
CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter evaluates potential environmental impacts that could occur from implementing each of the resource management plan (RMP) alternatives described in Chapter 2 for the BLM Little Snake Resource Management Plan Planning Area (RMPPA). Potential impacts considered in this chapter include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, and health (40 Code of Federal Regulations [CFR] §1508.8) impacts. The baseline used for determining the potential impacts is the current resource condition described in Chapter 3. This chapter is organized by resource topic and discusses potential impacts from implementing actions under the four alternatives. Discussions of cumulative impacts, irreversible and irretrievable commitment of resources, unavoidable adverse impacts, and the relationship between local short-term uses and long-term productivity conclude the chapter.

4.1 APPROACH TO THE ANALYSIS

Many management actions proposed in Chapter 2 are planning-level decisions and do not result in direct, on-the-ground changes; however, the analysis focuses on 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 20-year planning horizon. Impacts for some resources or resource uses could be confined to the BLM-administered surface estate (such as recreation and OHV use), whereas others could apply to all BLM-administered federal mineral estate (such as energy and minerals and requirements to protect resources such as Special Status Species and cultural resources from such activity). 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 might affect only certain resources and alternatives. This impact analysis identifies both enhancing and improving effects to a resource from a management action, as well as those that have the potential to deteriorate a resource; however, the evaluations are confined to the actions that have direct, immediate, and more prominent 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.

BLM manages public lands for multiple uses in accordance with the Federal Land Policy and Management Act (FLPMA). Land use decisions are made to protect the resources while allowing for different uses of those resources, such as energy and mineral development, OHV use, recreation, and livestock grazing. When there are conflicts among resource uses or when a land use activity could result in unacceptable or irreversible impacts to the environment, BLM may restrict or prohibit some land uses in specific areas. To ensure that BLM meets its mandate of multiple use in land management actions, the impacts of the alternatives on resource users are identified and assessed as part of the planning process. The projected impacts on land use activities and the associated environmental impacts of land uses are characterized and evaluated for each of the alternatives.

Impact analysis is a cause-and-effect process. The detailed impact analyses and conclusions are based on the planning team's knowledge of resources and the project area; reviews of existing literature; and information provided by experts in BLM, other agencies, interest groups, and

concerned citizens. Impacts on resources and resource uses are analyzed and discussed in detail commensurate with resources issues and concerns identified throughout the process. Geographic information system (GIS) analyses and data from field investigations were used to quantify effects where possible; however, in the absence of quantitative data, best professional judgment was used. Acreage calculations and other numbers used in this analysis are approximate projections for comparison and analytic purposes only. They do not reflect exact measures of on-the-ground situations. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.1.1 Impact Analysis Terminology

The following impact analysis focuses on identifying types of impacts and estimating their potential significance. This chapter uses the terms “impacts” and “effects” interchangeably, and the terms “increase” and “decrease” are used for comparison purposes. Table 4-1 lists other terms used to describe impacts. Direct and indirect impacts are discussed in Sections 4.3, 4.4, and 4.5. Cumulative impacts and methodology used in the cumulative analysis are discussed in Section 4.6.

Table 4-1. Types of Impacts

Type	Description
Direct Impacts	Effects that are caused by the action and occur at the same time and place. Examples include elimination of original land use through erection of a structure. Direct impacts could cause indirect impacts, such as ground disturbance resulting in resuspension of dust.
Indirect Impacts	Effects that are caused by the action but occur later in time or are farther removed in distance, but are still reasonably foreseeable and related to the action by a chain of cause-and-effect. Indirect impacts could extend beyond the natural and physical environment (e.g., environmental impact) to include growth-inducing effects and other effects related to induced changes to resource users (e.g., social impact).
Cumulative Impacts	Effects that result from the incremental impact of the action when it is added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts could result from individually minor, but collectively significant, actions that take place over time.

This analysis considers the context, intensity, and duration of an impact. Context relates to environmental circumstances at the location of the impact and in the immediate vicinity, affected interests, and the locality. Intensity refers to the severity or extent of the impact or magnitude of change from existing conditions. Duration refers to the permanence and longevity of the impacts, and is depicted as short-term or long-term. Short term is defined as anticipated to begin and end within the first 5 years after the action is implemented. Long term is defined as lasting beyond 5 years to the end of or beyond the 20-year planning time frame addressed in the RMP.

For ease of reading, impacts presented are direct, broad (occurring within the larger RMPPA area), and long-term, unless otherwise noted as indirect, localized, or short-term/temporary. Potential significant impacts are called out as they arise. As impacts could be perceived as beneficial (positive) or adverse (negative) by different readers, these descriptors were not used to define impacts.

Determining Significance

Determining significance can be complex, particularly at an RMP level. The significance of a resource or impact is dynamic and could change during the planning period. Significance can be real and supportable by fact, or perceived, and perhaps not fully supportable even with rigorous study. For this analysis, the approach to establish significance criteria was based on legal issues, public perception, and professional judgment. The significance criteria used in this analysis are intended to provide thresholds for comparison of the impacts of the planning alternatives, but are not necessarily thresholds that would trigger the need to prepare an environmental impact statement (EIS) for site-specific actions as required by Section 102 (C) of the National Environmental Policy Act of 1969 (NEPA). The significance of impacts associated with implementation-level decisions will be made based on more site-specific analysis and further consideration of the context and intensity of impacts as explained in the Council on Environmental Quality's (CEQ) significance criteria found in 40 CFR 1508.27. Specific significance criteria are presented under each resource topic.

Assumptions

Assumptions are made in the analysis concerning level of land use activity, resource condition, and resource response. Potential impacts and their significance are determined based on these assumptions. The following assumptions were used in the analysis. Additional assumptions are presented under each resource topic.

- ❑ Management actions proposed in the alternatives apply to public lands only; however, cumulative impacts analyses must consider potential actions by individuals or entities other than BLM related to the BLM-administered lands and federal minerals.
- ❑ The alternatives would be implemented in accordance with laws, regulations, and standard management guidelines.
- ❑ BLM policies, including *Standards for Public Land Health and Guidelines for Livestock Grazing Management*, would be applied, as appropriate, across all alternatives. These standards and guidelines would assess rangeland health and provide strategies to achieve resource conditions and management objectives. Under Alternative C, the Colorado Standards for Public Land Health (Standards and Guides) would act as the system-level outcomes for the Adaptive Management (AM) process, and the resource objectives listed for each resource in the RMP will be considered when assessing whether the Standards and Guides are being achieved.
- ❑ Funding would be available to implement the alternatives as described in Chapter 2.
- ❑ Restrictions or prohibitions on activities in specific areas would protect sensitive resources.
- ❑ Mitigation requirements would prevent or limit direct impacts associated with land use activities or would reclaim the land after the activity has been completed.
- ❑ Projections of the level of activity for land use would increase 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.
- ❑ Impacts of land use activities would occur regardless of location of the land use, and impacts would depend on the location of the activity and potentially affected resources.

4.2 AVAILABILITY OF DATA AND INCOMPLETE INFORMATION

CEQ regulations implementing NEPA require agencies evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS to identify incomplete or unavailable information if that information is essential to a reasoned choice among alternatives (43 CFR 1502.22).

As is typical in programmatic planning efforts, site-specific data is used to the extent possible and might not be entirely available. The best available information pertinent to management actions was used in developing this EIS. Considerable effort has been taken to acquire and convert resource data into digital format for use in the plan—both from BLM sources and from outside sources, such as the Natural Heritage Program; however, certain information was unavailable for use in developing this plan, usually because inventories have not been conducted or are incomplete. The following are some of the major types of unavailable data for the entire RMPPA:

- ❑ Field inventory of soils and water conditions
- ❑ Field inventory of vegetation composition and condition and extent of noxious weeds
- ❑ Field inventory of wildlife and Special Status Species occurrence and condition
- ❑ Native American traditional use areas
- ❑ Surveys for cultural or paleontological resources
- ❑ Visitor use trends
- ❑ Visual resource inventory
- ❑ Inventory of off-highway vehicle (OHV) routes.

For these resources, estimates were made concerning the number, type, and significance of these resources based on previous surveys and existing knowledge. In addition, some impacts cannot be quantified given the proposed management actions. Where this gap occurs, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent project-level analysis will provide the opportunity to collect and examine site-specific inventory data required to determine appropriate application of RMP-level guidance. In addition, ongoing inventory efforts by BLM and other agencies in the planning area continue to update and refine information used to implement this plan.

4.3 IMPACTS ON RESOURCES

4.3.1 Impacts on Air Quality

This section discusses the impacts of other management action on air quality. Existing conditions concerning air quality are described in Chapter 3. A qualitative emission comparison approach was selected for the Little Snake Field Office RMP air quality analysis. A more detailed justification and list of methodology used in this impact assessment can be found in Appendix I, Air Quality Technical Support Document.

The use of significance criteria in a qualitative analysis is limited, and only general statements can be made about National Ambient Air Quality Standards (NAAQS), Colorado Ambient Air Quality Standards (CAAQS), and federal guidelines for visibility impairment and/or atmospheric

deposition; however, when specific activities are proposed at the implementation stage, a more quantitative analysis would be required. For any future project, significance criteria for potential air quality impacts will include local, State, tribal, and federally enforced legal requirements to ensure that site-specific activities do not generate emissions that contribute to an exceedance of the NAAQS, Prevention of Significant Deterioration (PSD) increments, or other regulatory standards.

Methods of Analysis

Emissions calculations were based on the best available engineering data and assumptions; air, visibility, and emission inventory procedures; and professional and scientific judgment; however, assumptions were used when specific data or procedures were unavailable. Limitations are associated with a qualitative approach; however, given the uncertainties with the number, nature, and specific location of future sources and activities, this emission comparison approach is defensible and provides a sound basis for comparing alternatives.

Maximum potential particulate matter (PM) emissions from traffic on unpaved roads and well pad construction were used to estimate emissions for PM_{2.5} (particulate matter less than 2.5 microns in diameter) and PM₁₀ (particulate matter less than 10 microns in diameter) impacts. Maximum air pollutant emissions from each oil and gas well would be temporary (i.e., occurring during a 12-day construction period) and would occur in isolation, without significantly interacting with adjacent well locations. Particulate matter emissions from well pad and resource road construction would be minimized by application of water and/or chemical dust suppressants. The control efficiency of these dust suppressants was computed at 50 percent during construction. During well completion testing, natural gas could be burned (flared) up to 24 hours.

The emissions inventory was developed for the RMPPA using best available information concerning activities on BLM land provided by the Little Snake Field Office (LSFO) and is summarized in Appendix I, Air Quality Technical Support Document. The calculations used emissions factors accepted and recognized by State and federal regulatory agencies. This analysis selected two different time frames for evaluating future emissions. The time frames reflect the current base year conditions and the long-term impacts. It is assumed that all, if any, emission growth would be constant and linear in time. The inventory time frames are current emissions (using the year 2006 as a basis) and 20-year potential emissions for the long term (2026).

The analysis is based on the following assumptions:

- ❑ Emission factors recommended by the U.S. Environmental Protection Agency (EPA) (EPA 1995) are appropriate for all activities.
- ❑ Activity factors (or the quantification of activity for each resource provided by the LSFO) are appropriate for the base year and future time frames.
- ❑ Any anticipated recreational growth would follow growth trends for Colorado during the past 10 years.

- For the qualitative analysis, only emissions from BLM-administered activities are included. (For the cumulative analysis, emissions calculated from the Roan Plateau RMP/EIS are included for other federal and nonfederal actions throughout the State.)
- Calculations include criteria pollutants and hazardous air pollutants (HAP).
- Prescribed and wildland fire emissions are estimated by the Simple Approach Smoke Estimation Model (SASEM) (Sestak and Riebau 1988).

Emissions were calculated for the following activities: coalbed methane (CBM) development, conventional natural gas development, lands and realty actions, livestock grazing, OHV use, resource roads, saleable mineral development, and vegetation management (including prescribed fire). Activities related to cultural resources, paleontology, recreation, transportation and access, noxious weed control, wild horses, and wildlife and fish are assumed to be minor sources of air emissions. Information provided by the LSFO was used to estimate emissions from BLM activities.

The State of Colorado has the regulatory authority to require best available control technology. Impacts on visibility and atmospheric deposition could be mitigated by reducing emission of fine PM, nitrogen oxides, and volatile organic compounds (VOC).

Impacts Common to All Alternatives

Upward trends in activity in the LSFO area create a potential for long-term additional increases in emissions from all other resource management programs. Impacts on air quality from management actions associated with other programs are further discussed in this section.

Wildland and prescribed fires would cause short-term emissions of PM and carbon monoxide (CO) that could be spread over large portions of the LSFO area depending on the size of the fire and on wind conditions. In addition, particulate emissions, CO, oxides of nitrogen (NO_x), and hydrocarbons (which include HAPs) would result from the use of heavy equipment during fire suppression activities. Emissions would be generated from internal combustion engines from vehicular exhausts (referred to as tailpipe emissions) and directly from engines (e.g., chainsaws). The use of heavy equipment on unpaved and paved roads would cause emissions of PM, CO, NO_x, and hydrocarbons. Burning logging slash would cause short-term emissions of PM and CO. The use of tractors in the harvesting of trees produces some of the same emissions, but to a lesser degree.

Air emissions would be produced during all phases of oil and gas development, including exploration, well development, production, and well abandonment and road closures. During exploration and development, traffic on unpaved and paved roads would cause emissions of PM, CO, NO_x, SO₂, and hydrocarbons. During well development and completion, well flaring and associated emissions would cause PM, CO, NO_x, sulfur dioxide (SO₂), and hydrocarbon emissions (which include HAPs). In addition, during well development, drilling activities and construction activities would cause particulate emissions and gaseous emissions because of heavy equipment use. Air emissions are probable during oil and gas production. Emissions of NO_x and CO from compression activities (burning of natural gas) would occur for gas-burning compressors. PM, CO, NO_x, and hydrocarbon emissions (VOCs) would be produced from any glycol operations and flashing. Any flaring would cause PM, CO, NO_x, SO₂, and hydrocarbon

emissions (which include HAPs). During well abandonment and road closure, PM would result from travel on unpaved roads and demolition activities. Table 4-2 and Table 4-3 summarize total and specific pollutant emissions for all the alternatives. Appendix I, Air Quality Technical Support Document, contains the calculation details.

Air emissions would be produced during mining operations and reclamation activities. During mining activities, PM emissions would be produced from overburden removal, blasting, truck loading, bulldozing, grading, storage piles, railroad loading, and transport of heavy equipment over unpaved roads. Gaseous emissions from tailpipes (CO, NO_x, SO₂, and hydrocarbon) would occur from heavy equipment, trains, and vehicular travel.

The maintenance of unpaved roads and shoulders of paved resource roads would cause PM emissions and tailpipe emissions. Of particular concern are the emissions of PM from road graders. Recreational OHV use would also cause fugitive dust emissions of PM from traffic on unpaved trails and emissions of PM, CO, NO_x, and hydrocarbons directly from the tailpipe. In the winter, tailpipe emissions occur primarily from snowmobiles.

Trucks and heavy equipment (e.g., chain saws, fire engines, bulldozers) used in vegetation management and manipulation would cause dust from unpaved roads. In addition, prescribed fires used for vegetation treatment would cause particulate and gaseous emissions. Trucks and equipment used to conduct and control prescribed fire would cause tailpipe emissions. Areas receiving vegetation treatment would add short-term increases in PM until the vegetation recovers sufficiently to stabilize exposed soil.

The various construction activities authorized under Lands and Realty for rights-of-way (ROW) (e.g., communication sites, transmission lines, pipelines projects) produce emissions of PM. Soil disturbing activities (e.g., grading, bulldozing, trench digging, and travel on unpaved roads) are the main causes of the emissions. Tailpipe emissions from vehicular travel and emissions from equipment use would occur.

Livestock grazing and support of grazing activities, which include trucking of livestock into and out of the LSFO area, and checking livestock range improvements and fences generate tailpipe emissions and dust. These emissions are produced by construction activities and by travel on unpaved and paved roads.

Management actions for cultural resources, paleontology, wildlife and fish, and wild horses would have only minor or negligible impacts on air quality. Short-term, localized increases in fugitive dust emissions would occur during excavations for data recovery and travel to cultural and paleontological resource sites. Construction activity to manage wildlife and fish habitat would contribute to air emissions of PM. To a lesser degree, CO, NO_x, SO₂, and hydrocarbons would be generated from tailpipes. These impacts would be short-term. Trucks, heavy equipment, and helicopters used to gather wild horses would cause a short-term increase in tailpipe and fugitive dust emissions. No impacts to air quality would be anticipated from special management areas and social and economic conditions management actions.

4.3.1.1 Alternative A

Emissions under Alternative A would be anticipated to increase from 16,387 tons per year of pollutants estimated for the base year (2006) to 43,184 tons per year by the 20-year horizon (2026) (see Table 4-2 and Table 4-3). Given the low ambient concentrations that exist in the Little Snake RMPPA for some of the pollutants, it would be anticipated that the increase in emissions for Alternative A of CO, NO_x, SO₂, PM₁₀, and PM_{2.5} would not cause any exceedance of State or federal ambient air quality standards. Potential impacts to the air quality values of visibility, atmospheric deposition, or ozone would be made at the project-specific level.

4.3.1.2 Alternative B

Emissions under Alternative B would be anticipated to increase from 16,387 tons per year of pollutants estimated for the base year (2006) to 43,272 tons per year by the 20-year horizon (2026) (see Table 4-2 and Table 4-3). This increase would be slightly higher than, but similar to, Alternative A. Given the low ambient concentrations that exist in the Little Snake RMPPA for some of the pollutants, it would be expected that the increase in emissions for Alternative B of CO, NO_x, SO₂, PM₁₀, and PM_{2.5} would not cause any exceedance of State or federal ambient air quality standards. Potential impacts to the air quality values of visibility, atmospheric deposition, or ozone would be made at the project-specific level.

4.3.1.3 Alternative C

Emissions under Alternative C would be anticipated to increase from 16,387 tons per year of pollutants estimated for the base year (2006) to 43,105 tons per year by the 20-year horizon (2026), which is roughly equivalent to Alternatives A and B (see Table 4-2 and Table 4-3). Given the low ambient concentrations that exist in the Little Snake RMPPA for some of the pollutants, it would be expected that the increase in emissions for Alternative C of CO, NO_x, SO₂, PM₁₀, and PM_{2.5} would not cause any exceedance of State or federal ambient air quality standards. Potential impacts to the air quality values of visibility, atmospheric deposition, or ozone would be made at the project-specific level.

4.3.1.4 Alternative D

Emissions under Alternative D would be anticipated to increase from 16,387 tons per year of pollutants estimated for the base year (2006) to 35,468 tons per year by the 20-year horizon (2026) (see Table 4-2 and Table 4-3). This alternative would result in lower emissions than anticipated for Alternatives A, B, and C. Given the low ambient concentrations that exist in the Little Snake RMPPA for some of the pollutants, it would be expected that the increase in emissions for Alternative D of CO, NO_x, SO₂, PM₁₀, and PM_{2.5} would not cause any exceedance of State or federal ambient air quality standards. Potential impacts to the air quality values of visibility, atmospheric deposition, or ozone would be made at the project-specific level.

Table 4-2. Total Emissions for Alternatives (tons per year)

Alternative	2006	2026
Alternative A	16,387	43,184
Alternative B	16,387	43,272
Alternative C	16,387	43,105
Alternative D	16,387	35,468

Note: Totals are all pollutants minus PM_{2.5} and HAPS, because PM_{2.5} is a subset of PM₁₀ and HAPS are a subset of VOCs.

Table 4-3. Increase in Annual Air Emissions from 2006 Conditions on BLM-Administered Lands in the Little Snake Field Office Area

Time Frame	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs
ALTERNATIVE A							
2006	1,006	669	3,467	58	6,410	5,445	545
2026	1,961	1,498	8,643	80	15,998	16,501	1,650
Percent increase in emissions from base year	95	124	149	37	150	203	203
ALTERNATIVE B							
2006	1,006	669	3,467	58	6,410	5,445	545
2026	2,049	1,568	8,643	80	15,998	16,501	1,650
Percent increase in emissions from base year	104	134	149	37	150	203	203
Percent increase in emissions from No Action	4	5	0	0	0	0	0
ALTERNATIVE C							
2006	1,006	669	3,467	58	6,410	5,445	545
2026	1,977	1,511	8,643	80	15,930	16,476	1,648
Percent increase in emissions from base year	96	126	149	37	149	203	202
Percent increase in emissions from No Action	1	1	0	0	0	0	0
ALTERNATIVE D							
2006	1,006	669	3,467	58	6,410	5,445	545
2026	1,747	1,356	7,122	69	13,088	13,443	1,345
Percent increase in emissions from base year	74	103	105	18	104	147	147
Percent increase in emissions from No Action	-11	-9	-18	-14	-18	-19	-19

4.3.2 Impacts on Soil Resources

This section discusses impacts on soils from management actions of other resources and resource uses. Soils, especially in fragile soil areas, are susceptible to impacts from surface disturbance and compaction, which can lead to accelerated erosion, soil loss, and reduced productivity. Management actions involving ground disturbing activities, reducing vegetation cover, trampling, and using vehicles and heavy machinery contribute to soil impacts.

The following criterion was used to determine whether an impact would be significant:

- ❑ Increased erosion of soils to the point that associated vegetation communities were no longer supported at their current or desired community composition.

The analysis was based on the following assumptions:

- ❑ Soil resources would be managed to meet Standard 1 of the *Colorado Standards for Public Land Health*.
- ❑ Fragile soils would be managed to minimize erosion and maintain soil productivity.

The analysis organizes impacts into these groupings to combine similar impacts. The greatest anticipated impacts on soil resources would occur from surface disturbance associated with transportation and access and travel management, vegetation, fire, minerals, livestock, wildlife, grazing/wild horses, and recreation management actions. Soils management actions and actions that prohibit surface disturbing actions such as those associated with special management areas (e.g., areas of critical environmental concern [ACEC], special recreation management areas [SRMA], wild and scenic rivers [WSR]), fish and wildlife, and Special Status Species habitat improvements would maintain or improve soil conditions.

Wildland fire (prescribed fire and wildfire) impacts soil resources primarily by consuming litter, organic material, dead and down woody fuels, and vegetative cover. Because organic matter contributes to surface soil structure and porosity, burning of organic matter could result in soil structure degradation. Surface runoff and water and wind erosion would increase after fire as a result of these physical changes. Fires that consume large quantities of surface organic matter could reduce the productivity of soils by reducing moisture-holding capacity. Fire also alters soil chemistry by volatilizing organic matter and by changing the form, distribution, and quantity of nutrients. Burning surface organic matter could also cause the loss of some nutrients (primarily carbon, nitrogen, and sulfur) through volatilization. In some instances, however, fire treatments could potentially have beneficial impacts on soil (National Wildfire Coordinating Group 2001). Fire raises the pH of the soil, especially in soils that are naturally acidic. Because nutrient availability is related to soil acidity, elements critical for plant growth, such as phosphorus and nitrogen, become more available to plants as the soil pH increases. Fire also helps to release nutrients that might be bundled in forms that are unavailable to plants, such as woody material. The burning of surface organic matter releases some nutrients onto the soil. In some cases, prescribed burning may reduce long-term erosion by releasing existing understory plants and establishing new plants on sites that might have had little vegetative cover before burning.

Fire would kill some soil organisms on the site, including microorganisms, microarthropods, biological soil crusts, and plant roots. The effects of fire on soil microorganisms would depend

on fire severity (Neary et al. 1999). Effects could range from no detectable effect in the case of infrequent, low-severity fires to total sterilization in very severe fires. Fire severity would determine the degree of effects to soil, with more severe fires causing more extensive and long-term soil changes. Low to moderate severity fires would have fewer adverse effects on soils and in some cases might even improve soil nutrient availability. Recovery of soil quality after a treatment would depend on the burning intensity and its effects on soil processes (Neary et al. 1999).

Ground equipment associated with fire treatments or suppression of wildfires, such as equipment used to create fire lines, could disturb soils, increasing risk of erosion. These impacts would be localized in their extent. Although wildland fire treatments would have short-term effects on soil condition and productivity, surface disturbance impacts resulting from restoration activities would mitigate fire impacts and erosion. In addition, monitoring and evaluation, integrated with an adaptive management approach, would result in adjustments of fire treatments to reduce soil disturbance to levels similar to natural rates.

Cross-country OHV use disturbs and reduces surface cover (i.e., soil-stabilizing vegetation, organic litter, rocks, and soil crusts), displaces soil particles, and increases soil compaction. These impacts could create new waterflow paths and channels, as well as reduced water infiltration. As infiltration would be reduced, new flow paths could form overland waterflow that increases the amount of sediment eroded by water. Decreases in vegetation through crushing and soil compaction and through the loss of soil crusts (biologic and mechanical) reduce the stabilizing characteristics of soil. Under these conditions, wind can entrain soil particles, thereby, increasing wind erosion.

Impacts from management actions related to special recreation permits and required compliance with performance objectives do not vary by alternative. Authorizing commercial use special recreation permits (SRP) that protect resources would ensure that impacts on vegetation and soils were considered and minimized and that subsequent erosion by wind and water would not increase above natural rates as a result of commercial recreation use. In addition, soils management actions would ensure that applicants with permits for surface disturbing activities would comply with soils performance objectives, maintaining soils and soil productivity. These requirements ensure that mitigation and project design consider impacts on soils and implement mitigation to reduce impacts.

Under all alternatives, impacts on soils would not be anticipated as a result of implementing management actions for the following resources and resource uses: air quality, cultural and heritage resources, paleontological resources, and social and economic values.

4.3.2.1 Alternative A

Allowing cross-country OHV use on 991,920 acres (Table 4-4), especially if use were concentrated in specific areas, could result in significant increases in erosion, limiting the ability of soils to support desired vegetation communities.

Table 4-4. General and Fragile Soils Acres of OHV Designation Under Alternative A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Alternative A	991,920	286,860	72,480
Percent of RMPPA	74	21	5
Acres in fragile soils	0	38,530	0
Percent of fragile soils in RMPPA	0	100	0

Vegetation management actions, including vegetation treatments for ecological purposes, rangeland treatments for livestock, or noxious weed treatments, would expose soil when vegetation cover would be reduced and degrade root structures that hold soils in place. Mechanical or manual vegetation treatments could result in soil disturbance and compaction at the treatment site. Short-term soil exposure and compaction reduce water infiltration rates, increasing erosion at a rate greater than natural rates from both water and wind. Restrictions on surface disturbance in fragile soil areas would help protect fragile soil resources by adhering to performance objectives. Long-term impacts from vegetation management would improve vegetation health, specifically by converting overmature monoculture vegetation communities to increase structural diversity. Improved vegetation cover would maintain soil resources in place, protecting against water or wind erosion. Similar to vegetation treatments, managing areas for timber harvest (6,330 acres) and woodland products (37,600 acres) would result in short-term increases in erosion and soil loss; however, long-term impacts would maintain soil resources, specifically in areas of woodland product harvest, allowing shrublands and grasslands to be restored.

Soil management actions require that when surface disturbing activities are permitted, measures to reduce soil erosion are applied. Soils management actions that allow surface disturbance or permit surface occupancy in areas with fragile soils, when adherence to soils performance objectives can be met, ensures that highly erodible soils would be maintained to the extent possible, and that erosion rates would not exceed natural rates. Adherence to these objectives would reduce erosion of fragile soils from surface disturbances by controlling erosion and minimizing overland flow off disturbed areas.

Planned or permitted actions (e.g., oil and gas development, mineral material development, locatable mineral location, coal development, OHV use on existing or designated routes, ROW development/construction), although diverse and from several resource uses, result in similar impacts on soils. There are usually two impacts associated with the implementation or use of these actions: removal of vegetation and top soil and subsequent hardening or reclamation of the exposed soil surface. As with vegetation treatments, decreases in vegetation cover reduce soil protection from rain, surface runoff, and wind erosion. The longer soils are exposed without being hardened or reclaimed, the greater the potential for increases in erosion. Several permitted activities (e.g., buried pipeline construction, overhead powerline construction) result in short-term removal or disturbance of vegetation and soil but implement reclamation to stabilize soil and reduce or eliminate long-term soil erosion. In these cases, there would be no long-term loss

of soil or soil productivity. Other projects/activities require the soil to be exposed for extended periods of time. To avoid increased erosion, gulying soils associated with these projects are compacted to harden the surface and reduce erosion. The areas that have been hardened (e.g., roads, routes, trails, well pads, communication sites) have compacted soils with very low infiltration rates, which can lead to high rates of sheet erosion from water running over these compacted surfaces. As water leaves the compacted areas and encounters uncompacted soils, gulying can occur, creating channels and resulting in extensive erosion. Project design and proper construction can ensure that water drainage from the hardened surfaces would not result in significant impacts.

OHV use would be limited to designated or existing routes on 286,860 acres throughout the RMPPA and on all 38,530 acres identified as fragile soil areas (see Table 4-4); OHV use in areas limited to existing roads and trails could lead to route proliferation because new user-created routes would be perceived as existing routes by other users. Enforcement in areas designated as limited to existing roads and trails can be problematic because it is legal for users to travel these new routes. Route proliferation could result in increased soil erosion owing to impacts similar to those noted from cross-country OHV use in the introduction. OHV use on designated or existing established routes would indirectly protect soils from increased erosion by focusing impacts on hardened surfaces that have already been affected. Soils on 72,480 acres of special management areas that would be closed to OHV use would not be affected.

Energy and minerals development could result in site-specific impacts on soil resources through removal of vegetation and topsoil during development activities (e.g., digging, leveling, and scraping), as well as surface disturbance while constructing ancillary features (e.g., roads or pipelines) or during exploration. In addition, revegetating disturbed areas not needed for lease operations as soon as possible could reduce the long-term disturbance related to oil and gas exploration and development. Although 549,800 acres (see Table 4-5) of RMPPA mineral estate would be open to oil and gas leasing with standard stipulations, the reasonably foreseeable development scenario projects that 49,216 acres (2.5 percent of RMPPA mineral estate) would be disturbed during oil and gas exploration and development. Impacts on soils would occur on or directly adjacent to these acres. No acres with fragile soils would be open with standard stipulations (see Table 4-5). Adherence to soils performance standards, best management practices outlined in mining laws, regulations and policies, plans of operation, and pertinent restrictions, standard terms and conditions would reduce impacts on soils in areas that are leased. Following initial disturbance, 26,190 acres would be reclaimed, resulting in long-term impacts on soils on 23,030 acres. These areas would be mostly hardened roads, well pads, and other features associated with mineral development. Reclamation activities would reduce short-term soil loss and eliminate long-term soil losses.

Table 4-5. General and Fragile Soils Acres of Oil and Gas Leasing Category Designation Under Alternative A

	Open w/ Standard Stipulations	Open—CSU	Open—NSO	Closed to Leasing
Acres in Alternative A	549,800	116,210	192,190	78,190
Percent of RMPPA	29	6	10	4
Acres in fragile soils	0	22,170	14,290	0

	Open w/ Standard Stipulations	Open—CSU	Open—NSO	Closed to Leasing
Percent of fragile soils in RMPPA mineral estate	0	40	25	0
CSU = controlled surface use. NSO = no surface occupancy.				

Restrictions to protect other resources or uses often reduce the areas in which the impacts mentioned above could occur. Managing 270,380 acres as closed to leasing or open to leasing with no surface occupancy (NSO) stipulations would eliminate the impacts noted above associated with oil and gas development. Soils in areas that would be closed to mineral materials (7 percent of RMPPA or 97,790 acres), withdrawn from mineral entry (6 percent of RMPPA or 79,190 acres), or contain NSO stipulations for coal leasing (1 percent of RMPPA or 13,920 acres) would be protected from the impacts from mineral development noted above. The impacts would not occur on 108,470 acres (8 percent of RMPPA) in which ROWs would be prohibited. In addition, these impacts would not be likely on 535,390 acres (40 percent of RMPPA) in which ROW placement would be discouraged.

Impacts on soils from dispersed actions that affect vegetation are associated with impacts from grazing (livestock, wild horses, and wildlife) and associated features that support grazing. Site-specific impacts of ungulate grazing could include reducing percent cover of soil surface crusts through trampling and generally decreasing vegetative ground cover, increasing potential for surface runoff and erosion and reducing infiltration rates. These impacts would be concentrated in site-specific areas of ungulate congregation and not in areas of more dispersed use. Adjusting grazing practices to meet Standards and Guides would reduce the level of impacts, resulting in beneficial impacts in areas in which upland soils would exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform. In addition, livestock grazing could also increase organic litter and assist in seed dispersal, improving soil nutrient levels and pore space. Statewide standards and guidelines would be achieved through close cooperation with other rangeland uses, such as wildlife (in cooperation with the Colorado Division of Wildlife [CDOW]) and wild horses, ensuring that vegetation cover and associated soil condition would be maintained at levels that are appropriate to soil type, climate, and landform; however, disturbance of wild horses by OHV use would cause the horses to alter their traditional use areas, forcing them into smaller areas within the herd management area (HMA). This could cause overuse in some areas of the HMA, resulting in increases in vegetation loss and associated wind and water erosion.

Surface disturbances from the construction of range improvements would remove vegetation and increase erosion by wind and water in localized areas; however, range improvements would also improve livestock distribution, reducing the magnitude of localized vegetation removal and subsequent soil erosion as a result of livestock congregation.

Areas in which public recreation use would be concentrated, such as campgrounds, trails, and trailheads, and areas near visitor facilities, would experience soil compaction and erosion and a loss or reduction of vegetation cover, which would lead to increased overland flow and associated water erosion. These areas would experience the greatest amount of soil compaction and loss or reduction of vegetation cover, as well as destruction of biological crusts. Decreasing

recreation management (i.e., SRMAs or designated facilities) in areas already receiving large amounts of recreation use or large soil impacts could result in increased impacts. Recreation user distribution would occur haphazardly rather than in areas in which soil surfaces have been hardened to reduce long-term impacts. Managing for increasing numbers of recreation visitors in the Little Yampa/Juniper Canyon SRMA would have long-term impacts on soils. High use of areas with riverside access could result in stream banks becoming increasingly trampled, decreasing vegetation and increasing erosion. Proper management and public education would reduce impacts on soil erosion.

4.3.2.2 Alternative B

Impacts from cross-country OHV use would be similar to those noted in Alternative A, but the magnitude of impacts would be greater owing to more acres open to cross-country OHV (Table 4-6). Impacts from cross-country OHV use could occur on 87 percent of the RMPPA, an 18 percent increase compared with Alternative A. This could result in localized significant impacts on areas of concentrated cross-country OHV use in which soils lose the ability to support desired vegetation communities.

Table 4-6. General and Fragile Soils Acres of OHV Designation Comparison Between Alternatives B and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Alternative B	1,172,950	131,930	46,370
Percent of RMPPA	87	10	3
Acres different from Alternative A	+181,030	-154,930	-26,110
Percent change from Alternative A	18% increase	54% decrease	36% decrease
Acres in fragile soils	0	38,530	0
Percent of fragile soils in RMPPA	0	100	0
Acres in fragile soils different from Alternative A	0	0	0
Percent change of fragile soils from Alternative A	No change	No change	No change

Impacts from vegetation management actions, including vegetation treatments for ecological purposes, rangeland treatments for livestock, noxious weed treatments, or forest and woodland product harvest would be similar to those noted in Alternative A. In addition, managing upland and riparian vegetation to achieve desired plant community (DPC) objectives would improve vegetation health, thereby, decreasing the potential for erosion compared with Alternative A.

Impacts from fire management actions would be the same as for Alternative A, except that application of minimal to no fire suppression in areas in which fire would be desired could increase the acres in which the noted impacts could occur. Compared with Alternative A, this

would include short-term increases in erosion and loss of organic matter and plant cover, but also long-term increases in beneficial impacts as a result of vegetation functioning in its natural disturbance regime.

Compared with Alternative A, removing protections in fragile soils areas could allow surface disturbance or permit surface occupancy with minimal mitigation in areas with fragile soils. This management action would result in a high potential for erosion rates to accelerate above what is natural in these areas, resulting in gulying and lack of soil productivity. The resulting increases in soil erosion and decreases in ability to support existing or desired vegetation communities could become significant. However, although fragile soil stipulations would not be applicable, conditions of approval could be applied at the permitting level to protect the soil resource, mitigating the potential impacts.

Impacts from open OHV use would be the same as those noted in Alternative A, except there would be an increase of 181,030 acres (see Table 4-6) compared with Alternative A. Soils would not be affected on 46,370 acres in the Cross Mountain and Diamond Breaks Wilderness Study Areas (WSA) that would be closed to OHV use, which would be a 36 percent decrease compared with Alternative A. The remaining 131,930 acres would be limited to designated or existing routes. Impacts on soils in these areas would be the same as impacts from OHV use on routes noted in Alternative A.

Impacts from planned or permitted actions would be similar to those noted in Alternative A, except the acreage that would be affected would increase. The magnitude of impacts from oil and gas development could be greater than in Alternative A because of more acres open to oil and gas leasing with minor stipulations, especially areas with fragile soils. Oil and gas leasing would be open with standard stipulations on over 959,290 acres more than Alternative A, including 21,690 acres in fragile soil areas (39 percent of the fragile soils in the RMPPA mineral estate) (see Table 4-7). Although the reasonably foreseeable development scenario projects that 49,216 acres (2.5 percent of RMPPA mineral estate) would be disturbed during oil and gas exploration and development, more acres of fragile soils open to leasing increases the likelihood of development in these areas compared with Alternative A. Another difference in impacts from Alternative A would be that there would be no soils management actions that specifically protect fragile soils. Increasing acres of fragile soils open to leasing with standard stipulations could result in the disturbance, compaction, and associated erosion of fragile soils. As with Alternative A, long-term impacts on soils would occur on 23,030 acres; 26,190 acres would be reclaimed in the planning period. Requiring a plan for surface reclamation with every application for permit to drill (APD) or plans of development (POD) could reduce the long-term disturbance related to oil and gas exploration and development. Reclamation activities would reduce short-term soil loss and eliminate long-term soil losses.

Table 4-7. General and Fragile Soils Acres of Oil and Gas Leasing Category Designation Comparison Between Alternatives B and A

	Open w/ Standard Stipulations	Open—CSU	Open—NSO	Closed to Leasing
Acres in Alternative B	1,509,090	153,890	32,770	78,190
Percent of RMPPA	79	8	2	4
Acres different from Alternative A	+959,290	+37,680	-156,110	0
Percent change from Alternative A	174% increase	32% increase	83% decrease	No change
Acres in fragile soils	21,690	14,780	0	0
Percent of fragile soils in RMPPA mineral estate	39	26	0	0
Acres in fragile soils different from Alternative A	+21,690	-7,390	-14,290	0
Percent change of fragile soils from Alternative A	All acres are increased from Alt A	33% decrease	100% decrease	No change

Surface disturbances related to other mineral development and ROW development or construction would result in impacts similar to those noted in Alternative A, except the acres on which the impacts would not occur as a result of restrictions. These surface disturbances would result in increased disturbance of vegetation and soil and subsequent increases in erosion by wind and water above natural weathering and erosion rates.

Restrictions to protect other resources or uses often reduce the areas in which impacts could occur. Restrictions on surface disturbing activities would preclude surface disturbing activities on 89,240 acres (7 percent of RMPPA). In these areas, disturbance to vegetation and soils would not occur, and erosion would not be anticipated to exceed natural rates. Managing 110,960 acres (Table 4-7) as open to oil and gas leasing with NSO stipulations or closed to leasing would eliminate the impacts from oil and gas development noted above. Acres closed to leasing or open with NSO stipulations would decrease by 159,420 acres compared with Alternative A. No areas with fragile soils would be protected by NSO stipulations or closure to new leases, which could result in development and disturbance in these sensitive areas. These impacts would also apply to the West Cold Spring, Diamond Breaks, and Cross Mountain WSAs if released by Congress from wilderness consideration. Soils in areas that would be closed to mineral materials (7 percent of RMPPA, or 97,790 acres), withdrawn from mineral entry (11 percent of RMPPA, or 153,310 acres), or contain NSO stipulations for coal leasing (1 percent of RMPPA, or 13,920 acres) would be protected from impacts from mineral development. In addition, these impacts would not occur on 78,250 acres (6 percent of RMPPA) in which ROWs would be prohibited, which would be a decrease of 30,220 acres (28 percent) compared with Alternative A. These impacts would not likely occur on 555,440 acres (41 percent of RMPPA) in which ROW placement would not be encouraged.

Impacts on soils from dispersed actions that affect vegetation (livestock, wild horses, and wildlife grazing) would be the same as those noted in Alternative A.

The absence of increased recreation management (i.e., SRMA or designated facilities) in areas already receiving large amounts of recreation use or soil impacts could result in significant impacts. Distribution of recreation use would occur haphazardly, rather than in areas where soil surfaces have been hardened to reduce long-term impacts, which could result in vegetation loss and soil compaction over larger areas than with Alternative A. Areas in which public recreation use would be concentrated, such as campgrounds, trails, and trailheads, and areas near visitor facilities, would experience the most soil compaction and erosion and a loss or reduction of vegetation cover. That would lead to increased overland flow and associated water erosion. These areas would experience the greatest amount of soil compaction and loss or reduction of vegetation cover, as well as destruction of biological crusts.

4.3.2.3 Alternative C

The general magnitude of impacts from OHV use (see those noted in Alternative A) would be lower than Alternative A as a result of a 98 percent decrease in acres open to cross-country OHV use (Table 4-8). Impacts on soils in these areas could be significant, but would be limited to 2 percent of the RMPPA. Impacts from cross-country OHV use on areas with fragile soils would be the same as with Alternative A, but use would increase in other soil areas.

Table 4-8. General and Fragile Soils Acres of OHV Designation Comparison Between Alternatives C and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Alternative C	21,940	1,242,600	86,710
Percent of RMPPA	2	92	6
Acres different from Alternative A	-969,980	+955,745	+14,230
Percent change from Alternative A	98% decrease	333% increase	20% increase
Acres in fragile soils	0	36,250	2,280
Percent of fragile soils in RMPPA	0	94	6
Acres in fragile soils different from Alternative A	0	-2,280	+2,280
Percent change of fragile soils from Alternative A	0	6% decrease	All acres are increased from Alt A

Vegetation management actions, including vegetation treatments for ecological purposes, forest or woodland treatments, rangeland treatments for livestock, or noxious weed treatments would affect soils the same as noted in Alternative B; however, the acres on which these impacts would occur would be greater than for both Alternative A and Alternative B. That would increase the identified short-term impacts compared with Alternatives A and B, but it would also increase the long-term beneficial impacts related to improved vegetation condition. Impacts from fire management actions would be the same as for Alternative B.

Impacts on soils from soils management actions that require adherence to soils performance objectives for all permitted surface disturbing activities would be the same as for Alternative A. As also noted in Alternative A, soils management actions would require surface disturbing actions on fragile soils to meet performance objectives, which would reduce erosion of fragile soils from surface disturbances by controlling erosion and minimizing overland flow off disturbed areas.

There would be an 969,980-acre increase in areas in which OHV use would be limited to existing or designated routes compared with Alternative A (see Table 4-8). This increase would be associated with the decrease in the potential for significant impacts from cross-country OHV use compared with Alternative A. As a result of incomplete inventory data, some areas would be managed as limited to existing roads and trails until route designation can take place. This could lead to route proliferation as new user-created routes would be perceived as existing routes by other users. Enforcement in areas designated as limited to existing roads and trails can be problematic because it is legal for users to travel these new routes. Route proliferation could result in increased soil erosion owing to impacts similar to those noted from cross-country OHV use in the introduction. However, as a baseline of existing roads and trails is developed, BLM could identify and close or rehabilitate newly created routes. OHV use on designated or existing established routes would indirectly protect soils from increased erosion by focusing impacts on hardened surfaces that have already been affected. Impacts from OHV use on existing/designated routes (see those noted in Alternative A) would increase, but potentially significant impacts from managing most of the RMPPA as open to cross-country OHV use would decrease. Impacts to soils from OHV use would decrease because OHV use on the 92 percent of the RMPPA would be restricted to existing or designated routes. Approximately 20 percent more acres would not be affected by OHV use compared with Alternative A, because the Cross Mountain and Diamond Breaks WSAs and several other special designations and recreation areas, as well as water impoundments in the Sand Wash Basin HMA, would be closed to OHV use.

The magnitude of impacts from oil and gas development could decrease compared with Alternative A because of a 24 percent decrease in acres open to oil and gas leasing with standard stipulations (decrease of 132,010 acres) (see Table 4-9). In addition, 26 percent of fragile soils would be protected through NSO stipulations or closure to oil and gas leasing, which would be a 2 percent increase compared with Alternative A; however, the reasonably foreseeable development scenario for Alternative C does not vary from Alternative A, with 49,216 acres (2.5 percent of federal mineral estate) disturbed during oil and gas exploration and development. Also, as similar to Alternative A, long-term impacts on soils would occur on 23,030 acres because 26,190 acres would be reclaimed in the planning period. Impacts from requiring a plan for surface reclamation with every APD or POD would be the same as for Alternative B. In general, fewer acres of fragile soils could be affected by this development, compared with Alternative A.

Table 4-9. General and Fragile Soils Acres of Oil and Gas Leasing Category Designation Comparison Between Alternatives C and A

	Open w/ Standard Stipulations	Open—CSU	Open—NSO	Closed to Leasing
Acres in Alternative C	417,790	184,840	216,040	160,870
Percent of RMPPA	22	10	11	9
Acres different from Alternative A	-132,010	+68,630	+23,850	+82,680
Percent change from Alternative A	24% decrease	59% increase	12% increase	106% increase
Acres in fragile soils	0	21,900	12,210	2,350
Percent of fragile soils in RMPPA mineral estate	0	39	22	4
Acres in fragile soils different from Alternative A	0	-270	-2,080	+2,350
Percent change of fragile soils from Alternative A	0	1% decrease	15% decrease	All acres are increased from Alt A

Surface disturbances related to other mineral development would result in impacts similar to those noted in Alternative A, except the acres on which the impacts would not occur as a result of restrictions. These surface disturbances would result in increased disturbance of vegetation and soil and subsequent increases in erosion by wind and water above natural weathering and erosion rates. Impacts from development or construction within ROWs would be the same as for Alternatives A and B; however, the potential for new disturbances would decrease because of management actions that encourage the location of new ROWs in existing corridors. Encouraging ROWs in existing ROW corridors would reduce new disturbance and associated increases in erosion compared with Alternative A.

Restrictions to protect other resources or uses often reduce the areas in which the impacts described above could occur. Restrictions on surface disturbing activities would preclude surface disturbing activities on 273,100 acres (20 percent of RMPPA). This would be a 183,860-acre increase (206 percent increase) compared with Alternative B. In these areas, disturbance to vegetation and soils would not occur, and erosion would not be anticipated to exceed natural rates. Managing 100,020 more acres as open to oil and gas leasing with NSO stipulations or closed to leasing would eliminate the impacts from oil and gas development noted above on 37 percent more acres than for Alternative A (see Table 4-9). Soils in the WSAs (current WSAs and WSAs if released by Congress from wilderness consideration), suitable WSR corridors, and some special management areas and SRMAs would not be affected by oil and gas development because of closure to oil and gas leasing. Soils in areas that would be closed to mineral materials (12 percent of RMPPA, or 157,910 acres), closed to coal leasing (less than 1 percent of RMPPA, or 230 acres), or withdrawn from mineral entry (14 percent of RMPPA, or 194,400 acres) or that would contain NSO stipulations for coal leasing (1 percent of RMPPA or 13,870 acres) would be protected from impacts from mineral development. In addition, impacts noted above would not occur from ROW development/construction on 91,560 acres (7 percent of RMPPA) where ROWs would be prohibited. This would be a decrease of 16,910 acres (16 percent) compared

with Alternative A. Additionally, these impacts would not likely occur on 141,260 acres (11 percent of RMPPA) in which ROW placement would not be encouraged.

Impacts on soils from dispersed actions that affect vegetation (livestock, wild horses, and wildlife grazing) would be the same as those noted in Alternative A.

Areas in which public recreation use would be concentrated, such as campgrounds, trails, and trailheads, and areas near visitor facilities, would experience the most soil compaction and erosion, and a loss or reduction of vegetation cover, which would result in increased overland flow and associated water erosion. These areas would experience the greatest amount of soil compaction and loss or reduction of vegetation cover, as well as destruction of biological crusts. Managing continually increasing recreation visitors in the five designated SRMAs would have long-term, adverse impacts on soils and water; however, impacts would be less than with Alternative B, for which none of the SRMAs would be designated. Although designation and development would result in hardening some areas, increasing management presence would decrease campsite establishment or expansion and the associated impacts on soils of compaction and increased overland erosion. Proper management and public education would further reduce impacts to soil erosion. Restricting participant numbers (limited to 50) and activities for commercial events in backcountry SRMAs would reduce impacts from large-group events compared with Alternatives A and B.

4.3.2.4 Alternative D

The general magnitude of impacts from OHV use (similar to those noted in Alternative A, except magnitude) would be least in this alternative as a result of having no areas open to cross-country OHV use (see Table 4-10).

Table 4-10. General and Fragile Soils Acres of OHV Designation Comparison Between Alternatives D and A

	Open to Cross-Country OHV Use	OHV Use Limited to Designated Routes	Closed to OHV Use
Acres in Alternative D	0	1,079,440	289,650
Percent of RMPPA	0	79	21
Acres different from Alternative A	-991,920	+792,585	+217,170
Percent change from Alternative A	100% decrease	276% increase	300% increase
Acres in fragile soils	0	22,640	15,890
Percent of fragile soils in RMPPA	0	59	41
Acres in fragile soils different from Alternative A	0	-15,890	+15,890
Percent change of fragile soils from Alternative A	No change	41% decrease	All acres are increased from Alt A

Vegetation management actions, including vegetation treatments for ecological purposes, forest or woodland treatments, rangeland treatments for livestock, or noxious weed treatments, would be the same as those noted in Alternative B, except the acres on which these impacts would occur would be anticipated to be greatest under this alternative because of large acreages identified for treatment. This would increase the identified short-term impacts compared with all other alternatives, but it would increase the long-term beneficial impacts related to improved vegetation condition. Improved long-term vegetation condition would result in long-term decreases in erosion. Impacts from fire management actions would be the same as in Alternative B. Impacts on soils from soils management actions that require adherence to soils performance objectives for all permitted surface disturbing activities would be the same as for Alternative A. As also noted in Alternative A, soils management actions would require surface disturbing actions on fragile soils to meet performance objectives, which would reduce erosion of fragile soils from surface disturbances by controlling erosion and minimizing overland flow off disturbed areas.

Compared with Alternative A, there would be a 792,585-acre increase in areas where OHV use would be limited to designated routes (Table 4-10). That increase would be associated with the decrease in the potential for significant impacts from cross-country OHV use compared with Alternative A. That would reduce impacts on soils because limiting OHV use to designated routes on 79 percent of the RMPPA limits impacts to these routes and the soils directly adjacent. Acres closed to OHV use would increase by 217,170 acres compared with Alternative A because the WSAs, several other special designations and recreation areas (portions of some SRMAs and backcountry areas), as well as water impoundments in the Sand Wash Basin HMA would be closed to OHV use. This results in soils on more than 21 percent of RMPPA being protected from OHV impacts, maintaining the natural erosion rates on most of the RMPPA.

The magnitude of impacts from oil and gas development would be decreased compared with all other alternatives because of increases in restrictions on surface disturbing activities. Anticipated surface disturbance associated with the reasonably foreseeable oil and gas development scenario would decrease by 12,305 acres to 36,915 acres (1.9 percent of RMPPA mineral estate) compared with other alternatives. In these areas, soils would be affected as noted in Alternative A. Long-term impacts from oil and gas exploration and development (see those noted in Alternative A) would occur on 17,272 acres (5,758 acres less than Alternatives A, B, and C) as a result of reclamation of 19,643 acres; however, 63 percent of areas with fragile soils would be protected from long-term impacts from oil and gas development as a result of NSO stipulations or closure to leasing (see Table 4-11) as compared with 25 percent in Alternative A. Impacts from requiring a plan for surface reclamation with every APD or POD would be the same as Alternative B. Although more than 24 percent of the RMPPA mineral estate would be open to leasing with minor or standard stipulations, physical disturbance would not exceed the 36,915 acres that would be associated with reasonably foreseeable development.

Table 4-11. General and Fragile Soils Acres of Oil and Gas Leasing Category Designation Comparison Between Alternatives D and A

	Open w/ Standard Stipulations	Open—CSU	Open—NSO	Closed to Leasing
Acres in Alternative D	364,880	94,210	459,940	275,630
Percent of RMPPA	19	5	24	15
Acres different from Alternative A	-184,920	-22,000	+267,750	+197,440
Percent change from Alternative A	34% decrease	19% decrease	139% increase	253% increase
Acres in fragile soils	0	1,010	20,780	14,670
Percent of fragile soils in RMPPA mineral estate	0	2	37	26
Acres in fragile soils different from Alternative A	0	-21,160	+6,490	+14,670
Percent change of fragile soils from Alternative A	0	95% decrease	45% increase	All acres are increased from Alt A

Surface disturbances related to other mineral development would result in similar impacts to those noted in Alternative A, except on the acres on which the impacts would not occur because of restrictions. These surface disturbances would result in increased disturbance of vegetation and soil and subsequent increases in erosion by wind and water above natural weathering and erosion rates.

Restrictions to protect other resources or uses often reduce the areas in which the impacts mentioned above could occur. Restrictions on surface disturbing activities would preclude these activities on 632,940 acres (47 percent of RMPPA). That would be a 543,700-acre increase (609 percent) compared with Alternative B. In these areas, disturbance to vegetation and soils would not occur, and erosion would not be anticipated to exceed natural rates. Managing 465,190 more acres as open to oil and gas leasing with NSO stipulations or closed to leasing would eliminate the impacts from oil and gas development noted above on 172 percent more acres than in Alternative A (Table 4-11). Higher than any other alternative, 63 percent of fragile soil areas would be protected through NSO stipulations or closure to leasing. Soils in areas that would be closed to mineral materials (40 percent of RMPPA—540,510 acres), closed to coal leasing (less than 1 percent of RMPPA, or 230 acres), withdrawn from mineral entry (44 percent of RMPPA, or 587,220 acres), or contain NSO stipulations for coal leasing (1 percent of RMPPA, or 13,870 acres) would be protected from impacts from mineral development. In addition, impacts from development or construction in ROWs would be the same as in Alternative C, except impacts from ROW development or construction would not occur on 499,700 acres (37 percent of RMPPA) in which ROWs would be prohibited. This would be an increase of 391,230 acres (361 percent increase) compared with Alternative A. Additionally, these impacts would not likely occur on 15,190 acres (1 percent of RMPPA) in which ROW placement would not be encouraged.

Impacts from dispersed actions that affect vegetation that would be unique to this alternative are limited to wild horse management action. Although proper management of wild horses in the Sand Wash Basin HMA at the abandoned mine lands (AML) would reduce trampling and grazing of vegetation, thereby reducing the potential for erosion above natural rates, designation of a wild horse range could change the impacts on soils. If animal unit months (AUM) were converted from livestock to wild horses by managing primarily for wild horses, flexibility in management would be lost (i.e., limiting season of use and controlling distribution). That would result in more growing season use and areas of heavy or severe use. That would lead to loss of perennial vegetative cover and increased areas of wild horse concentration, increasing bare soil cover and associated soil erosion from wind or water compared, with the other alternatives. Impacts from livestock grazing and forest product management actions would be the same as for Alternative A.

Managing continually increasing recreation visitors in the eight designated SRMAs would have long-term, adverse impacts on soils and water; however, impacts would be less than with Alternatives B or C, in which none (B) or fewer (C) of the SRMAs would be designated. Although designation and development would result in hardening some areas, increasing management presence would decrease campsite establishment or expansion, the associated impacts on soils of compaction, and increased overland erosion. Proper management and public education would further reduce impacts on soil erosion. Restricting participant numbers (limited to 25) and activities for commercial events in backcountry SRMAs would reduce impacts from large-group events compared with Alternatives A, B, or C.

4.3.3 Impacts on Water Resources

This section presents potential impacts on water resources from management actions for other resource programs. Existing conditions for water resources are described in Section 3.1.4. The discussion of impacts on water resources includes the effects of surface disturbing activities on water quality and watershed health. Surface disturbing activities, or activities that decrease vegetation cover, or otherwise alter land surface cover, would potentially affect water quality and watershed health. In addition, a discussion of effects on water rights and potential future water projects resulting from BLM WSR suitability determinations is also included.

Impacts on water resources would be significant if any of the following were to occur:

- ❑ Alteration of the physical characteristics of streams, wetlands, or riparian areas beyond the designated use of the receiving stream or failure of the water to meet federal or state quality standards
- ❑ Degradation of water quality beyond the designated use of the receiving stream or failure of the water to meet federal or state quality standards.

The analysis is based on the following assumptions:

- ❑ Substantial surface disturbance to soil, including compaction of soil or loss of vegetative cover, would increase water runoff and downstream sediment loads and lower soil productivity, thereby degrading water quality, altering channel structure, and affecting overall watershed health.

- ❑ The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location within the watershed, time and degree of disturbance, existing vegetation, precipitation, and mitigating actions applied to the disturbance.
- ❑ An increase of pollutants in surface waters would affect other beneficial uses (e.g., stock watering, irrigation, and/or drinking water supplies).
- ❑ Access roads would be properly designed.

Fire suppression and surface disturbing activities cause the majority of impacts on water resources. Management actions for resources that result in surface disturbance include energy and mineral, open OHV travel management, and vegetation treatments. Management actions for resources or resource uses that restrict surface disturbance are fish and wildlife, NSO, and controlled surface use (CSU) for oil and gas exploration and development. Restrictions on surface disturbing activities would protect and maintain current water quality and minimize erosion and sedimentation.

Impacts on water resources from fragile soils protections, livestock grazing management actions, and vegetation treatments would be the same under all alternatives. Restrictions on surface disturbance in fragile soils areas would reduce the likelihood of sediment loading, salinity, and turbidity to nearby streams. Managing livestock use of riparian areas, limiting duration of use during the hot season, changing season from summer to winter use, and herding would reduce soil compaction and vegetation loss that could increase surface runoff and sediment loading. Livestock grazing management actions to conduct vegetation treatments or construct range improvements would indirectly improve water quality and water resources by decreasing erosion. Treatments could initially increase localized sedimentation and erosion, but these impacts would decrease in the long term. Developing offsite water sources, developing riparian pasture management systems, and fencing riparian and spring sources could reduce livestock impacts on creeks, springs, and riparian areas, which could maintain or improve riparian condition and reduce the likelihood of sediment loading to nearby creeks and springs. Grazing by wildlife has similar impacts on riparian areas, but impacts are more difficult to manage.

Impacts on water resources would not be anticipated as a result of implementing management actions for the following resources and resource uses: air quality, cultural and heritage resources, paleontological resources, visual resource management, and social and economic values.

4.3.3.1 Alternative A

Continuing to use maximum suppression of fire on areas with high resource values and structures would reduce short-term indirect impacts to water resources, such as localized erosion and sediment loading. In the long term, however, maximum fire suppression could result in uncharacteristically large or intense wildfires. Impacts on water resources caused by uncharacteristically large or intense wildfires could be significant if ash, chemical fire retardant, and pollution loading (e.g., elevated mineral concentrations of selenium) as a result of increased surface runoff degrade water quality beyond the designated use of the stream. However, these impacts would be temporary until reclamation of the area occurs.

Restrictions on surface disturbing activities would protect and maintain current water quality and minimize erosion and sedimentation. Management actions that would continue to restrict surface disturbing activities include OHV use closures (5 percent of the RMPPA, or 72,480 acres), closures to oil and gas leasing (4 percent of the RMPPA mineral estate, or 78,190 acres), NSO stipulations on oil and gas leasing (10 percent of the RMPPA mineral estate, or 192,190 acres), CSU on oil and gas leasing (6 percent of the RMPPA mineral estate, or 116,210 acres), timing limitation stipulations on 61 percent of the RMPPA mineral estate (1,162,040 acres), closures to mineral material sales (5 percent of the RMPPA mineral estate, or 97,790 acres), and recommendations for withdrawal from locatable mineral entry (4 percent of the RMPPA mineral estate, or 79,190 acres).

Surface disturbing activities could increase localized erosion, sediment loading, salinity, and turbidity, which affect water quality. Such activities include continuing to allow open OHV use on 74 percent of the RMPPA (991,920 acres), oil and gas leasing with standard stipulations on 29 percent of the RMPPA mineral estate (549,800 acres), locatable mineral entry on 96 percent of the RMPPA (1,821,090 acres), mineral material sales on 95 percent of the RMPPA (1,802,490 acres), and further coal leasing consideration on 638,800 acres. However, best management practices, standard stipulations, and conditions of approval would reduce the extent of these impacts. In addition, revegetating disturbed areas not needed for lease operations as soon as possible could reduce the long-term disturbance related to oil and gas exploration and development.

Continuing to allow heavy recreation use in the Little Yampa/Juniper Canyon area, limited recreation management and facilities in the extensive recreation management areas (ERMA), and providing developed recreation sites could compact soil and remove vegetation cover, which would lead to localized increases in erosion and sediment loading to nearby streams and the Yampa River.

4.3.3.2 Alternative B

Appropriate fire management response could increase short-term impacts such as localized erosion and sediment loading, compared with Alternative A. In the long term, AMR would decrease the potential for uncharacteristically large or intense wildfires and associated impacts to water quality.

Compared with Alternative A, this alternative would have fewer restrictions on surface disturbing activities and provide less protection to water resources. There would be no stipulations on surface disturbing activities near perennial water sources, which could increase localized erosion and sediment loading to nearby perennial water sources compared with Alternative A. These impacts could be significant if water quality degrades beyond the designated use of the stream. Allowing surface disturbance on fragile soil areas (38,530 acres) without performance objectives would increase localized erosion and surface runoff as well as salinity and elevated mineral concentrations, which could be significant if water quality degrades beyond the designated use of the stream. Surface disturbance in the fragile soil areas would decrease vegetation cover and increase sediment loading, salinity, and turbidity to nearby streams and rivers.

Fewer surface distance restrictions could increase localized erosion and sediment loading and decrease water quality. Management actions that would restrict surface disturbing activities include closures to OHV use on 3 percent of the RMPPA (46,370 acres), no ground disturbance (NGD) restrictions on 7 percent of the RMPPA (89,240 acres), closures to oil and gas leasing on 4 percent of the RMPPA mineral estate (78,190 acres), NSO stipulations on 2 percent of the RMPPA mineral estate (32,770 acres), CSU stipulations on 8 percent of the RMPPA mineral estate (153,890 acres), timing limitation stipulations on 8 percent of the RMPPA mineral estate (149,360 acres), closures to mineral material sales on 5 percent of the RMPPA (97,790 acres), and recommendations for withdrawal from locatable mineral entry on 8 percent of the RMPPA (153,310 acres).

Surface disturbing activities could affect water quality by increasing localized erosion, sediment loading, salinity, and turbidity. Such activities include allowing open OHV use on 87 percent of the RMPPA (1,172,950 acres), oil and gas leasing with standard stipulations on 79 percent of the RMPPA mineral estate (1,509,090 acres), locatable mineral entry on 92 percent of the RMPPA mineral estate (1,746,970 acres), mineral material sales on 95 percent of the RMPPA mineral estate (1,802,490 acres), and further coal leasing consideration on 638,800 acres. When compared with Alternative A, this alternative would open more acres to surface disturbing activities, which could increase the likelihood of increased localized erosion and sediment loading to nearby streams and rivers. In addition, requiring a plan for surface reclamation with every APD or POD could reduce the long-term disturbance related to oil and gas exploration and development.

Managing for desired plant community objectives and emphasizing vegetation treatments would indirectly protect water resources and water quality by improving vegetation productivity, which could reduce erosion and surface runoff and maintain or improve water quality.

Conservation measures in Appendix J for the Colorado River cutthroat trout (such as monitoring water quality and evaluating livestock grazing impacts) and boreal toad habitat (such as minimizing activities that might increase or cause sedimentation in boreal toad habitat and prevent and reduce the impact of acid mine drainage) could maintain or improve the quality of water resources in these areas of the RMPPA compared with Alternative A. Monitoring of water quality could lead to strategies that, if implemented, could help maintain or improve existing water quality and identify water quality issues if they arise. Restricting activities that might increase or cause sedimentation could reduce sediment loading and turbidity. Reducing the impacts of acid mine drainage would maintain water quality and could, in some cases, improve water quality.

Impacts associated with heavy recreation use in the Little Yampa/Juniper Canyon area, limited recreation management and facilities in the ERMAs, and providing developed recreation sites would be the same as for Alternative A.

4.3.3.3 Alternative C

Impacts from wildland fire management would be the same as for Alternative B.

This alternative would provide more protection to water resources than Alternatives A or B. Restrictions on surface disturbing activities would protect and maintain current water quality and reduce erosion and sedimentation. Management actions that would restrict surface disturbing activities include closures to OHV use on 6 percent of the RMPPA (86,710 acres), NGD restrictions on 20 percent of the RMPPA (273,100 acres), closures to oil and gas leasing on 9 percent of the RMPPA mineral estate (160,870 acres), NSO stipulations on 11 percent of the RMPPA mineral estate (216,040 acres), CSU stipulations on 10 percent of the RMPPA mineral estate (184,840 acres), timing limitation stipulations on 64 percent of the RMPPA mineral estate (1,216,190 acres), closures to mineral material sales on 8 percent of the RMPPA mineral estate (157,910 acres), and recommendations for withdrawal from locatable mineral entry on 10 percent of the RMPPA mineral estate (194,400 acres). These management actions would preclude or restrict surface disturbance, which would protect and maintain current water quality and reduce erosion and sedimentation.

Surface disturbing activities could cause localized increases in erosion, sediment loading, salinity, and turbidity. Such activities include allowing open OHV use on 2 percent of the RMPPA (21,940 acres), oil and gas leasing with standard stipulations on 22 percent of the RMPPA mineral estate (417,790 acres), locatable mineral entry on 90 percent of the RMPPA mineral estate (1,705,879 acres), mineral material sales on 92 percent of the RMPPA mineral estate (1,742,370 acres), and further coal leasing consideration on 638,570 acres. When compared with Alternative A, fewer acres would be open to surface disturbing activities. In addition, impacts from requiring a plan for surface reclamation with every APD or POD would be the same as in Alternative B.

Preventing the spread of noxious weeds and eliminating invasive species would improve vegetation health and productivity, which would indirectly maintain or improve water resources and water quality compared with Alternative A. Managing for desired plant community objectives and emphasizing vegetation treatments would have impacts similar to those described under Alternative B; however, beneficial impacts would be greater because the annual average of vegetation treatments would increase.

Water quality protections or improvements associated with actions that result from implementing the conservation measures in Appendix J for the Colorado River cutthroat trout and boreal toad habitat would be the same as for Alternative B.

Impacts associated with heavy recreation use in the Little Yampa/Juniper Canyon area, limited recreation management and facilities in the ERMAs, and providing developed recreation sites would have effects similar to those of Alternative A.

Until the U.S. Congress officially designates a stream segment as a WSR, the Wild and Scenic Rivers Act does not provide any additional authority or requirements for BLM to participate in water rights processes. This occurs because no water right is created for BLM until Congress actually designates the suitable segment. Agency actions to protect outstandingly remarkable values in the suitable segment are restricted to authorities the agency already possesses under other federal laws, including FLPMA.

If a river segment is not yet designated by Congress, BLM involvement in water rights processes would be triggered only if the water right applicant required access to BLM lands for development of the water right. BLM involvement would also be triggered if the proposed water right would injure an existing BLM water right decreed for other purposes. In addition, BLM is obligated to not impair the free-flowing conditions of the segment by allowing major dams, diversions, rip-rap, and other water control infrastructure to be constructed in the river channel in the suitable segment. However, BLM would not be able to object to the proposed water right based on injury to outstandingly remarkable values. This occurs because BLM would have not yet quantified, via analytical studies, the precise amount of flow needed to support the outstandingly remarkable values. The quantification process would occur after the segment is designated by Congress.

Evidence of this approach is provided by BLM's implementation of the 1989 RMP, in which BLM determined that it would "undertake no actions nor permit any activities which could adversely affect outstandingly remarkable values of the Yampa River segments listed in the Nationwide Rivers Inventory List which would make them eligible for the National WSR System." Since that time, BLM has not opposed any new applications for upstream water rights or water projects based on the need to protect outstandingly remarkable values in these segments.

BLM has not participated in past water rights cases that have been filed by the Colorado River District to prove reasonable diligence on the project, and BLM would not expect to do so in the future. The historic applications for reasonable diligence have never represented that BLM has given land use authorization for construction of the project, so BLM has never had a basis to object. A BLM suitability determination does not invoke additional involvement by BLM in state-based water rights processes that would be required for proposed water projects.

A suitability determination does not remain in effect indefinitely. It remains in effect only as long as the land use plan that made that determination is in effect. BLM has the authority to change the determination via a land use plan amendment or during its next revision of the plan. If, in the future, plans and funding are in place for a water project that requires BLM land use authorization, the project proponents can ask BLM to reconsider its suitability determination in a land use plan amendment. This would include future water projects arising from the State's Interbasin Compact process. Alternatively, the project proponents could ask BLM to change its suitability finding during the next plan revision, based on new information and expanded public demand for development of additional water supplies.

4.3.3.4 Alternative D

Impacts from wildland fire management would be the same as under Alternative B.

Compared with Alternatives A, B, and C, this alternative would provide the most protection to water resources. Restrictions on surface disturbing activities would preclude or restrict surface disturbance, which would protect and maintain current water quality and reduce erosion and sedimentation. Management actions that would restrict surface disturbing activities include OHV use closures on 22 percent of the RMPPA (289,650 acres), NGD restrictions on 47 percent of the RMPPA (632,940 acres), closures to oil and gas leasing on 15 percent of the RMPPA mineral estate (275,630 acres), NSO stipulations on 24 percent of the RMPPA mineral estate (459,940

acres), CSU stipulations on 5 percent of the RMPPA mineral estate (94,210 acres), timing limitation stipulations on 64 percent of the RMPPA mineral estate (1,214,610 acres), closures to mineral material sales on 28 percent of the RMPPA mineral estate (540,510 acres), and recommendations for withdrawal from locatable mineral entry on 31 percent of the RMPPA mineral estate (587,220 acres).

Surface disturbing activities could increase localized erosion, sediment loading, salinity, and turbidity, which would affect water quality. Such activities include allowing oil and gas leasing with standard stipulations on 19 percent of the RMPPA mineral estate (364,880 acres), locatable mineral entry on 69 percent of the RMPPA mineral estate (1,313,060 acres), mineral material sales on 72 percent of the RMPPA mineral estate (1,359,770 acres), and further coal leasing consideration on 638,570 acres. When compared with Alternatives A, B, and C, this alternative would have the fewest acres open to surface disturbing activities as well as no areas open to cross-country OHV use. In addition, impacts from requiring a plan for surface reclamation with every APD or POD would be the same as under Alternative B.

Preventing the spread of noxious weeds and eliminating invasive species would improve vegetation health, which would indirectly maintain or improve water resources and water quality compared with Alternative A. Managing for desired plant community objectives and emphasizing vegetation treatments would have impacts similar to those under Alternatives B and C; however beneficial impacts would be greatest because this alternative has the greatest annual average of vegetation treatments.

Water quality protections or improvements associated with actions that result from implementing the conservation measures and recommendations in Appendix J for the Colorado River cutthroat trout and boreal toad habitat would be the same as under Alternative B.

Impacts associated with heavy recreation use in the Little Yampa/Juniper Canyon area, limited recreation management and facilities in the ERMAs, and providing developed recreation sites would have effects similar to those of Alternative A.

Impacts from BLM WSR suitability determinations would be similar to those in Alternative C.

4.3.4 Impacts on Vegetation

This analysis addresses potential impacts to vegetation, rangelands, forests and woodlands, riparian areas, and wetlands from implementing the management actions under the alternatives described in Chapter 2. This analysis focuses on those management alternatives or actions that have the potential for physical disturbance of vegetation and rangelands, loss of habitat, and loss or disturbance of riparian/wetland areas and/or their functioning condition in the planning area. Particular focus was placed on vegetation communities with the greatest changes in structure and species composition and most at-risk from potentially severe mortality events such as drought and insects and disease infestation. Mitigation measure(s) were incorporated in the analysis when possible to reduce the adverse effects of significant impacts on vegetation, rangelands, and riparian/wetland areas.

The effects of management actions on vegetation, rangelands, forests and woodlands, and riparian/wetland areas may vary widely, depending on a variety of factors such as the type of

soils, soil moisture, topography, and plant reproductive characteristics. Surface disturbance removes existing vegetation and can increase opportunities for noxious weeds and invasive species establishment, reducing vegetation diversity, production, and desirable plant cover. Indirectly, this could reduce the ecological health of rangelands and forest and woodland areas. Increasing surface disturbance could increase erosion rates and decrease riparian/wetland functioning conditions. Impacts on vegetation resources also vary depending on the seral stage and composition of vegetation communities, which can be classified as grassland, scrublands, or forest and woodlands. These classifications are based on the major species found in the vegetation types listed in Chapter 3. The composition of a plant community changes over time as a result of interactions with factors, such as climate, resource uses, and disturbance. In many cases, the potential composition of these units differs from the existing composition. Consequences to vegetation diversity, which includes structure, productivity, vigor, percent cover, density, and species composition, were based on likely changes relative to movement toward desired vegetation conditions. In the absence of quantitative data, best professional judgment was used, and impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

Impacts on vegetation, rangelands, forests and woodlands, and riparian/wetland areas would be considered significant if the following were to occur:

- ❑ Reclaimed areas do not attain adequate vegetation ground cover and species composition to stabilize the site from disturbance within 5 to 10 years in sagebrush/grass communities and 15 to 20 years in cold desert communities
- ❑ Any action or event that would remove a vegetation community's unique attributes or ability to support other resource values
- ❑ Any unmitigated loss of wetlands or wetland function
- ❑ Proper Functioning Condition (PFC) cannot be attained or maintained as a minimum physical state or the Colorado BLM Standard #2 for Public Land Health was not obtainable.
- ❑ Management actions or activities that accelerate erosion and runoff and, thereby, alter the physical characteristics of wetland and riparian vegetation
- ❑ Replacement or substantial invasion of native communities with noxious and invasive weeds to the degree that such invasions cannot be successfully controlled.

The analysis is based on the following assumptions:

- ❑ Adequate vegetative ground cover and species composition for site stabilization typically would occur within 5 to 10 years in sagebrush/grass communities and 15 to 20 years in cold desert communities.
- ❑ Sagebrush reestablishment in disturbed areas would create a vegetative landscape similar to adjacent lands in excess of 20 years.
- ❑ Adequate forage would be available for current wildlife and wild horse herd population objectives.
- ❑ All plant communities would be managed toward achieving a mix of species composition, cover, and age classes across the landscape.
- ❑ Noncommercial woodland communities would increase in age and cover with reduced composition and cover of understory species.

- ❑ The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location in the watershed; the type, time, and degree of disturbance; existing vegetation; precipitation; and mitigating actions applied to the disturbance.
- ❑ Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of the RMPPA, recreational activities, wildlife and livestock grazing and movements, and surface disturbing activities.
- ❑ Weed and pest control would be carried out in coordination with the appropriate county weed and pest control district and owners of adjacent property.
- ❑ Climatic fluctuation would continue to influence the health and productivity of plant communities on an annual basis.
- ❑ BLM would comply with the Colorado Statewide Strategic Plan for Control and Eradication of Noxious and Invasive Weeds.

The relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities would be affected under all alternatives. However, implementation of any alternative would not completely eliminate a plant species, plant community, or seral stage. Impacts from management actions that are common to all the alternatives include surface disturbance from vegetation, forest and woodland management, fire management, rangeland improvements, recreation use, and energy and minerals management. These activities result in the removal of existing vegetation and the conversion of areas to an earlier seral stage, which could change vegetation community succession. Converting areas to an earlier seral stage could increase the primary productivity of the vegetation community and could reduce the diversity of scrubland and forest and woodland vegetation. Reducing vegetation diversity could reduce the ecological health of rangelands and forest and woodlands in these areas. Typically, vegetation communities recover from surface disturbance and gradually return to a composition and structure that existed before disturbance. Surface disturbing activities could increase opportunities for noxious weed and invasive species establishment. Disturbance does not always lead to plant invasion, but it could provide a temporary location for a potential invasive species to establish. Reclamation would reduce the effects of surface disturbance on vegetation communities and reduce risk for noxious weeds and invasive species establishment.

Management actions that restrict surface disturbing activities would help retain existing diversity and seral succession. These restrictions are included under soil, water, vegetation, fish and wildlife habitat, Special Status Species habitat, visual resources, special management areas (SMA), energy and minerals, and recreation management actions. In addition, closing areas to motorized vehicle use or limiting motorized access to designated or existing roads and trails would also help maintain vegetation diversity and reduce opportunities for noxious weeds and invasive species establishment. Surface disturbance restrictions could alter the method, extent, or location of vegetation treatments implemented to improve the ecological health of rangelands, forests, and woodlands. Developing offsite water sources, developing riparian pasture management systems, and fencing riparian and spring sources could reduce livestock impacts on creeks, springs, and riparian areas, which could result in maintaining or improving riparian conditions.

Implementing vegetation treatments could cause a short-term increase in opportunities for noxious weeds and invasive species establishment by disturbing surfaces and removing existing vegetation. Vegetation treatments would reduce opportunities for noxious weeds and invasive species establishment by increasing the productivity and vigor of vegetation in treated areas, which would increase the ability of desirable vegetation in treated areas to compete with noxious weeds and invasive species.

Eliminating or controlling the establishment and spread of noxious weeds would improve vegetation composition and structure by increasing the percent cover of desirable plant species in treated areas. This would improve the ecological health of rangelands and forests and woodlands and increase riparian/wetland functioning condition in treated areas. This would result in an increase in vegetation diversity as well as ecological health of rangelands and forests and woodlands. Increasing vegetation diversity could increase riparian/wetland functioning condition by improving the structure and percent cover of desirable species, and it could reduce erosion rates.

Wildlife consumption of vegetation, particularly when population levels are high, can alter vegetation structure and species composition (Anderson and Shumar 1986, Warmbolt and Hoffman 2004). Adjusting wildlife use in the RMPPA could improve the ecological conditions of vegetation and rangelands and increase riparian/wetland functioning conditions by increasing vegetation diversity and decreasing erosion. Adjusting wildlife use could reduce opportunities for noxious weed and invasive species establishment by improving vegetation composition and structure and moving these areas toward desired plant community conditions.

Livestock and wildlife alter vegetation by removing portions of plants, and the resulting impacts depend on the extent of the removal, length of grazing period, and climatic conditions (Kimball and Schiffman 2003; Howery 1999). This could result in areas in which Standards and Guides are not being met. Improving allotments not meeting Standards and Guides could improve vegetation diversity, riparian/wetland functioning condition, and the ecological health of rangelands. This could reduce opportunities for noxious weed and invasive species establishment. In addition, improving vegetation diversity could increase riparian/wetland area functioning condition.

Land exchanges and disposals could reduce fragmentation of BLM-administered lands, particularly in the eastern portion of the RMPPA. This could improve BLM's ability to implement management actions that result in increased vegetation diversity or that improve the ecological health of rangelands, which could also increase riparian/wetland functioning conditions.

Impacts on vegetation, rangeland, and riparian/wetland areas would not be anticipated as a result of implementing management actions for air quality, cultural and heritage resources, paleontological resources, visual resources, and social and economic values.

4.3.4.1 Alternative A

Surface disturbing activities from resources or resource uses could affect vegetation and the ecological health of rangelands and forests and woodlands and/or reduce riparian/wetland

functioning conditions. These activities could also affect forests and woodlands by reducing stand density and retaining fire-adapted species. Continuing to manage federal mineral estate with 549,800 acres as open to oil and gas exploration and development, 638,800 acres as suitable for coal leasing, 1,802,490 acres as open for mineral material sales, and managing the RMPPA with 991,920 acres as open to OHV recreation use could increase surface disturbance. In addition, continuing to not establish guidance for competitive recreation events could also increase surface disturbance from human uses, which could have significant impacts on vegetation by altering the physical characteristics of riparian/wetland areas.

Continuing to manage 88 miles of riparian wetlands that are rated functioning at risk (FAR) or nonfunctioning (NF) and 35 miles rated as PFC as open to OHV recreation use would continue to increase erosion rates and reduce riparian/wetland functioning condition, particularly in areas rated as FAR or NF, which could result in the loss of capacity of riparian/wetland areas to support other resources.

Surface disturbing activities from oil and gas development (e.g., well pads, access roads, and central facilities) would remove vegetation on 49,216 acres during the planning period. It is assumed that these activities would be located primarily in the high oil and gas potential area (Map 3-32) and mostly affect sagebrush and saltbush vegetation, which are common in the RMPPA. Surface disturbance in these areas would increase the amount of early seral vegetation in these vegetation communities. Surface reclamation of disturbed areas not needed for lease operations would ensure restored areas of native vegetation and removal of noxious weeds, resulting in the return of healthy vegetation communities.

Restricting surface disturbing activities helps retain existing vegetation and riparian/wetland functioning condition. Management actions that restrict surface disturbing activities include continuing to manage wildlife habitat with site-specific timing restrictions (1,162,040 acres), close areas to oil and gas leasing (78,190 acres), manage areas as no surface occupancy (NSO) (192,190 acres), close areas to mineral material sales (97,790 acres), and recommend areas for withdrawal from locatable mineral entry (79,190 acres). In addition, continuing to manage 38,530 acres to protect fragile soils from surface disturbance would preserve the sparse vegetation in these areas and reduce erosion. Engineering reclamation plans for projects on fragile soils could reduce the long-term effect of surface disturbance on 85,340 acres of vegetation. Reducing surface disturbance helps maintain existing vegetation diversity, ecological health of rangelands and forests and woodlands, and riparian/wetland functioning condition by retaining existing vegetation and reducing erosion rates. Restricting surface disturbance would also reduce opportunities for noxious weed and invasive species establishment.

Continuing to manage Vermillion Basin as open for energy and mineral leasing and a portion as open to OHV use would increase surface disturbance of the area. That could reduce vegetation diversity and riparian/wetland function. However, managing a portion as limited to existing roads and trails for OHV use and Vermillion Creek drainage and Vermillion Bluffs as sensitive to siting ROWs could reduce surface disturbance from human uses, which could locally increase vegetation diversity and riparian/wetland function in the Vermillion Basin.

Continuing to monitor rangelands and proceed as funding and staffing permit could reduce vegetation diversity if decreases in the ecological health of rangelands and forests and woodlands

and in riparian functioning conditions were not detected. In addition, livestock grazing using federal preference (149,503 AUMs) until monitoring studies are completed could decrease vegetation diversity if these areas do not meet standards and guides. Reduced vegetation diversity could increase opportunities for noxious weeds and invasive species establishment, indirectly reducing the ecological health of rangelands, as well as decrease riparian/wetland functioning conditions by altering the hydrologic patterns.

Continuing to eliminate or control the establishment and spread of noxious weeds would improve vegetation composition and structure by increasing the percent cover of desirable plant species in treated areas. This would improve the ecological health of rangelands and forests and woodlands and increase riparian/wetland functioning condition in treated areas, which would increase vegetation diversity and improve the ecological health of rangelands and forests and woodlands. Increasing vegetation diversity could increase riparian/wetland functioning condition by improving the structure and percent cover of desirable species, and it could reduce erosion rates.

Continuing to manage fire in the RMPPA by using maximum suppression would retain existing vegetation in the short term; however, fire suppression increases vegetation density and areas dominated by late seral succession vegetation. That reduces vegetation diversity and the ecological health of rangelands and forest and woodlands (Lett and Knapp 2003). Decreasing ecological health could increase risk for noxious weed and invasive plant species establishment. Full suppression could lead to significant loss of unique vegetation characteristics, reduce resistance to disease and insect pest infestations, and increase the risk of uncharacteristically large or intense wildfires.

Managing 535,390 acres as ROW avoidance areas and pursuing easements on a case-by-case basis could relocate surface disturbing activities to less sensitive areas. In addition, ROW criteria for wind and solar energy development could limit surface disturbance by limiting the locations in which development could occur. Implementing vegetation treatments on a case-by-case basis could also increase vegetation diversity, as well as improve the ecological health of rangelands and forests and woodlands. These management actions could increase vegetation productivity and vigor in the RMPPA and reduce risk for noxious weed and invasive species establishment. Increasing ecological health could reduce mortality from insect pests and disease, which would help retain existing vegetation diversity.

Not controlling surface use on prairie dog habitat outside of the black-footed ferret reintroduction areas could reduce the quality of vegetation resources by increasing surface disturbance in localized areas. This increase in surface disturbance could benefit prairie dog expansion and reduce vegetation species diversity and structure in these areas. In addition, managing access and providing minimal recreation facilities in the ERMA could increase localized surface disturbance and opportunities for noxious weeds and invasive species establishment by removing existing vegetation cover. That could cause localized impacts from the loss of unique vegetation community characteristics and might increase the establishment of noxious weeds and invasive species.

Working with CDOW to reduce livestock/big game conflicts and manage the wild horses in the Sand Wash Basin to the appropriate AML would help maintain existing vegetation conditions.

Constructing rangeland improvement projects on 69 allotments could also reduce conflicts for forage. Reduction of conflicts and the proper management of wild horses would reduce trampling and grazing of vegetation, thereby reducing the potential for erosion. However, not adjusting wildlife and horse numbers for range conditions could decrease the ecological health of rangelands and increase the risk for noxious weeds and invasive species establishment.

4.3.4.2 Alternative B

Impacts from oil and gas activities would be the same as described in Alternative A, except 1,509,090 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to standard lease stipulations, 303,250 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to lease stipulations such as CSU and seasonal restrictions, 32,770 acres would be subject to NSO stipulations, and 78,190 acres would be closed.

Managing 276 miles of riparian areas that are rated as FAR or NF and 59 miles rated as PFC and open to OHV use would increase surface disturbance and could reduce riparian functioning conditions in these areas. That could have a significant impact if riparian/wetland areas lost capacity to support other resources, compared with Alternative A.

Managing Vermillion Creek and drainage as open for ROWs could increase surface disturbance from human uses; however, managing Vermillion Basin as limited to designated roads and trails for OHV use, as closed to coal leasing, and withdrawn or closed to minerals, and as CSU for oil and gas leasing could reduce surface disturbance compared with Alternative A. This action could locally increase vegetation diversity and riparian/wetland function in the Vermillion Basin compared with Alternative A.

Decreasing the areas in which surface disturbing activities are restricted, compared with Alternative A, would have an impact on vegetation resources in the RMPPA. These activities could also affect forests and woodlands by reducing stand density and retaining fire-adapted species. Managing 1,172,950 acres as open to OHV use, encouraging wind and solar energy development, and eliminating access restrictions could increase surface disturbance. In addition, not protecting 38,530 acres of fragile soils from surface disturbances could result in a loss of the sparse vegetation resources because erosion could increase, which could result in a significant impact by reducing vegetation diversity and increasing areas dominated by noxious weeds and invasive species compared with Alternative A. Implementing best management practices (BMP) in the RMPPA could decrease the effect of surface disturbance and increase vegetation diversity. If implementing BMPs decreases the effect of surface disturbance, erosion rates could decrease, which could improve riparian/wetland functioning condition compared with Alternative A.

Generally, restrictions on surface disturbing activities would help retain existing vegetation resource conditions. Management actions that restrict surface disturbing activities include areas closed to OHV use (46,370 acres), NGD restrictions (89,240 acres), areas closed to oil and gas leasing (78,190 acres), NSO stipulations (32,770 acres), areas closed to mineral material sales (97,790 acres), and areas recommended for withdrawal from locatable mineral entry (153,310 acres). Engineering reclamation plans for projects in fragile soils areas could reduce the long-term effect of surface disturbance on 85,340 acres of vegetation. Compared with Alternative A,

there are fewer restrictions on surface disturbing activities under Alternative B. Fewer surface disturbance restrictions could result in a loss of vegetation diversity and an increase in opportunities for noxious weeds and invasive species establishment.

Using prescribed fire, conditional fire suppression, and AMR would increase vegetation diversity and resistance to disease and insect pest infestations by improving the ecological health of rangelands and forests and woodlands. This type of fire management could decrease risk for noxious weed and invasive plant species establishment in the long term, compared with Alternative A.

Increasing livestock forage while meeting Standards and Guides and implementing vegetation treatments primarily to increase livestock forage production could reduce vegetation diversity in the RMPPA. These actions could result in a long-term decrease in vegetation diversity by converting areas to early seral stages and monocultures, increasing opportunities for mortality in grasslands and scrublands from insect pests and disease. Where vegetation diversity decreases, risk for noxious weeds and invasive species establishment could increase, which could have a significant impact on the ability of rangelands to support other resources in the long term.

Temporarily opening closed OHV areas to designated road and trails for big game harvest could result in proliferation of noxious weeds and invasive species along roads and trails in localized areas, compared with Alternative A.

Implementing seasonal restrictions on surface disturbing activities within wildlife habitat (71,220 acres), seasonal limitations for oil and gas leasing and development (149,360 acres), and site-specific restrictions (158,950 acres) could reduce surface disturbance during the vegetation growing season. Managing wildlife and Special Status Species habitat as NGD reduces surface disturbance and increases vegetation diversity compared with Alternative A. Implementing conservation measures in Canada Lynx habitat could improve Douglas-fir and lodgepole pine ecological health by increasing structural diversity. In addition, conservation measures for Yellow-billed Cuckoo habitat could increase riparian/wetland functioning conditions by increasing area rated as PFC. Implementing conservation measures in areas containing cutthroat trout habitat could improve or maintain watershed conditions and increase riparian/wetland functioning condition by reducing erosion rates, which could decrease impacts on vegetation, compared with Alternative A, as restrictions apply to a greater area of the RMPPA.

Implementing conservation measures and surface disturbance restrictions in wildlife habitat could alter the location or extent of vegetation treatments in forests and woodlands. This could increase vegetation diversity and riparian/wetland functioning conditions compared with Alternative A.

Managing the wild horse HMA to AML would maintain existing vegetation conditions; however, adjusting for range conditions could increase the ecological health of rangelands, which could indirectly decrease opportunities for noxious weeds and invasive species establishment, compared with Alternative A. Reducing livestock/big game conflicts by decreasing big game populations and managing the wild horses in the Sand Wash Basin to AML could increase BLM management flexibility in responding to vegetation changes.

Managing WSAs (78,250 acres), if released by Congress, for multiple use consistent with resource goals and objectives would result in localized vegetation loss and introduce noxious weeds, which could become significant depending on the level of activity. In addition, managing all river segments as not suitable for inclusion under the WSR system could increase surface disturbance from human use. Managing these areas for multiple use could also result in increased opportunities for noxious weeds and invasive species establishment compared with Alternative A. BLM would have more flexibility in implementing vegetation treatments in these areas, compared with Alternative A.

Authorizing motorized and nonmotorized competitive events consistent with OHV area and route designations could reduce surface disturbance and/or maintain existing vegetation. Monitoring user conflicts and using education to further resource protection could reduce surface disturbance and opportunities for noxious weeds and invasive species establishment. This could increase vegetation diversity, compared with Alternative A.

4.3.4.3 Alternative C

Compared with Alternatives A and B, increasing the area in which restrictions apply to surface disturbing activities would decrease impacts on vegetation under this alternative. These activities could also affect forests and woodlands by reducing stand density and retaining fire-adapted species over the long term. Management actions for resources that result in surface disturbance include energy and minerals, open OHV travel management, and vegetation treatments. Management actions for resources or resource uses that restrict surface disturbance include NGD, the option for oil and gas leaseholders to limit sagebrush habitat fragmentation in fish and wildlife habitat in exchange for easing timing limitations, conservation measures for Special Status Species habitat, and closed and NSO restrictions for oil and gas exploration and development.

Impacts from oil and gas activities would be the same as described in Alternative A, except that 417,790 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to standard lease stipulations, 184,840 acres would be subject to CSU stipulations, 216,040 acres would be subject to NSO stipulations, and 160,870 acres would be closed. Decreasing the areas open to surface disturbing activities would reduce impacts on vegetation from surface disturbance discussed under Alternatives A and B. The loss of vegetation from oil and gas surface disturbing activities on the remaining acreage in the RMPPA would continue to occur unless leaseholders whose leases or units are within the critical sagebrush habitat area (Map 2-4) opt into an agreement to limit habitat fragmentation (i.e., vegetation removal) in return for easing wildlife timing limitations (big game and sage-grouse only) and allowing year-round drilling. Should leaseholders opt for this agreement, a 5 percent surface disturbance threshold would be required, which could severely limit disturbance to vegetation communities in these areas and provide overall long-term protection of sagebrush vegetation communities as a result of the Reclamation Performance Standard (Appendix O) requirements. It is unknown, however, what level of long-term protection of vegetation communities would occur owing to the agreement being at each leaseholder's discretion. Limiting disturbance to less than 5 percent and implementing strategies to limit or mitigate sagebrush fragmentation would increase the potential for large, undeveloped tracts of habitat. Because successfully reclaimed areas would no longer count against the 5 percent disturbance limitation, increasing the rate of reclamation

would be incentivized, which could lead leaseholders to speed up the reclamation process, as well as to better ensure that reclamation is successful.

The effect of implementing BMPs would be the same as for Alternative B; however, replacing topsoil to preserve the seed bank and mycorrhizal species could improve the ecological health of rangelands and forests and woodlands by increasing vegetation diversity, compared with Alternatives A and B.

Management of Vermillion Basin would indirectly protect sensitive vegetation communities from surface disturbances by limiting disturbance through leased units to 1 percent of the size of the unit, closures to mineral material sales and other minerals, and both limiting OHV use to designated routes and closing some of the area to OHV use. Limiting or excluding realty actions would also indirectly protect vegetation communities.

Increasing the area in which restrictions to surface disturbance apply while maintaining the ability to grant exceptions, waivers, and modifications could reduce impacts to vegetation resources, compared with Alternative B. This management action could reduce risk for noxious weed and invasive species establishment and improve the ecological health of rangelands and forests and woodlands by increasing vegetation diversity. Management actions that restrict surface disturbing activities include areas closed to OHV use (86,710 acres), NGD restrictions (273,100 acres), areas closed to oil and gas leasing (160,870 acres), NSO stipulations (216,040 acres), areas closed to mineral material sales (157,910 acres), and areas recommended for withdrawal from locatable mineral entry (194,400 acres). Implementing surface restrictions to protect 38,530 acres of fragile soils from human use could help retain the sparse vegetation resources in these areas. In addition, implementing BMPs in sage-grouse habitat to reclaim habitat and reduce footprint for projects associated with resource uses could increase vegetation diversity and reduce surface disturbance. Engineering reclamation plans could reduce the long-term effect of surface disturbance on vegetation. Managing 6,260 acres along streams as eligible for inclusion in the WSR system could also reduce surface disturbance from human uses, which could maintain or increase vegetation diversity and riparian/wetland functioning condition within the RMPPA, compared with Alternatives A and B.

Because of incomplete inventory data, 1,039,500 acres would be managed as limited to existing roads and trails until route designation can take place. This could lead to route proliferation because new user-created routes would be perceived as existing routes by other users. Route proliferation could result in increased surface disturbance, soil erosion, habitat fragmentation, and loss or degradation of vegetation. However, as a baseline of existing roads and trails is developed, BLM could identify and close or rehabilitate newly created routes.

Working closely with livestock permittees, maintaining a variety of habitats, and implementing vegetation treatments to restore desired shrublands, forests, and woodlands would increase vegetation diversity compared with Alternatives A and B. Implementing vegetation treatments on 4,110 acres per year (82,200 acres over 20 years) could increase vegetation diversity and the ability of vegetation to support other resources. Preventing the spread of noxious weeds would improve vegetation composition and structure by increasing the percent cover of desirable plant species in the RMPPA. Increasing vegetation diversity could decrease opportunities for noxious weeds and invasive species establishment, which could affect the ability of the rangeland to

support other resources in the long term. Impacts from fire would be the same as with Alternative B.

Managing for Special Status Species habitat and implementing conservation measures would have the same impacts on vegetation as Alternative B. However, protective stipulations for Special Status Species could alter the location, extent, or timing of vegetation treatments compared with Alternatives A and B. Vegetation treatments that improve the vegetative characteristics of sage-grouse lek sites could be permitted through the exception criteria in Appendix E, which could increase vegetation diversity and riparian/wetland functioning conditions compared with Alternatives A and B.

Managing WSAs, if released by Congress, as closed to locatable and other minerals and as not available for coal leasing could reduce surface disturbance and would retain existing vegetation diversity, which could increase vegetation diversity and riparian/wetland functioning conditions, compared with Alternatives A and B.

Working with CDOW to reduce livestock/big game conflicts and managing the wild horses to achieve AML would have the same impacts as Alternative B. Authorizing motorized and nonmotorized competitive events consistent with OHV area and route designations could reduce surface disturbance and/or maintain existing vegetation. Monitoring user conflicts and using education to further resource protection could reduce surface disturbance and the risk for noxious weeds and invasive species establishment. This action could increase vegetation diversity compared with Alternatives A and B.

4.3.4.4 Alternative D

Compared with Alternatives A, B, and C, increasing the area in which restrictions apply to surface disturbing activities would decrease impacts on vegetation under this alternative. These activities could also affect forests and woodlands by reducing stand density and retaining fire-adapted species. Management actions for resources that result in surface disturbance include energy and minerals, and vegetation treatments. Management actions for resources or resource uses that restrict surface disturbance include NGD in fish and wildlife habitat, conservation measures for Special Status Species, increasing the ROW exclusion areas, and closed and NSO stipulations for oil and gas exploration and development.

Impacts from oil and gas activities would be the same as described in Alternative A. The number of wells (2,273), however, would be 25 percent fewer than for Alternatives A, B, and C, which would result in a total of 9,303 acres less surface disturbance than Alternatives A, B, and C (39,913 acres total) during the planning period.

Under Alternative D, 364,880 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to standard lease stipulations, 94,210 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to CSU lease stipulations, 459,940 acres would be subject to NSO stipulations, and 275,630 acres would be closed. Implementing BMPs within the RMPPA would have the same effect on reducing surface disturbance as would Alternative B. In addition, not granting waivers and modifications could further reduce the effects of surface disturbance from Alternative C.

Managing Vermillion Basin as closed to oil and gas leasing, limited to designated roads and trails for OHV use, and as a ROW exclusion area would reduce surface disturbance from human uses compared with Alternatives A, B, and C. That could locally increase vegetation diversity and might increase riparian/wetland function in Vermillion Basin.

Restrictions on surface disturbing activities would benefit vegetation resources. When compared with Alternatives A, B, and C, there would be an increase in restrictions on surface disturbing activities under this alternative. Enlarging the areas managed with surface disturbance restrictions could increase vegetation diversity and decrease opportunities for noxious weeds and invasive species establishment. Management actions that restrict surface disturbing activities include areas closed to OHV use (289,650 acres), NGD restrictions (632,940 acres), areas closed to oil and gas leasing (275,630 acres), NSO stipulations (459,940 acres), areas closed to mineral material sales (540,510 acres), and areas recommended for withdrawal (587,220 acres) from locatable mineral entry. Engineering reclamation plans could reduce the long-term effect of surface disturbance on vegetation. Protecting 38,530 acres of fragile soils and 8,480 acres suitable for inclusion in the WSR system from human use could also decrease surface disturbance. Implementing BMPs within the RMPPA would reduce the effects of surface disturbance and help maintain existing vegetation diversity and ecological health of rangelands, forests and woodlands, and riparian/wetland functioning condition by retaining existing vegetation and erosion rates.

Managing livestock to improve other resources and implementing vegetation treatments to restore desired shrublands and forests and woodlands could result in a greater improvement in vegetation diversity compared with Alternatives A, B, and C. Preventing the spread of noxious weeds would improve vegetation composition and structure by increasing the percent cover of desirable plant species in the RMPPA. Implementing vegetation treatments on 8,750 acres per year (175,000 acres over 20 years) could increase vegetation diversity and the ability of vegetation to support other resources. In addition, implementing range improvements to maintain sustainable natural diversity of plant communities would maintain or improve vegetation diversity in areas identified through the Rangeland Health assessment process. Managing livestock grazing to improve other resources could increase the vegetation diversity by increasing the percent cover of native species or other vegetation desirable to wildlife species. Fire management would have impacts similar to those in Alternatives B and C. The use of conditional fire response and AMR would increase vegetation diversity compared with Alternative A.

Managing for Special Status Species habitat for regeneration and multiple age classes of vegetation and implementing conservation measures and recommendations would have the same impacts on vegetation as Alternative C. However, protective stipulations for Special Status Species could alter the location, extent, or timing of vegetation treatments compared with Alternatives A and B.

Managing the HMA area with AML would maintain existing vegetation conditions; however, managing these areas primarily for wild horses could reduce vegetation diversity if AUMs were converted from livestock to wild horses and BLM management flexibility decreases (e.g., limiting season of use and controlling distribution). This action will result in more growing season use and areas of heavy and severe use, leading to loss of perennial vegetative cover and

increased soil erosion, as well as an increased risk for noxious weed and invasive species establishment, compared with Alternatives A, B, and C. Reducing livestock/big game conflicts by decreasing livestock populations and managing the wild horses in the Sand Wash Basin to AML could decrease BLM management flexibility.

Managing WSAs, if released by Congress, as closed to locatable and other minerals and as not available for coal leasing could reduce surface disturbance and would retain existing vegetation diversity. In addition, managing areas with backcountry characteristics outside WSAs as closed to OHV use and oil and gas leasing could decrease surface disturbance from human uses. This action could maintain or increase vegetation diversity and riparian/wetland functioning conditions compared with Alternatives A, B, and C.

Authorizing motorized and nonmotorized competitive events consistent with OHV area and route designations could reduce surface disturbance and/or maintain existing vegetation. Monitoring user conflicts and using education to further resource protection could reduce surface disturbance and opportunities for noxious weeds and invasive species establishment. This could increase vegetation diversity compared with Alternative A; however, it could decrease BLM management flexibility compared with Alternatives B and C.

4.3.5 Impacts on Fish and Wildlife Habitat

This section discusses potential impacts of other management actions on fish and wildlife habitat based on existing conditions of fish and wildlife habitat described in Section 3.1.6.

Impacts on fish and wildlife habitat would be considered significant if the following were to occur:

- ❑ Disturbance and/or loss of plant communities, food supplies, cover, breeding sites, and other habitat components necessary for population maintenance used by any species to a degree considered vital to the population
- ❑ Disturbance and/or loss of seasonally important habitat (e.g., critical for overwintering or successful breeding) to a degree considered vital to the population
- ❑ Interference with a species movement pattern that decreases the ability of a species to breed or overwinter successfully to a degree considered vital to the population.

The following assumptions were used in the analysis:

- ❑ If monitoring reveals that mitigation is unsuccessful in precluding significant impacts, immediate measures to prevent further impacts would be implemented as appropriate to the species affected.
- ❑ Disturbance of any component of a species habitat would be detrimental, with the degree of detriment dependent on the importance of the habitat component to the maintenance of the population.
- ❑ Impacts on non-native fish and wildlife species would not be considered significant unless the result provides an important component for native species that would otherwise not be adequately available.
- ❑ Impacts on populations that exceed the current carrying capacity and would not reduce those populations below the carrying capacity would not be considered significant.

- Sufficient habitat exists to maintain current CDOW data analysis unit (DAU) objectives.
- Disruptive activities would displace wildlife, although some wildlife adaptation would occur.

Management actions with potentially significant impacts on fish and wildlife habitat include resource uses that result in surface disturbance and disruptive activities, such as energy and minerals, lands and realty, and travel management. Management actions with potential to enhance fish and wildlife habitat include special management areas and management of soils, water, vegetation, and fish and wildlife for preservation, maintenance, and enhancement of current ecosystem values.

Surface disturbing and disruptive activities cause habitat fragmentation, loss, or displacement, depending on the type, amount, and location of activity. Habitat fragmentation occurs when a contiguous habitat is broken up (fragmented) by surface disturbing activities, causing a reduction in usable ranges and disruption of movements among crucial habitats (e.g., severe winter range), transitional areas, and parturition areas; the isolation of smaller, less mobile species; and an increase in habitat generalists that are characteristic of disturbed environments (Harris 1991). Habitat loss is caused by road construction and road use, facility construction and placement, pipeline construction, field facility maintenance, ROW construction, range improvements, and indirect areas of disturbance surrounding these areas. 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 use of 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. Habitat fragmentation has also been known to interfere with the metapopulation dynamics of many fish populations. When extinctions occur as a result of localized environmental degradation, restrictions of fish passage eliminate the possibility of the area being recolonized from a neighboring population. Surface disturbance could increase sediment delivery to stream and standing water systems, which might interfere with the life history requisites of fish.

Displacement from surface disturbance or disruptive activities moves animals into less desirable habitat and increases competition for available resources with other species and uses. Impacts of human activity on big game and severe winter range include habitat and forage loss caused by surface disturbing and other disruptive activities at any time of the year. Indirect impacts on wildlife occur from displacement and physiological stress from human presence and activity during sensitive life stages. Disturbed big game incurs a physiological cost either through excitement (preparation for exertion) or locomotion. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to a poorer (lower) quality habitat. Chronic or continuous disturbance could result in reduced animal fitness and reproductive potential (Geist 1978).

Factors affecting wildlife species, especially big game, associated with minerals management actions in the RMPPA include the reduction in usable habitat and disruption of movements

between crucial habitats (e.g., severe winter range), transitional areas, and parturition areas associated with the construction of access roads, facilities, or other surface disturbances. Existing oil and gas leases in the RMPPA are spread primarily throughout the northern half (from Highway 40 north); however, there are some existing leases east and west of Highway 13 on the border of the RMPPA and west and south of Oak Creek and Hayden, respectively (Map 3-30). Existing coal leases are located south of Craig, primarily in the area between Oak Creek and Hamilton (Map 3-31). The primary big game migratory corridor goes through some existing oil and gas leases, as well as the area with the majority of coal leases. Further development in these concentrated areas would temporarily reduce available habitat and would likely disrupt migratory corridors. Existing leases within the RMPPA might not provide the specific mitigation measures needed to protect important wildlife habitats. In specific cases in which stipulations would not be adequate to protect habitat, conditions of approval (COA) for APDs could be applied and would be based on site-specific analysis and would establish specific necessary mitigation measures not covered by stipulations for resource and environmental protection. BLM specialists would review sensitive resources with lease operators to develop and implement protection measures to allow for effective development operations where impacts could be avoided or mitigated. Depending on the economics of the industry at the time, it is possible that developers could claim an economic hardship and, therefore, not have to implement recommended mitigation measures.

Within the RMPPA, 296,850 acres, 246,950 acres, and 80,780 acres of leased land with high potential for oil and gas overlap with elk, mule deer, and pronghorn severe winter ranges, respectively. Operational activity from oil and gas development, mining, and salable minerals extraction occurring during the winter on severe winter range all contribute to indirect impacts on wildlife when they are most vulnerable. Initially, the average surface disturbance per oil and gas well pad would amount to 28 acres (4 acres per drill pad, 12 acres for roads, and 12 acres for transmission lines and pipelines). Occasionally, drilling of multiple well bores from a single well pad would reduce impacts on wildlife by reducing the number of surface locations and surface area disturbance. In addition, some wells are dry holes or abandoned producers that are reclaimed. After the well becomes a producer, the area in which disturbance occurs would be reduced to two acres per well and seven acres per access road, on average, as a result of reclamation activities (BLM 2005). Reclamation efforts, however, 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.

Elk have been shown to avoid active oil and gas wells within 1.25 miles (Gusey 1986; Powell 2003; WGFD 2000), drill site construction within 2.4 miles (Hayden-Wing Associates 1990), and major roads within 1.25 miles (Powell 2003). The effect of disturbance was reduced by topographic visual barriers between the source of disturbance and the elk (Ward 1986; Kuck et al. 1985; Van Dyke and Klein 1996). Some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gusey 1986; WGFD

2000), albeit at 50 percent of the previous levels in forested environments (Hayden-Wing Associates 1990). Studies particular to oil and gas activities have shown that elk tolerate some level of operating wells and associated facilities as long as human presence is absent or cover is available in the vicinity of the well site (Gusey 1986; Hayden-Wing Associates 1990). Van Dyke and Klein found that elk showed no shift in home range between the pre- and postdrilling of a single oil well with all roads closed to other traffic and remote monitoring during sensitive periods (winter and parturition) However, there was a shift in their use of commonly used habitat areas out of view of the drill pad during both periods, increased intensity of use in commonly used habitat areas after drilling, and a slightly reduced use of total home range (Van Dyke and Klein 1996). Van Dyke and Klein concluded that if drilling occupied a relatively small amount of home range, elk were able to compensate by shifting areas of use. Kuck concluded that persistent disturbance weakened the tendency of elk to return to the disturbed area and that selection of lesser quality habitat occurred (Kuck et al. 1985); however, abandonment of the traditional calf-rearing habitat did not result in abandonment of calves or a difference in survival rates between disturbed and control groups. There were no data to suggest that elk habituated to mining noises. Johnson and Wollrab found that elk distribution changed during gas exploration and field development through the abandonment of winter and calving habitat and changes in range (Johnson and Wollrab 1987). Although elk returned to disturbed sites, populations were lower (sometimes less than half), and the use of the habitat was unpredictable. When studying elk response to roads, Lyon and Ward found that elk (in a forested environment) moved from 0.24 to 1.8 miles, depending on the amount and type of traffic, road quality, and adjacent cover density (Lyon and Ward 1982). Road avoidance has been reported to occur typically in areas of open vegetation with less adjacent cover (Perry and Overly 1976; Lyon 1979), in shrublands, rather than in pine forests and juniper woodlands (Rost and Bailey 1979), and in areas with increased density of high-quality roads (Hershey and Legee 1976).

Hiatt and Baker examined the effects of a single well installation on winter distributions of elk and mule deer and found that both species avoided the drilling site, but not the access road during drilling (Hiatt and Baker 1981). They also examined vegetation at the well location and concluded that shifts in usage were not the result of differences in vegetation. Because fewer studies have been conducted on the effects of human disturbance on mule deer and pronghorn, particularly from roads and/or oil and gas development, possible effects on these species are not well understood. Rost and Bailey found that mule deer avoid roads by up to 200 meters (0.12 miles) and that road avoidance was greater where roads were more traveled and were in shrub versus forested habitats (Rost and Bailey 1979). There are no known published studies on pronghorns' reactions to roads; however, it has been documented that woven wire ROW fences along roads impede or block pronghorn movement, resulting in fragmentation of habitat (Deblinger 1988; Bruns 1977) and pronghorn deaths caused by the reduction or elimination of access to severe winter relief range. Easterly examined winter distribution of and habitat use by pronghorn and mule deer in a petroleum production complex and found that pronghorn used four of six oil fields in proportion to their availability and that mule deer used five of six oil fields in proportion to their availability (Easterly et al. 1991). Two of the most active oil fields were used less than expected by pronghorn given their availability, and no mule deer were observed in one of the most active oil fields. Easterly concluded that there was continued use of winter range by pronghorn and mule deer after construction of an oil and gas field (Easterly et al. 1991).

Oil and natural gas production could result in the use of pits to separate oil from produced water or to evaporate large volumes of water with high levels of total dissolved solids (TDS). Birds are attracted to these pits because they mistake them for natural bodies of water. The sticky oil then entraps the birds in the pits, and they die from exposure and exhaustion. Birds that do manage to escape can die from starvation or experience impaired reproduction caused by the toxic effects of oil ingested during preening. Scavengers and predators can also suffer adverse effects from consuming oiled birds. Pits or ponds containing hypersaline water can pose a mortality threat to migratory birds through ingestion of toxic brine, susceptibility to avian botulism, and sodium crystallization on feathers, which destroys thermoregulatory and buoyancy functions. A study of bird mortality in oil pits in Wyoming, conducted by Brent J. Esmoil for the University of Wyoming, demonstrated that deterrents, such as flagging, strobe lights, metal reflectors, and noisemakers were not effective at preventing bird mortalities in these pits. Esmoil did not find any mortality in pits completely covered by netting or by wire mesh sufficiently small enough to prevent songbirds from falling through the wire (USFWS 2003).

Short-term impacts from coal mining activities would include displacement of wildlife as a result of human activities and heavy equipment operations in those areas leased as suitable for coal mining. Long-term benefits would include enhanced and more diversified vegetative cover, providing better habitat for wildlife. 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).

Habitat loss, degradation, fragmentation, and species displacement from linear features (e.g., powerlines, roads, and pipelines) and other permitted facilities (e.g., communication sites and wind turbines) would occur. ROW-approved actions for powerlines, communication sites, and wind turbines could also include injury and death to bats, raptors, and other migratory birds as a result of collisions. 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 edge effects.

The crossing of riparian areas by roads can act to fragment populations of aquatic species by limiting movement among required habitats. Additional impacts of roads would include alteration of local hydrologic conditions resulting from modified flow paths, which could affect habitat suitability for aquatic species by increasing sedimentation. For example, clean gravels are required by many fish species for successful spawning. Increased sedimentation can embed these gravels and render spawning efforts unsuccessful.

Transportation routes tend to fragment habitats and can act as barriers to some species. Migration routes could be altered or eliminated, changing some traditional use patterns on a local level. Seclusion areas for wildlife would become smaller and more dispersed in some areas. Transportation routes could also increase public accessibility to areas that previously have been somewhat inaccessible to vehicles during the winter and spring, which could become more important and increase adverse impacts on wildlife as increased demands for use of public lands occur.

In general, travel management activities that result in increased human presence would have a localized impact on fish and wildlife species. Impacts could include increased displacement of

wildlife, increased stress during critical time periods, and degradation of habitats. OHV use can alter the seasonal use patterns of many wildlife species. Of particular concern are raptor nesting sites, big game parturition areas, and all winter habitats. The reduction of designated road densities 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.

Recreation management activities that increase human presence would have a localized impact on fish and wildlife species. These activities include hiking, biking, camping, boat use, fishing, hunting, and sightseeing. Impacts of human activity on big game severe winter range include direct impacts of loss of habitat and forage occurring from surface disturbing and other disruptive activities at any time of the year and indirect impacts of displacement and physiological stress occurring from human presence and activity during the winter.

Wildland fire suppression activities and fuel reduction projects would be conducted according to the appropriate management response (AMR) requirements for fire. Fire reduces dense understory, which has mixed values for various species of wildlife. Fire also acts as a rejuvenator by returning nutrients to the soil. Wildland fire could be beneficial and detrimental to wildlife and their habitats by converting late-seral vegetation to early and mid-seral vegetation, which would provide diversity in habitat, forage, and cover. In late-successional vegetation communities, fire would return the vegetative community to an earlier stage of succession. This conversion could displace species adapted to late-seral vegetation types in local areas.

Using wildland fire as a component of the ecosystem would promote returning fire to its natural role in maintaining diverse habitats for wildlife. Wildland fires usually occur in summer and early fall when conditions for fire are optimum. During the past several decades, human intervention in fire suppression has led to increased fuel loading that could allow wildland fires to burn with greater intensity, resulting in greater consumption of vegetation. Fire-sensitive vegetation such as bitterbrush, which is an important browse species for big game, is often killed and its composition within the plant community reduced. On rare occasions, these fires have the potential to burn exceptionally hot, resulting in sterilization of soils. Sterilization of the soils could delay revegetation for many years. This delay could result in the long-term loss of wildlife habitat. Periodic random wildland fires would rejuvenate overmature, decadent shrub communities and would remove vegetation, forage, hiding cover, and thermal cover. Historically, less intense fires that did not affect entire wildlife populations created mosaics resulting in more variability in vegetation seral stage, species composition, vertical stratification, and improved herbaceous understory. That would benefit species that prefer open habitats, such as mountain bluebirds, and species that benefit from increases in fire-responding vegetation.

Natural disturbance regimes maintain the diversity of riparian ecosystems, resulting in more diverse habitat (Naiman et al. 1993). An example of this effect would be the response to occasional fire by desirable riparian vegetation, such as willow, in areas exhibiting encroachment by upland species; however, these disturbances can also include fire-related flooding, debris flows, landslides, and increased siltation, all of which would affect the riparian ecosystem (Dwire et al. in press). Debris flows, increased siltation, and loss of riparian/wetland vegetation as a result of wildland fires would affect amphibian populations by temporarily altering the suitability of aquatic habitats. For fragmented amphibian populations that lack sufficient recolonization potential, these impacts might be significant at the population scale. For

amphibian populations that do not exhibit fragmentation, rapid vegetative responses following wildfire would allow habitats to be recolonized from neighboring populations. Wildlife fires that add carbon to aquatic systems can alter water quality characteristics and affect fish populations and their habitats. However, given sufficient recolonization routes and vegetative succession, aquatic populations could benefit from increased inputs of carbon that result from fires. Fire suppression activities occurring in fish and amphibian habitats would potentially harm populations of these species as a result of the application of toxic fire-fighting chemicals in riparian/wetland areas. Roads or other surface disturbance associated with fire suppression activities might also increase sedimentation rates into riparian/wetland habitats.

The effects on wildlife of 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 Public Land 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.

The impacts of livestock grazing management on stream processes and fish habitats have been well documented (Armour 1991; White 1996; Rinne 1999). These impacts include the loss of stabilizing riparian vegetation, which can lead to stream instability and an associated loss of habitat complexity; the loss of shading vegetation, which can lead to elevated stream temperatures and increased sediment delivery; and the loss of stream channel complexity provided by fluvial process and woody debris. These impacts can range from negligible to significant, depending on livestock grazing intensity, site characteristics, and species habitat requirements. Livestock grazing systems that are specifically designed to reduce or remove adverse riparian effects have been developed and successfully applied in many areas.

Livestock improvements designed to alter grazing distribution and use of pastures, such as fences, can affect wildlife. Fences would create travel barriers, cause stress and energy loss, and might cause death to big game species from entanglement. In addition, fences have altered the distribution of big game species and created obstructions for birds and perches for predator species. The indirect effect of fences on wildlife is the control provided to livestock management for utilizing the vegetation resource while minimizing impacts to wildlife habitat. Fences built to BLM standards would decrease impacts on big game movements by incorporating design elements that reduce injury and entanglement and decrease stress and energy loss.

Water developments for livestock have expanded the range of wildlife into areas that formerly lacked water sources and were seasonally used. Water improvements that lack water controls (e.g., reservoirs) located in the big game severe winter range could retain big game in these areas longer in the spring; consequently, the quantity and quality of available forage could be decreased the following winter. Water developments also bring livestock use into previously unused areas, which further decreases available forage.

Impoundments change the hydrologic regime of the watershed and affect fish habitats by altering water temperatures and the timing and volume of flow, minimizing the effects of flushing flows and altering sediment transport within the system. In addition, impoundments constructed on streams containing populations of fish, invertebrates, or amphibians would limit movement

among required habitats. Consideration of alternative water development designs, such as wells and guzzlers, would help minimize the adverse impacts that impoundments can have on upstream and downstream fish populations.

Authorized excavation of cultural sites and cultural inventories would have local and short-term impacts on wildlife and their habitats. The short- and long-term impacts associated with these actions would not be detrimental to wildlife and their associated habitat given the limited footprint of such actions on the landscape. Land acquisitions intended to preserve cultural resources, generally would benefit fish and wildlife resources as a result of the consideration of fish and wildlife habitat requirements during acquisition analysis. Any proposed wildlife habitat enhancement project would require a cultural clearance before beginning the project. If cultural sites are found at proposed locations of wildlife habitat enhancement projects, projects would have to be reevaluated, site adjustments would have to be made, and the projects might have to be redesigned.

Management actions for paleontological resources most likely would provide various degrees of wildlife and fish protection through habitat preservation that minimizes vegetation loss and erosion by restricting surface disturbing and other disruptive activities. It is expected that adverse impacts associated with paleontological management would be limited to relatively small areas.

SMA management actions could reduce or eliminate surface disturbance, thereby protecting fish and wildlife habitats. Protections aimed at conserving vegetation and limitations on surface disturbing and other disruptive activities would maintain overall habitat conditions. Developments, uses, and facilities would be managed spatially to minimize loss or alteration of wildlife habitat of higher value.

Vegetation manipulation to improve wildlife habitat would include prescribed burns; livestock grazing strategies; and biological, chemical, and mechanical controls. These treatments provide diverse habitats for various species of wildlife. Vegetation management would maintain or improve wildlife and their habitats; however, there would be short-term impacts on habitat and displacement of wildlife until vegetation communities reestablished themselves. Prescribed fires are usually conducted during the spring or fall. These fires are generally “cooler” than summer wildland fires. The short-term effect of these fires includes the loss of habitats and displacement of wildlife. Prescribed fires would improve the diversity of vegetation age classes and lead to greater herbaceous vegetation production and forage quantity and quality, improving palatability for some wildlife species. Conversely, the loss of late successional vegetative communities would reduce habitats available to species requiring expansive tracts of contiguous late-successional habitat. Vegetation treatments in upland areas could, under limited conditions, increase water yields and affect fish habitats. These effects are likely to be highly variable, depending on local hydrologic characteristics and fish community interactions. Vegetation treatments in upland areas often divert livestock and wildlife use away from riparian and wetland areas, thus, increasing the vigor and structural diversity of these plant communities. This would lead to increased growth of woody and herbaceous riparian vegetation that, in turn, would increase channel stability, stream shading, and introduction of woody debris, which would improve habitat conditions for fishes. The management of wetland/riparian areas to increase proper functioning conditions also improves fish habitat conditions. Because the PFC assessment methodology does not incorporate the habitat requirements of fishes, additional management

would be necessary to ensure that habitats provide conditions suitable to meet the life history requirements of fishes. Watershed management would provide benefits to wildlife by maintaining or restoring habitat conditions through the establishment of DPC objectives, buffer zones placed around riparian areas, and restrictions on surface disturbance in riparian areas and floodplains.

The health of fisheries in the planning area is directly related to the overall health and functional capabilities of riparian resources, which reflect watershed health. Any activities that affected the ecological condition of the watershed and its vegetation cover would directly affect the aquatic environment. It is assumed that any substantial disturbance to the soils or changes in vegetation cover would have an adverse effect on watershed health and water quality and would have an adverse effect on associated fisheries. The degree of impact attributed to any one disturbance or series of disturbances would be influenced by location within the watershed, time and degree of disturbance, existing vegetation, and precipitation. Surface disturbances result in accelerated erosion and runoff, increasing streamflow and sediment and nutrient loads to local channels. Sedimentation of a given channel can affect fisheries by reducing habitat complexity, which results in a lower diversity of prey. Increased turbidity also results from increased sediment input, which decreases light penetration and inhibits visual predation by fish. Surface disturbance near streams that results in substantial removal of riparian vegetation can increase current velocity, which puts additional strain on fish and reduces nutrient cycling. In addition to increased sediment input, stream bank disturbance can affect fisheries by creating bank instability, which can alter flow and destroy pool-riffle formations necessary for fish survival. Increased nutrient loading of streams can increase primary production above natural levels, which degrades habitat and decreases oxygen levels for fish.

Impacts on fish and wildlife habitat would not be anticipated as a result of implementing management actions for air quality, visual resource management, and social and economic values.

4.3.5.1 Alternative A

The majority of impacts on fish and wildlife habitat under this alternative would occur from energy and mineral activity, as well as other surface disturbing and/or disruptive activities, such as OHV use.

Surface disturbing activities would be managed to avoid sensitive fish and wildlife resources, where possible. Impacts from energy and minerals management that would occur on fish and wildlife species and associated habitat include habitat loss, degradation, fragmentation, and species displacement from oil and gas development (e.g., well pads, access roads, and central facilities) on 49,216 acres during the planning period. It is assumed that these activities would be located primarily in the high oil and gas potential area (Map 3-32) and would affect mainly sagebrush and saltbush habitat types, which are common in the RMPPA. Big game, raptors, prairie dogs, and other sagebrush obligate species are the principal wildlife species affected.

A combination of 549,800 acres of federal oil and gas leasable lands open to leasing consideration and subject to standard lease stipulations and 116,210 and 1,162,040 acres of federal oil and gas leasable lands open to leasing consideration and subject to CSO and to

seasonal restrictions, respectively. Development within these areas would affect wildlife habitat as a result of surface disturbing activities being allowed within habitats. CSU stipulations reduce impacts because they provide BLM with the flexibility to work with operators to locate wells and facilities to reduce or eliminate disturbance and/or disruption to wildlife and associated habitat. Seasonal restrictions would allow specifically for protection of wildlife during sensitive life stages, reducing stress on animals during these critical time periods. However, they would not provide long-term protection of habitat. Exceptions would occasionally be granted based on a site-specific analysis (Appendix E) to allow for activities in these areas that would not affect fish and wildlife species.

Big game would experience adverse effects from oil and gas development in areas open to oil and gas development (Table 4-12) with seasonal restrictions, resulting in possible avoidance (up to 1.25 miles) of areas disturbed by drilling and roads. Possible disruption of migratory corridors could also occur from oil and gas and coal lease development; however the level of effect would depend on the timing and location of activity in the RMPPA. If development of the 152 wells per year were dispersed throughout the leases of the RMPPA, effects on big game would likely be minimal, as suitable, where sufficiently large primary alternative habitats exist. If development were concentrated in the high development potential area, as is assumed for analysis purposes, displacement of big game from primary habitat areas to other habitat would occur as a result of most big game habitats being located in almost the same area as the high potential for oil and gas.

Table 4-12. Big Game Habitat Acreage Relative to Oil and Gas Development Potential and Stipulations (Alternative A)

	Total (acres)	Total Leased in High Potential	Total Leased in Medium Potential	Open	NSO	CSU	Seasonal	Closed
Elk severe winter range	337,580	226,960	60,950	46,560	60,980	19,830	274,720	97
Elk migration corridor	58,610	65,100	0	13,406	4,070	140	40,890	0
Mule deer severe winter range	228,460	149,670	67,720	0	43,210	5,460	228,460	5,950
Pronghorn severe winter range	120,300	44,980	41,580	0	18,180	3,870	119,250	680

Avoiding active white-tailed prairie dog colonies within the black-footed ferret reintroduction area would protect the white-tailed prairie dog and associated habitat characteristics from surface disturbances. Designation of active colonies as an avoidance area does not ensure protection of colonies if other means to achieve surface development cannot be found. A decrease in habitat quality would also occur owing to a lack of maintaining early vegetative seral stages in the area.

A combination of 192,190 acres of federal oil and gas leasable lands open to leasing consideration and subject to lease stipulations, such as NSO, and 78,190 acres of federal oil and

gas leasable lands closed to leasing and other mineral activity would protect wildlife habitat and species that are dependent on specific habitat types from activities. Approximately 79,190 acres also would be recommended for withdrawal from locatable mineral entry, which would also protect wildlife habitat from activities in these areas. In addition, some wells are dry holes or abandoned producers, and these areas are reclaimed. After reclamation, these areas would remain dominated by herbaceous species, with desirable shrubs reestablishing in the long term. Early seral habitats would improve habitat for wildlife species, such as prairie dogs, before use by wildlife dependent on shrubs or other late seral habitats.

Fish and wildlife protection stipulations (NSO, CSU, and seasonal) under this alternative are specified for oil and gas activities; therefore, fish and wildlife habitat would not be protected, unless otherwise indicated, from other surface disturbing activities such as other minerals and ROW. This could potentially reduce habitat quality or result in the removal of habitat.

The majority (991,920 acres, or 74 percent) of the RMPPA and big game habitat would be open to OHV use with some seasonal limitations in the Sand Wash Basin HMA for wild horse foaling that would overlap with big game birthing. Impacts on big game species would include habitat degradation, species displacement, and increased stress if activity occurs during critical time periods. The use of OHVs in the gathering of shed antlers would cause deer and elk undue stress if harassed by OHV operators. Areas closed to OHV use or limited to designated roads and trails would avoid impacts associated with the disruption of wintering big game, as well as preserve habitat characteristics.

As a result of most of the RMPPA being open to ROW development (705,540 acres), habitat fragmentation could occur from surface disturbance activity associated with ROWs. Newly authorized ROWs could also lead to increased recreation and OHV use in areas previously inaccessible, which would displace wildlife and increase stress during critical time periods. The disposal of 6,670 acres of BLM-administered public lands would result in a loss of fish or wildlife habitat from public ownership. The limited ability to manage isolated tracts identified for disposal under this alternative makes these tracts less effective fish and wildlife habitats than BLM-administered lands located in areas of blocked ownership. Consideration for the placement of wind and solar energy developments, facility placement, new communication sites, or other permitted actions would continue to occur on a case-by-case basis. BLM would consider sensitive or high-value fish and wildlife habitats in designating areas for the placement of these facilities and would likely maintain the suitability of these habitats.

A 50 percent increase in overall recreation use (based on assumptions outlined under Recreation), most of which would be motorized, would increase impacts of human activity on wildlife habitat, which include direct impacts of loss of habitat and forage occurring from motorized activities and indirect impacts of displacement and physiological stress occurring from human presence and activity. Unrestricted flatwater river floatboating in the Little Yampa/Juniper Canyon SRMA could increase surface disturbance and decrease wildlife and fisheries habitat quality. Impacts on wildlife could include loss of habitat, security, migratory bird nesting habitat, and feeding areas.

Maximum fire suppression in areas of high resource value, as well as in Special Status Species critical management areas, would indirectly preserve wildlife habitat characteristics in the short

term; however, without the use of fire to regenerate available forage and remove decadent vegetation, long-term deterioration of wildlife habitat in maximum suppression areas could occur. Fire suppression activities occurring in fish and amphibian habitats would also potentially harm populations of these species as a result of the application of toxic firefighting chemicals in riparian/wetland areas. In addition, roads or other surface disturbance associated with fire suppression activities could increase sedimentation rates into riparian/wetland habitats.

NSO stipulations within 500 feet to 0.25 mile surrounding perennial water sources would maintain or restore habitat conditions by establishing protective buffers around these areas. However, because NSO stipulations apply only to oil and gas activities, other activities could degrade fish and wildlife habitat surrounding perennial water sources. Furthermore, no protection exists for ephemeral water sources, so fish and wildlife habitat surrounding these areas would likely be highly degraded by all surface disturbing activities.

Vegetation treatments would be conducted on a case-by-case basis, but for purposes of analysis, a total of 3,110 acres of vegetation would be subject to vegetation treatments under this alternative and 1,388 acres subject to prescribed burns. Noxious and invasive weeds are spreading and would need to be controlled to prevent their spread into native plant communities. Spread of noxious and invasive weeds would affect wildlife through loss of habitat, reduction in habitat diversity and forage, and increased foraging by wildlife into other areas that might have lesser-value habitat. Treating infestations on a case-by-case basis consistent with current policy would not likely be adequate to control the spread of noxious weeds that degrade fish and wildlife habitat.

Improving livestock grazing allotments to meet *Standards for Public Land Health* would improve wildlife habitat by increasing the amount of desirable vegetation cover, structure, and species diversity. Ensuring that herd objectives are maintained would also reduce the competition among wild horses, livestock, and wildlife species and improve the suitability of riparian and wetland habitats for various fish and wildlife species.

Management of 6,330 acres for sustained-yield commercial forest products and 37,600 acres of woodland for sustained-yield woodland products would result in either short-term or long-term effects to wildlife habitat characteristics, depending on species requirements, from alteration or removal of habitat components such as cover, nesting and roosting sites, and modification of understory vegetation.

Management of the Limestone Ridge ACEC would indirectly protect wildlife habitat characteristics from surface disturbances through NSO and closures to locatable minerals, mineral material sales, surface mining for coal (underground allowed with NSO), OHVs, and most lands and realty actions. Managing Irish Canyon and Lookout Mountain ACECs as CSU for oil and gas operations, limiting OHV use to designated routes, and excluding lands and realty actions would indirectly protect wildlife habitat characteristics from surface disturbances. Management of the Cross Mountain Canyon ACEC would indirectly protect wildlife habitat characteristics through NSO, closure to OHV use, closure to mineral material sales, closure to surface mining (underground allowed with NSO), and lands and realty exclusion.

If released by Congress, managing the Diamond Breaks and Cross Mountain areas as recreation management areas could increase wildlife displacement from the potential increase of human presence in the area. However, this displacement would likely be short-term. If released by Congress, managing the West Cold Spring area as part of the Cold Spring and Little Snake management units and managing the Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears areas as multiple use, except for oil and gas leasing, could result in the removal of wildlife habitat from surface disturbing activities, as well as the displacement of wildlife from the area as a result of potential increase in human presence in the area.

Multiple use management of lands with wilderness characteristics outside existing WSAs (e.g., Vermillion Basin) would likely reduce the quality and quantity of wildlife habitat as a result of surface disturbing activities. Increased human presence in the area would also result in short-term wildlife displacement, depending on the amount and timing of surface disturbance activities.

4.3.5.2 Alternative B

Impacts from oil and gas activities would be the same as described in Alternative A, except that 1,509,090 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to standard lease stipulations; 153,890 and 149,360 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to lease stipulations with CSU and seasonal restrictions, respectively; 32,770 acres would be subject to NSO stipulations; and 78,190 acres would be closed.

An additional 959,290 acres (174 percent increase compared with Alternative A) of federal mineral estate would be open to oil and gas development under standard terms and conditions, which would result in more severe impacts on fish and wildlife than described under Alternative A. In particular, providing no protection for raptor nest sites and waterfowl and shorebird important production areas, as compared with Alternative A, would result in the potential removal of nest sites and/or disturbance during nesting. That could reduce breeding sites and other habitat components vital to the raptor population, thus, would likely result in a significant impact to raptors, waterfowl, and shorebirds. Also, providing little protection of big game birthing areas or severe winter range (Table 4-13), as compared with Alternative A (Table 4-12), would most likely result in both disruption to sensitive birthing activities and a reduction of available habitat, which would lead to a reduction in big game populations. The timing and location of oil and gas activities are unknown at this time; therefore, it is unknown whether impacts on big game would reach the significance criteria outlined above. Additional protections for big game and other fish and wildlife species could be applied through a COA on an APD consistent with Appendix E if it is determined that impacts on species would be significant.

Table 4-13. Big Game Habitat Acreage Relative to Oil and Gas Development Potential and Stipulations (Alternative B)

	Total (acres)	Total Leased in High Potential	Total Leased in Medium Potential	Open	NSO	CSU	Seasonal	Closed
Elk severe winter range	337,580	226,960	60,950	271,350	17,220	0	60,390	100
Elk migration corridor	58,610	65,100	0	54,100	190	0	470	0
Mule deer severe winter range	228,460	149,670	67,720	196,290	10,570	270	39,380	5,950
Pronghorn severe winter range	120,300	44,980	41,580	101,230	4,940	2,130	16,460	680

In addition, in areas designated NSO and CSU for oil and gas activities, areas would also be designated NGD (essentially equivalent to NSO) and site-specific relocation (SSR) (essentially equivalent to CSU) for other ground disturbing activities, such as other minerals and ROW actions. This designation would help protect fish and wildlife habitat from all surface disturbing activities; however, because of the lack of protection for specific fish and wildlife habitat components (e.g., winter range, birthing areas, nest sites), effects would still most likely lead to a reduction in available habitat.

Management of active white-tailed prairie dog colonies in the black-footed ferret reintroduction area would be the same as described under Alternative A.

Impacts of OHV use would be the same as described under Alternative A; however, an additional 181,030 acres would be open, increasing the impacts on wildlife from habitat degradation, species displacement, and increased stress if activity in these areas occurs during critical time periods, compared with Alternatives A and B. The amount of acreage either closed to OHV use or limited (either to designated or existing roads and trails) would be less under Alternative B, therefore, reducing the avoidance of impacts associated with the disruption of wintering big game and the preservation of habitat characteristics.

The impacts associated with surface disturbances from ROWs granted for oil and gas development would be the same as described in Alternative A. ROWs for other activities would most likely result in greater habitat fragmentation from surface disturbance activity than under Alternative A, as a result of ROWs being allowed on a case-by-case basis and not through designated ROW corridors and as a result of an additional 10,170 acres being open to ROW location under Alternative B. Newly authorized ROWs could also lead to increased recreation and OHV use in areas previously inaccessible, which would lead to displacement of wildlife and increased stress during critical time periods.

The impacts associated with the disposal of BLM-administered public lands would be the same as described in Alternative A. However, applying a landscape-level approach to land tenure

adjustments under Alternative B could indirectly reduce effects by increasing fish and wildlife habitat quality over a greater area as a result of retaining blocked lands that have public access and public value and can be efficiently managed.

Encouraging wind and solar energy development under Alternative B could result in increased surface disturbance, compared with Alternative A and, therefore, reduce fish and wildlife habitat quality. Impacts on migratory bird mortality from wind energy developments would be reduced by use of best available technologies. New communication sites could be located in all areas, except ROW exclusion areas, with priority given to use of existing sites for new developments. Use of existing sites would most likely maintain the suitability of fish and wildlife habitats by locating communication towers on disturbed surface. Should new locations be needed, a reduction of habitat quality from surface disturbance would occur; however, effects are expected to be minor because of the small footprint of communication towers.

Although no SRMAs would be identified under this alternative, the (50 percent) increase in overall recreation use, the majority of which would be motorized, would be expected to be the same as under Alternative A. Impacts on fish and wildlife habitat would be similar to those described under Alternative A. However, ERMA actions, such as monitoring for user conflicts, monitoring resource conditions, and using education to further resource protection, would most likely decrease surface disturbances and maintain fish and wildlife habitat quality.

The use of AMR in areas such as important cultural resources, areas in which fire is not desired, and private lands and urban interfaces and the use of conditional fire suppression in areas in which fire is desired but constraints exist would ensure that factors are considered on a case-by-case basis, depending on the area affected. This use of AMR would likely enhance wildlife habitat overall by allowing fire where appropriate. Minimal to no fire suppression would alter or eliminate wildlife habitat characteristics in the short term; however, fire would regenerate available forage and remove decadent vegetation, further enhancing wildlife habitat for most species in the long term. The impacts on fish and amphibian habitats from fire suppression activities with the use of toxic firefighting chemicals would be the same as described in Alternative A.

Providing no protection of fragile soil areas, as compared with Alternative A, would most likely result in fish and wildlife habitat degradation from increased erosion and sedimentation as a result of surface disturbances in or near these areas. In addition, no stipulations for protection of perennial or ephemeral water sources would most likely result in wildlife habitat degradation from surface disturbance, erosion, and increased sedimentation. Impacts could be potentially significant on fisheries, depending on the proximity of the surface disturbance to water sources.

Management of DPC objectives to emphasize commodity uses could result in vegetation communities that might not provide the required habitat components for all wildlife species in the RMPPA. For example, removal of sagebrush to provide grassland for livestock forage would remove habitat components for those species (e.g., sage sparrow) that depend on sagebrush for all or part of their life cycle, resulting in loss of vital species habitat.

Vegetation treatments would be conducted on a total of 7,750 acres, with 3,542 acres treated by prescribed burns. This is 4,640 more acres of vegetation treatments than under Alternative A

(2,154 more acres burned), which would benefit some species by conversion of habitat, but would not benefit those dependent on the vegetation converted. Effects on fish and wildlife habitat from the spread of noxious and invasive weeds would be the same as described under Alternative A.

Effects of wild horse management on fish and wildlife habitat would be the same as described under Alternative A. However, allowing for the adjustment of the AML, consideration of competing uses would occur so as not to affect wildlife habitat/forage to the extent that would result in a substantial reduction in availability.

Managing livestock grazing using the Standards and Guides to increase livestock forage could improve wildlife habitat for species with similar requirements. Increasing livestock forage could reduce the quality of habitat for wildlife dependent on nonforage vegetation species. Managing livestock grazing using Standards and Guides and focusing on allotments in which land health standards have not been met or in which riparian assessments are “functioning at risk” or at a “downward trend” could also improve riparian/wetland functioning condition by reducing erosion or increasing vegetation diversity. This management action would improve fisheries habitat by decreasing sedimentation and maintaining or improving spawning habitat.

Decreasing big game populations could improve vegetation conditions in areas used primarily by wildlife or areas in which there are livestock or big game conflicts. Emphasizing vegetation treatments, range improvements, and commodity uses to increase forage production could improve wildlife habitat for species with similar forage requirements. Increasing livestock forage, however, could reduce habitat quality for species that require more diverse vegetation communities and structure or have specialized habitat requirements. Range improvements could also alter the distribution of wildlife species and alter the use of habitats, which could introduce competition with livestock in additional areas. Reserve conservation allotments would provide the opportunity to adjust use from other areas, which could improve the overall health and productivity of wildlife habitat in the RMPPA.

The effects of harvesting forest and woodland products would be the same as described in Alternative A.

Management of the Cross Mountain Canyon area consistent with WSA requirements would indirectly protect and enhance wildlife habitat characteristics. However, allowing mineral development, OHV use, and lands and realty actions in the Limestone Ridge, Irish Canyon, and Lookout Mountain areas would indirectly and potentially alter wildlife habitat characteristics through surface disturbances. If they are released by Congress, managing the Diamond Breaks, Cross Mountain, West Cold Spring, Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears areas as multiple use could result in the removal of wildlife habitat from surface disturbing activities, as well as the displacement of wildlife from the area as a result of potential increase in human presence in the area. This management action could increase impacts on wildlife, compared with Alternative A.

Management of Vermillion Basin would provide some protection to wildlife habitat characteristics by closing the area to locatable and other minerals and limiting OHVs to designated routes. CSU stipulations on oil and gas leases and lands and realty authorizations on a

case-by-case basis could affect wildlife habitat characteristics in the area as a result of surface disturbances, as well as cause short-term displacement of wildlife as a result of increased human presence. Management of other lands with wilderness characteristics outside existing WSAs (e.g., Dinosaur North and Cold Springs Mountain) would be the same as described under Alternative A.

4.3.5.3 Alternative C

Effects of soil and water resource management and management of active white-tailed prairie dog colonies in the black-footed ferret reintroduction area would be the same as described under Alternative A. Effects of fire and wild horse management and the management of the Cross Mountain Canyon area would be the same as described under Alternative B.

Impacts from oil and gas activities would be the same as described under Alternative A, except that 417,790 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to standard lease stipulations; 142,860 and 1,216,190 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to CSU and seasonal restrictions, respectively; 216,040 acres would be subject to NSO stipulations; and 160,870 acres would be closed.

Providing more intensive management of oil and gas development and other surface disturbing activities through the use of closures and NSO, CSU, NGD, and SSR stipulations would result in maintaining or preserving fish and wildlife habitat characteristics and migratory corridors throughout the RMPPA. As described under Alternative A, seasonal restrictions would allow specifically for protection of wildlife during sensitive life stages, reducing stress on animals during these critical time periods; however, they would not provide long-term protection of habitat. With most (1,216,190 acres) of the federal mineral estate protected under seasonal stipulations, loss of habitat from surface disturbing activities would continue to occur unless leaseholders whose lease or unit is in the critical sagebrush habitat area (Map 2-4) opt into an agreement to limit habitat fragmentation in return for easing timing limitations (big game and sage-grouse only) and allowing year-round drilling. Should leaseholders opt for this agreement, a 5 percent surface disturbance threshold would be required, which could severely limit disturbance to habitat in these areas and provide overall long-term protection of wildlife habitat, especially for sagebrush obligate species, owing to Reclamation Performance Standard (Appendix O) requirements. However, because the agreement is at each leaseholder's discretion, it is unknown what level of long-term habitat protection would occur. If leaseholders opt into this agreement, there could be a reduction in habitat loss and fragmentation due to oil and gas development either by protecting existing habitat resources from new development or by ensuring that habitat values lost to previous disturbance are reclaimed before new disturbance is created. Requiring that previously disturbed lands meet the reclamation standards in Appendix O before any new disturbances above 5 percent would ensure that reclaimed areas have sufficient diversity and vigor to support wildlife populations. In addition, limiting disturbance to 5 percent would reduce the potential for habitat fragmentation. Requiring strategies to limit or mitigate habitat fragmentation in PODs would maintain habitat in undisturbed blocks, protecting Special Status Species habitat. In addition, requiring operators to submit a POD would allow the operator and BLM to develop site-specific strategies to limit surface disturbance, habitat fragmentation, and other impacts from oil and gas related activities. However, removal of timing limitations

during sensitive periods for big game and allowing year-round drilling disturbance could result in displacement and physiological stress from human presence and activity during sensitive life stages. Disturbed big game incurs a physiological cost either through excitement (preparation for exertion) or locomotion. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to poorer (lower) quality habitat. Chronic or continuous disturbance could result in reduced animal fitness and reproductive potential (Geist 1978). Persistent disturbance could weaken the tendency of big game to return to the disturbed area(s) (Kuck et al. 1985). As shown in Table 4-14, big game would experience adverse effects from oil and gas development in areas open to oil and gas development with seasonal restrictions, resulting in possible avoidance (up to 1.25 miles) of areas disturbed by drilling and roads. However, limiting disturbance to less than 5 percent and implementing strategies to limit or mitigate sagebrush fragmentation would increase the potential for large, undeveloped tracts of habitat. In addition, because successfully reclaimed areas would no longer count against the 5 percent disturbance limitation, increasing the rate of reclamation would be incentivized, which could lead leaseholders to speed up the reclamation process, as well as to better ensure that reclamation is successful. Alternative C would have more overall protection of big game habitat than Alternatives A and B.

Table 4-14. Big Game Habitat Acreage Relative to Oil and Gas Development Potential and Stipulations (Alternative C)

	Total (acres)	Total Leased in High Potential	Total Leased in Medium Potential	Open	NSO	CSU	Seasonal	Closed
Elk severe winter range	337,580	226,960	60,950	43,940	71,810	24,370	337,580	1,480
Elk migration corridor	58,610	65,100	0	13,360	4,820	330	58,610	0
Mule deer severe winter range	228,460	149,670	67,720	0	44,600	6,440	228,460	9,390
Pronghorn severe winter range	120,300	44,980	41,580	0	18,900	3,650	119,250	3,200

Impacts of OHV use would be the same as described under Alternative A, although the magnitude of the impacts would be substantially less. This is because most of the acreage (1,242,600 acres) is either limited to existing roads and trails or to designated routes, pending travel management planning to designated routes as the need arises, based on resource and other indicators. Managing 1,039,500 acres as limited to existing roads and trails until route designation can take place could lead to route proliferation because new user-created routes would be perceived as existing routes by other users. Enforcement in areas designated as limited to existing roads and trails can be problematic because it is legal for users to travel these new routes. Route proliferation could result in increased soil erosion, habitat fragmentation, and loss/degradation of vegetation.

The impacts associated with surface disturbances from ROWs granted for oil and gas development would be the same as described under Alternative A. ROWs for other activities would most likely indirectly result in less habitat fragmentation from surface disturbance activity than under Alternatives A and B as a result of encouraging ROW development in previously disturbed existing major road, power transmission lines, and oil and gas pipeline corridors. In addition, 91,560 acres would be excluded from ROW location, and 141,260 acres would be ROW avoidance areas. Newly authorized ROWs could increase recreation and OHV use in areas previously inaccessible, which would lead to displacement of wildlife and increased stress during critical time periods.

The impacts associated with the disposal of BLM-administered public lands would be the same as described under Alternative A. However, applying a landscape-level approach to land tenure adjustments through identification of zones with specific criteria could indirectly reduce effects by increasing fish and wildlife habitat quality over a greater area as a result of retaining blocked lands that have public access and public value and can be efficiently managed. Actively seeking acquisition of additional lands in the identified central zone of the RMPPA to protect wildlife habitat could provide more areas for preserving and enhancing fish and wildlife habitat quality.

Effects of wind and solar energy development would be the same as described under Alternatives A and B. However, encouraging wind and solar energy development consistent with resource objectives and using major ROW criteria for wind and solar energy development could limit surface disturbance by limiting the locations in which development could occur. Limiting surface disturbance helps maintain existing wildlife and fisheries habitat quality. Effects of communication site management would be the same as described under Alternative B.

A 60 percent increase (a 10 percent increase compared with Alternative A) in overall recreation use is expected under this alternative because the Serviceberry and Fly Creek areas would be closed to OHV for backcountry hunting experiences. An increase in hiking would also be expected in these areas because of their backcountry nature. Effects on fish and wildlife habitat would be similar to those described under Alternative A, and there would be a slight increase of displacement and physiological stress occurring from human presence and activity in these areas; however, these effects would be minimal.

DPC objectives would enhance fish and wildlife habitat through active management of vegetation communities. Managing DPC objectives to emphasize wildlife habitat, livestock grazing, watershed, and biodiversity values, while maintaining or enhancing habitat for Special Status Species, would most likely provide most of the required habitat components for all wildlife species in the RMPPA. However, enhancing habitat for Special Status Species might be detrimental to other wildlife species because of specific habitat requirements of many of the Special Status Species.

Vegetation treatments would be conducted on a total of 4,110 acres, with 1,888 acres treated by prescribed burns. That is 1,000 more acres receiving vegetation treatments than under Alternative A (500 more burned acres). Emphasizing vegetation treatments to maintain a variety of habitats could improve more fish and wildlife habitats for all species than under Alternative A. Particularly in the Sand Hills land health assessment (LHA), restoration of 80 acres of

bitterbrush and other important forage species would reduce existing overuse pressures for forage by wildlife and restore the shrub composition of this habitat to predisturbance conditions.

Effects on fish and wildlife habitat from the spread of noxious and invasive weeds would be the same as those described in Alternative A. However, by preventing the spread of noxious and invasive weeds, eliminating new infestations, and partnering with resource users and other stakeholders to reduce the occurrence of noxious weeds, there would be greater protection of fish and wildlife habitats than under Alternative A.

The effects on fish and wildlife habitat of managing livestock using Standards and Guides would be the same as those described under Alternative A. However, managing livestock grazing to develop sustainable ranching operations could improve more wildlife and fisheries habitat than under Alternatives A and B by improving vegetation diversity and reducing surface disturbance. Considering range improvements to maintain a variety of habitats could improve wildlife and fisheries habitats for all species; however, range improvements could also alter the distribution of wildlife species and the use of habitats. The effect of using reserve conservation allotments would be the same as that described under Alternative B.

The effects of harvesting forest and woodland products on fish and wildlife habitat would be less than described under Alternative A because harvesting would be determined on a case-by-case basis and because the following areas would be closed to harvest: areas with an NSO or NGD designation as well as areas closed to oil and gas leasing, areas with fragile soils or slopes of greater than 20 percent, and areas with specific wildlife concerns such as habitats important to woodland-dependent species.

Management of the Limestone Ridge area would have an increased effect on fish and wildlife habitat compared with Alternative A because only sensitive plants and remnant plant communities would be avoided through a CSU/SSR stipulation, which could allow surface disturbance inside and outside these areas. Management of the Irish Canyon ACEC would have the same effect on fish and wildlife habitat as that described under Alternative A; however, additional protection of wildlife habitat would occur through closure of the area to oil and gas exploration and development and through recommendation for withdrawal from mineral location. Management of the Lookout Mountain area would also indirectly protect wildlife habitat characteristics from surface disturbances through CSU/SSR stipulations on oil and gas/surface disturbance and closures to other minerals except locatables and limiting OHV use to designated trails.

If released by Congress, management outlined for the Diamond Breaks area would result in overall preservation of wildlife habitat characteristics through closures to energy and minerals and OHV use and through ROW exclusion. Wildlife displacement from increased human presence in the area would be likely; however, this effect would be short-term. If it is released by Congress, management outlined for the Cross Mountain area would result in overall preservation of wildlife habitat characteristics through closures to energy, minerals, and OHV use and ROW exclusion. If they are released by Congress, managing the West Cold Spring, Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears areas as closed to energy and minerals, designating them as ROW exclusion areas, and limiting OHV use to existing roads and trails would protect wildlife habitat characteristics from some surface disturbing activities. However,

designating the West Cold Spring area as a ROW avoidance area and allowing wind energy on a case-by-case basis could potentially result in disturbance to some wildlife habitat.

Limiting OHV use to designated routes and oil and gas leasing to NSO within 0.25 mile of each side of the wild and scenic suitable Yampa River segments 1, 2, and 3 would protect habitats from the effects of surface disturbance (e.g., erosion, vegetative modifications) for various fish and wildlife species occurring in or downstream of these areas. Recommending this area for withdrawal from mineral entry would preserve habitats from the effects of surface disturbance. Maintaining or enhancing segments 1 and 2 for suitable fish spawning habitat would further protect fisheries habitat for continued success of the species.

Management of Vermillion Basin would indirectly protect wildlife habitat characteristics from mineral development by limiting surface disturbance to 1 percent of a leased unit, closures to mineral material sales and other minerals, and both limiting OHV use to designated routes and closing some of the area to OHV use. Limiting or excluding realty actions would also indirectly protect wildlife habitat.

Management of Dinosaur North and Cold Springs Mountain would indirectly protect wildlife habitat characteristics from surface disturbances through closures to oil and gas leasing and locatable and other minerals and through limiting OHV use to designated routes. Alteration of habitat quality/quantity could occur if a ROW cannot avoid the area or if a wind energy project is developed, as in the case of Cold Springs Mountain.

4.3.5.4 Alternative D

The effects on fish and wildlife habitat of land tenure adjustments and the spread of noxious and invasive weeds would be the same as those described under Alternative C. The effects of fire management on the Cross Mountain Canyon area would be the same as those described under Alternative B. Effects of soil and water resource management would be the same as those described under Alternative A.

Impacts from oil and gas activities would be the same as those described under Alternative A; however, the reasonably foreseeable development (RFD) number of wells (2,273) would be 25 percent fewer than under Alternatives A, B, and C and therefore would result in 39,913 acres of surface disturbance during the planning period. There is a total of 9,303 acres less surface disturbance than under Alternatives A, B, and C and less acreage of wildlife habitat directly affected by oil and gas development activities.

Under Alternative D, 364,880 acres of federal oil and gas leasable lands would be open to leasing consideration and subject to standard lease stipulations; 94,210 and 1,214,610 acres of federal oil and gas leasable lands would be open to leasing consideration subject to CSU and seasonal restrictions, respectively; 459,940 acres would be subject to NSO stipulations; and 275,630 acres would be closed.

Providing the most intensive management of oil and gas development and other surface disturbing activities of any alternative through the use of closures, NSO, CSU, NGD, and SSR stipulations would maintain or preserve fish and wildlife habitat characteristics and migratory corridors throughout the RMPPA. As described under Alternative A, seasonal restrictions would

allow specifically for protection of wildlife during sensitive life stages, reducing stress on animals during these critical time periods. These restrictions, however, would not provide long-term protection of habitat. Because this alternative has the most acreage (1,214,610 acres) of the federal mineral estate under seasonal stipulations, loss of habitat from surface disturbing activities would continue to occur.

As shown in Table 4-15, most of the big game habitat is open to oil and gas leasing with seasonal stipulations. Alternative D has more overall protection of big game habitat than do Alternatives A, B, and C as a result of additional areas designated CSU and closed.

Table 4-15. Big Game Habitat Acreage Relative to Oil and Gas Development Potential and Stipulations (Alternative D)

	Total (acres)	Total Leased in High Potential	Total Leased in Medium Potential	Open	NSO	CSU	Seasonal	Closed
Elk severe winter range	337,580	226,960	60,950	32,520	75,120	21,320	337,580	22,208
Elk migration corridor	58,610	65,100	0	13,360	9,260	320	40,890	2
Mule deer severe winter range	228,460	149,670	67,720	0	50,660	5,030	228,460	31,150
Pronghorn severe winter range	120,300	44,980	41,580	0	47,900	1,850	119,250	3,610

Impacts of OHV use would be the same as those described under Alternative A, although effects would be minimal as a result of no open areas and the majority of acreage being “limited to designated routes” or closed under this alternative (1,369,090 acres), with travel management planning as described under Alternative C implemented to prioritize areas for transportation planning. Not managing any areas as limited to existing roads and trails until route designation would reduce the potential for route proliferation as users stay on designated routes. Reducing route proliferation would help to maintain natural soil erosion rates, maintain habitat connectivity (reduced fragmentation), and maintain vegetation. In the long term, limiting OHV use to designated routes would alleviate associated surface disturbances, as well as minimize disturbance to wildlife from human presence.

The impacts associated with surface disturbances from ROWs granted for oil and gas development would be the same as those described in Alternative A. ROWs for other activities would indirectly result in less habitat fragmentation from surface disturbance activity than under Alternatives A, B, and C because ROWs would be encouraged in previously disturbed existing major road, power transmission line, and oil and gas pipeline corridors and an additional 408,140 acres (499,700 acres total) would be excluded from ROW location, compared with Alternative C.

Effects of wind and solar energy development would be the same as those described in Alternative C; however, development of these renewable energy sites would cause less surface

disturbance than would Alternative C as a result of ROW exclusion actions. Limiting surface disturbance would help maintain existing wildlife and fisheries habitat quality. Communication site management would cause no new surface disturbance or effects on fish and wildlife habitat because new sites would be located on existing site footprints.

Alternative D would be the most restrictive on recreation use with a 20 percent increase in overall use during the planning period. An increase in hiking would be expected because more areas would be managed for nonmotorized use under Alternative D. However, the overall effect on fish and wildlife habitat from recreation use would be the least under this alternative, with minimal surface disturbance and displacement and physiological stress occurring from human presence and activity.

In general, DPC objectives would enhance fish and wildlife habitat through active management of vegetation communities. Managing of DPC objectives to emphasize wildlife habitat, watershed, and biodiversity values, with particular emphasis being placed on maintaining or enhancing habitat for Special Status Species, would very likely provide most of the required habitat components for all wildlife species in the RMPPA. However, putting particular emphasis on habitat for Special Status Species might be detrimental to other wildlife species because of the specific habitat requirements of many Special Status Species.

Vegetation treatments would be conducted on a total of 8,750 acres, with 4,042 acres treated by prescribed burns. That is 5,640 more acres receiving vegetation treatments than under Alternative A (2,654 more burned acres). Emphasizing vegetation treatments to maintain a variety of habitats could improve more fish and wildlife habitats for all species than could Alternative A. Particularly in the Sand Hills LHA, restoration of 1,000 acres (80 percent more area than Alternative C) of bitterbrush and other important forage species would reduce existing overuse pressures for forage by wildlife and restore the shrub composition of this habitat to predisturbance conditions.

The effects on fish and wildlife habitat of managing livestock using Standards and Guides would be the same as those described under Alternative A; however, managing livestock grazing to improve habitat for other resources would improve more wildlife and fisheries habitat than would Alternatives A, B, and C by improving vegetation diversity and reducing surface disturbance. Allowing range improvements to maintain sustainable natural diversity of plant communities, and when identified through the rangeland health assessment process, would improve wildlife and fisheries habitats for all species. The effect of using reserve conservation allotments would be the same as that described under Alternative B.

Management of the Sand Wash Basin HMA principally for wild horses would likely result in a reduction of available winter and summer ranges for big game species because preference for forage and available habitat would be given to the wild horse herd.

The effects on fish and wildlife habitat of harvesting forest and woodland products would be the same as described under Alternative C.

Management of the Limestone Ridge ACEC would have the same effect on fish and wildlife habitat as that described under Alternative A; however, closing the ACEC to oil and gas leasing

and development, as well as other minerals, would further protect wildlife habitat characteristics. Management of the Irish Canyon ACEC would indirectly protect wildlife habitat characteristics from surface disturbances through NSO stipulations, closures to locatable and other minerals, excluding most lands and realty actions, and limiting OHV use to designated trails. Management of the Lookout Mountain ACEC would have the same effect on fish and wildlife habitat as that described under Alternative C. However, additional protections would very likely be afforded to wildlife habitat characteristics as a result of the area being managed for ROW exclusion and under a more stringent visual resource management (VRM) class objective. Management of the White-tailed Prairie Dog ACEC would indirectly protect wildlife habitat characteristics from surface disturbances through NSO stipulations, closures to locatable and other minerals, excluding most lands and realty actions, and limiting OHV use to designated trails. Managing the area as an ACEC would specifically protect most of the active and inactive known white-tailed prairie dog colonies in the RMPPA from surface disturbances. Designation of the Natural Systems ACECs with management of CSU for oil and gas, ROW avoidance, OHV limited to designated routes, and closed to locatable and other minerals could indirectly protect wildlife habitat characteristics from surface disturbances in these areas.

If released by Congress, management outlined for the Diamond Breaks area would result in overall preservation of wildlife habitat characteristics through closures to energy and minerals and OHV use. Consideration of ROWs on a case-by-case basis could result in the short-term removal of habitat, if approved. Wildlife displacement from increased human presence in the area would be likely; however, this effect would be short-term. If released by Congress, management outlined for the West Cold Spring SRMA would result in preservation of wildlife habitat characteristics through closures to energy and minerals, limiting OHV use to designated routes, and ROW exclusion. If released by Congress, management outlined for the Cross Mountain ACEC would result in the same effects as those described under Alternative C. If they are released by Congress, management outlined for the Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears SRMAs would result in preservation of wildlife habitat characteristics through closures to energy and minerals, limiting OHV use to designated routes, and ROW exclusion.

Closing the area within 0.25 mile of each side of the wild and scenic suitable Yampa River segments 1, 2, and 3; Beaver Creek segment 1; and Vermillion Creek segment 1 to OHV use, oil and gas leasing, and mineral entry would ensure preservation of habitats from the effects of surface disturbance (e.g., erosion, vegetative modifications) for various fish and wildlife species occurring in or downstream of these areas. Maintaining or enhancing Yampa segments 1 and 2 for suitable fish spawning habitat would further protect fisheries habitat for continued success of the species.

Management of Vermillion Basin, Dinosaur North, Cold Springs Mountain, Cross Mountain area, Diamond Breaks area, and Pinyon Ridge area would indirectly protect wildlife habitat characteristics from surface disturbances through closures to oil and gas leasing, locatable and other minerals, and OHV use and excluding lands and realty actions.

4.3.6 Impacts on Special Status Species

This analysis focuses on impacts to Special Status Species, including federally listed species, as well as BLM Sensitive and State-listed species, as a result of disturbances from management actions and resulting effects on species or their populations and changes to the condition of their habitats. Federal protections and BLM policy protecting threatened, endangered, and Sensitive Species were considered methods for reducing the potential impacts from permitted activities. Although data on known locations and habitats within the RMPPA are available, the data are neither complete nor comprehensive concerning all Special Status Species known to occur or of potential habitat that might exist. Known and potential Special Status Species and habitat locations were considered in the analysis; however, the potential for species to occur outside these areas was also considered and, as a result, some impacts are discussed in more general terms.

Impacts on Special Status Species would be considered significant if the following were to occur:

- ❑ Harm or harassment of any federally listed threatened or endangered species
- ❑ Destruction or deterioration of federally listed threatened or endangered species' habitat, migration corridors, breeding areas, or designated critical habitat
- ❑ Decreased population viability or contribution to the federal listing of any federal candidate species or BLM Sensitive Species
- ❑ Viability of protected plant populations jeopardized, with least likelihood of reestablishment after disturbance, or actions resulting in the need to list a species under the Endangered Species Act (ESA)
- ❑ Loss of habitat function or habitat value in BLM Sensitive Species habitats.

The analysis is based on the following assumptions:

- ❑ Ground disturbing activities could lead to modification (positive or negative) of habitat and/or loss or gain of individuals, depending on the amount of area disturbed, the species affected, and the location of the disturbance.
- ❑ Changes in air, water, and habitat quality could lead to direct impacts and could have cumulative impacts on species survival.
- ❑ Impacts on Special Status Species would be more significant than impacts on common species.
- ❑ The U.S. Fish and Wildlife Service (USFWS) would be consulted for any actions that have a potential to affect federally listed species.
- ❑ Conservation measures as of April 2005, outlined in Appendix J, are used for analysis purposes. However, BLM would implement the Statewide Programmatic RMP Project Design Criteria finalized following the Statewide RMP Amendment process or any changes developed in subsequent guidance.

Because Special Status Species have specific habitat requirements, disturbance to the species or their habitat could result in population declines, which could affect survivability of local populations. Specific habitat requirements, population trends in the RMPPA, and factors affecting population trends in the RMPPA are detailed in Chapter 3 (Section 3.1.7), relevant

recovery plans or conservation strategies, and the biological assessment prepared for this RMP under ESA Section 7 requirements. Three general categories would be anticipated to be the most influential on Special Status Species and their habitat—disturbances from casual use, disturbances from permitted activity, and changes to habitat condition. The following analysis is grouped by management action to compare changes in management direction under each alternative.

Because of their widespread occurrence and generally unsupervised nature, recreation and OHV activity would most likely have the greatest effect on Special Status Species and their habitats. Unlike permitted activities (such as oil and gas, ROWs, and developments) that are subject to site-specific environmental review and monitoring, recreation and OHV activity are not under as much scrutiny, which could result in detrimental effects to Special Status Species as casual use increases over time. For example, users could inadvertently trample Special Status Plant Species or damage Special Status Species habitats while camping, hiking, boating, or exploring on OHVs. Similarly, users could introduce noise or dust that could disturb species during sensitive periods, which could indirectly affect reproduction or cause species to abandon areas such as nest sites or areas containing key habitat components or containing important food sources. Stress inflicted on species could also deteriorate species health, which could affect survivability. Humans, pets, and vehicles also act as dispersal agents for invasive weeds, which degrade Special Status Species habitat. OHV use has the potential to cause direct mortality of Special Status Species through accidental or intentional kills by vehicles; stress-related mortality caused by human and OHV presence and intentional harassment by humans (Havlick 2002); and modification of habitat as a result of vegetation loss, soil compaction, and introduction of weed species (Hall 1980; Webb 1983). Effects would likely be greater in areas that receive frequent and/or intense recreation use. Areas that would be subject to more visitation would include easily accessible locations, such as along major roads, near communities, or in areas that offer attractive opportunities for recreation. Although damage to Special Status Species habitats would continue to be monitored, detrimental effects from casual use would not be apparent until after the damage has occurred, which would then be appropriately mitigated to the extent practical and feasible. BLM onsite management of recreation and OHV activity could alleviate such conflicts. Such management would vary by alternative as compared in the following sections.

Permitted activities (including mineral exploration and development, ROW and facility construction, and other activities subject to site-specific NEPA evaluation and monitoring) would result in ground disturbance that could accumulate to affect large expanses of habitat. Surface disturbances could remove or degrade native vegetation, fragment habitats, and introduce invasive weeds that degrade adjacent habitats. Removal of vegetation could influence Special Status Species' behaviors either directly, by limiting availability of nesting and roosting areas, or indirectly, by altering the food supplies. These alterations not only modify existing habitat, they also alter the use of adjacent habitats. Surface disturbance (including road construction) could increase runoff and sediment load in watercourses, consequently affecting survival and productivity of Special Status Species and their food sources. Roads and road construction associated with permitted activities could result in loss of habitat, fragmentation of remaining habitat, and disturbance or mortality of Special Status Species. Actual area of habitat lost to roads could be generally inconsequential; however, habitat fragmentation and the effects on species' behavior could become significant (BioLogic 2004). Noise associated with mining, vehicular traffic, and other human activities could potentially cause Special Status Species to

abandon roost or nest sites. Permitted activities could potentially cause mortality from collisions with vehicles, fences, utility lines, or structures; increased avian predation as a result of the establishment of raptor hunting perch sites (Connelly et al. 2000); drowning or poisoning in water impoundments (Massey 2001); or increased legal harvest or poaching. On the contrary, such activities could also perpetuate early successional grassland development by decreasing woody browse and tall grasses and increasing the amount of bare ground, which would provide desirable habitat for some species, such as prairie dog populations, black-footed ferret, and the mountain plover (CDOW, BLM, and FWS 2001; FWS 1999; FWS 2002; NRCS 2001). However, all permitted activities that might affect federally threatened or endangered species would have to undergo ESA consultation and be mitigated to ensure that those species would not be adversely affected on either a project-specific basis or at a cumulative level. In addition, BLM policy requires other Special Status Species of nonfederal status (such as BLM Sensitive and State-listed species) to receive the same protection and consideration as federally protected species. BLM management of areas allowable for permitted activity and protection of Special Status Species habitats could alleviate any potential for cumulative habitat degradation, such as NSO and seasonal closures. NSO buffers for Special Status Species and their habitats would afford direct protection to those species, as well as refuge for Special Status Species sensitive to activity that could occur in these areas. Seasonal closures of Special Status Species habitats would provide direct protection from disruptive activity during sensitive periods. Seasonal closures for other wildlife species, such as big game, would also provide temporary refuge for Special Status Species sensitive to activity that could occur in these areas. Such management would vary by alternative. Exceptions to stipulations protecting Special Status Species could be granted if the disruption or impact is minimal or if the species or population could withstand the impact. Applying COAs to protect resources, including Special Status Species, would minimize disturbance to Special Status Species and habitat under all alternatives.

Changes to habitat conditions would occur as a result of fire management; vegetation, weed, and forest and woodland treatments; range improvements; and Special Status Species or wildlife habitat enhancements. These actions, or lack thereof, would address future habitat conditions, which foster Special Status Species. Although individual actions toward habitat conditions might not influence Special Status Species, long-term habitat goals might change the quality of habitat conditions, whether improved or diminished. Such management would vary by alternative.

Impacts on Special Status Species from management actions associated with attaining rangeland health and land tenure adjustments would be the same under all alternatives. Continuing to improve allotments that are not meeting Standards and Guides and working with CDOW to reduce livestock and big game conflicts would reduce disturbances from grazing animals and in the long term improve the ecological health and condition of rangeland ecosystems that could provide necessary habitat components for Special Status Species. Implementing vegetation treatments in areas not meeting PFC would minimize potential impacts on aquatic and riparian habitats that could be occupied by Special Status Species. Under all alternatives, continuing to pursue land tenure adjustments to consolidate surface ownership could indirectly provide more contiguous habitat for Special Status Species gained through land exchange.

Impacts on Special Status Species would not be anticipated as a result of implementing management actions for air quality, cultural resources, paleontology, visual resource management, and social and economic values.

4.3.6.1 Alternative A

Disturbance From Casual Use

Depending on the extent and timing of activity, recreation opportunities under this alternative could cause slight to significant changes to habitats that could be occupied by Special Status Species or could provide necessary habitat components. Continuing not to monitor recreation indicators, or to regulate use at sites and access points for all types of recreation activity, could result in surface disturbance and reduced habitat quality for Special Status Species in areas that receive frequent or intense recreation use. The Little Yampa/Juniper Canyon SRMA (19,290 acres), which offers boating along the Yampa River, is easily accessible from Highways 40 and 13 and, located near Craig, it poses a threat to Special Status Species from recreation use in this area. Continued unrestricted flatwater river boating in the Little Yampa/Juniper Canyon SRMA could result in degradation of Special Status Species habitat from pollution and soil disturbance created as a result of recreation use. Twenty miles of the Yampa River within the SRMA are designated critical habitat for the federally endangered Colorado pikeminnow; 3,570 acres include bald eagle roost sites along the riparian corridor, and 4,000 acres serve as sage-grouse severe winter habitat. Damage to critical habitats for the endangered pikeminnow would most likely occur, which could become significant as boating activity, including use of unconventional watercraft (e.g., jet skis), increases over time and results in changes to underwater environments. Continuing to provide developed recreation sites (e.g., boat ramps, campgrounds, picnic sites) along the Yampa River, in Irish Canyon, and at Rocky Reservoir could concentrate surface disturbance from recreation activity, thereby minimizing disturbance to Special Status Species, if facilities are sited away from habitats. However, facilities located in proximity to streams could increase runoff and dust, both of which could potentially cause slight to significant changes in stream characteristics. Changes in stream characteristics could result in altered water chemistry (e.g., phosphorous loading), increased sediment loads, or elevated mineral concentrations (e.g., selenium). Changes in water chemistry and concentrations of certain minerals, such as selenium, can be locally toxic to fish. Sediment loading to critical habitat of endangered fishes decreases fish survival at all life stages by altering important habitat characteristics (e.g., substrate), reducing the amount and availability of preferred habitats for all life stages of endangered fishes, and adding contaminants that are bound to soil particles. An increase in contaminant concentrations in the river would most likely result in an increase in the bioaccumulation of these contaminants in the food chain, which could adversely affect the endangered fishes. Selenium is of particular concern because of its effects on fish reproduction and its tendency to concentrate in low-velocity areas that are important habitats for Colorado pikeminnow and razorback suckers (BioWest 2004). Campgrounds and picnic sites would also increase the presence of trash, potential predators, and disease that could threaten Special Status Species. Limited management of recreation use while providing access and minimal facilities to areas outside the SRMA (referred to as an ERMA) could create surface disturbance and reduce habitat quality for Special Status Species in localized areas that receive more frequent use.

Allowing cross-country OHV use to occur over 74 percent of the RMPPA (991,920 acres) would increasingly attract OHV users as the activity's popularity increases, which could eventually affect Special Status Species and necessary habitat components. Depending on the extent and timing of OHV use, the resulting degradation to vegetation communities could cause slight to significant changes to habitats that could be occupied by Special Status Species or provide

necessary habitat components. Cross-country OHV use could damage Special Status Species habitat, of which stationary species, such as plants, would be most susceptible, depending on the plant species and intensity of OHV use. The possible long-term habitat deterioration could eliminate potential habitat, which could otherwise foster expansion of Special Status Species from current territories. The potential future increase of human activity in areas that could be occupied by Special Status Species would also introduce additional disturbance during sensitive periods. Areas open to over-the-snow vehicles (97 percent of the RMPPA) could potentially disturb Special Status Species sensitive to activity and noise during winter months. Open OHV use occurs within known habitat for federally endangered and threatened species (the Colorado pikeminnow, bald eagle, and experimental populations of the black-footed ferret) as well as other Special Status Species listed in Table 4-16. Continued OHV closures (5 percent of the RMPPA, or 72,480 acres) in the Diamond Breaks WSA, Limestone ACEC, Cross Mountain WSA, Serviceberry area, and Fly Creek area, as well as closures near black-footed ferret release sites would provide direct protection to Special Status Species habitat and minimize disturbance to vital components from recreation activity associated with OHV use.

Motorized access to areas designated as limited (21 percent of the RMPPA, or 286,860 acres) that could be occupied by Special Status Species could result in disturbance to species during sensitive periods from noise and could result in localized disturbance to habitat adjacent to routes. If any of the existing WSAs were released by Congress and subsequently opened to OHV use, impacts to Special Status Species from cross-country travel would also occur in these areas. An access and transportation plan could lead to better transportation management that minimizes direct disturbance to Special Status Species and habitat from dust and erosion that could otherwise deteriorate habitat occupied by Special Status Species.

Disturbance From Permitted Uses

Although the statewide programmatic RMP conservation measures or recommendations would not be implemented under this alternative, site-specific consultation on all permitted activities that might affect federally threatened and endangered species would ensure that those species would not be adversely affected. However, addressing permitted activity on a site-specific basis would not provide as many benefits as a landscape-level approach to protecting Special Status Species and their habitats. In addition, protections and stipulations established for other resources under this alternative and protections of Sensitive Species under BLM policy would provide protection from potential effects as a result of permitted activities.

Approximately 1,822,090 acres of BLM-administered federal mineral estate (96 percent of the RMPPA) would be open to oil and gas leasing consideration, which could cause slight to significant changes to important habitat components and population function as development occurs within more areas of the RMPPA. Authorized wells would not be anticipated to adversely affect species populations; however, population function could decline and become significant as development increases.

Approximately 49,216 acres would be disturbed as a result of an anticipated 3,031 wells drilled, of which 23,030 acres would be reclaimed and converted to early seral stages. Disturbance to habitats could displace Special Status Species, and the possible long-term habitat deterioration could eliminate potential habitat that might otherwise foster expansion of Special Status Species

from current territories. Special Status Species that have a small range, such as plants, could be directly and indirectly affected by loss of habitat components resulting from the introduction of noxious and invasive weeds and conversion of large areas to early seral stage vegetation or cheatgrass as well pads are reclaimed. Use of non-native species or nonadapted strains of native plants in well pad reclamation could also be a direct effect to special status plants and their habitat. On the contrary, conversion of large expanses to early seral vegetation could provide additional habitat that fosters some Special Status Species, such as the prairie dog, black-footed ferret, and mountain plover.

Approximately 638,800 acres in the coal planning area would be acceptable for further consideration of federal coal leasing, 96 percent (1,821,090 acres) would be available for locatable minerals, and 96 percent (1,821,090 acres) would be available for mineral material sales, which would have effects on Special Status Species similar to those of oil and gas activity. Areas open to mineral activity occur in known habitat for federally endangered and threatened species (e.g., bald eagle, experimental populations of the black-footed ferret, special status plants), as well as other Special Status Species listed in Table 4-16. Continuing to close to oil and gas leasing 4 percent of the RMPPA mineral estate (78,190 acres), applying NSO to 192,190 acres (10 percent of the RMPPA), and applying CSU to 116,210 acres (6 percent of the RMPPA) would provide direct protection and reduce disturbance to Special Status Species habitat, threatened and endangered species, and vital habitat components. However, if the Diamond Breaks, Cross Mountain Canyon, and West Cold Spring WSAs were released by Congress and subsequently made available to mineral leasing and development, impacts from minerals activity would also occur in these areas. BMPs and COA applied to mineral development on a site-specific basis would minimize potential disturbance to Special Status Species and their habitat. Conducting surveys for potential Special Status Plant Species before ground disturbance would help identify locations and distribution of BLM Sensitive Species throughout the RMPPA, as well as protect identified occurrences.

Approximately 705,540 acres (52 percent of the RMPPA) are available for ROW development (including powerlines, pipelines, wind and solar projects, and communication sites); if ROW development were authorized, habitats that could be occupied by Special Status Species or provide necessary habitat components would be disturbed. Potential impacts on Special Status Species and habitats would be minimized if ROWs were authorized in existing and potential corridors. Construction and maintenance activities associated with the development could cause disturbances to species, including during sensitive periods. Excluding ROWs on 108,470 (8 percent of the RMPPA) and avoiding placement of ROWs on 535,390 acres (40 percent of the RMPPA) would minimize the potential for habitat deterioration and disturbance to Special Status Species.

Managing 6,330 acres of commercial forest and 37,600 acres of woodlands for sustained yield could increase surface disturbance to habitats and disturb Special Status Species sensitive to activity. Such activity could also remove or modify necessary habitat components; however, project-specific coordination with USFWS and CDOW would protect Special Status Species occurring in these areas from adverse effects. Similarly, allowing special recreation permits (SRP) for large events or events that involve surface disturbing activity could lead to direct or indirect impacts on Special Status Species and habitats, particularly in areas that contain known or potential populations and habitats. Stipulations placed on SRPs in accordance with federal

protections and BLM policy for Special Status Species would minimize the potential for such impacts.

Changes to Habitat Condition

Continuing to provide full protection to buffer areas near or adjacent to critical management areas for threatened, endangered, and candidate species and for Colorado BLM Sensitive Plant Species and using prescribed fire to improve resource habitat conditions would provide direct protection of critical management areas for Special Status Species from wildfire and removal of critical habitat elements as a result of fire. Maximum suppression could limit fire that is necessary to foster habitat conditions for some species. Fire suppression activity could also deteriorate habitat conditions in some localized areas or indirectly affect Special Status Species in adjacent areas. Fire suppression activities (e.g., vehicles, pedestrians, and aircraft) could disturb species that are sensitive to disturbance, such as roosting or nesting species (TREC 2004). Fire retardant could also be flushed into watercourses after rainstorms or placed directly into streams during the management of a wildland or prescribed fire. Large amounts of sediment and chemical fire retardant could be locally toxic to fish (BioWest 2004). Catastrophic wildfires caused by excessive fuel loading from maximum fire suppression could reduce vegetation cover across large expanses, which would permanently displace many species, directly lead to mortality for some species, increase localized surface water runoff, and result in sediment loading in nearby rivers and streams that could be occupied by endangered fishes.

Under Alternative A, the following treatments would be anticipated to occur annually: vegetation treatments on 2,310 acres, forest and woodland treatments on 800 acres, and weed treatments on 8,600 acres. Conducting annual vegetation, weed, forest, and woodland treatments on a case-by-case basis would move vegetation communities toward improved ecological health and rangeland condition that could provide necessary habitat components for Special Status Species and sagebrush obligate species; however, these activities could cause temporary or permanent disturbances to Special Status Species, especially plants, occupying treated areas, and could remove sagebrush necessary for sage-grouse. The approach of addressing vegetation treatments as needed, rather than on a landscape-level or desired plant communities (DPC) approach, would not yield as many benefits to Special Status Species that might be necessary to offset the effects of increasing recreation and permitted activity and could eventually result in deteriorated ecological health and condition of rangelands, forests, riparian areas, and wetlands that may otherwise provide necessary habitat components for Special Status Species. Allowing construction of range improvements could improve ecological health, reduce erosion, and improve conditions of rangelands, riparian zones, and wetlands that may provide necessary habitat components for Special Status Species.

Table 4-16. Special Status Species Occurrences in Open Areas Under Alternative A

Special Status Species ¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Total acres open in the RMPPA	991,920	549,800	638,800

Special Status Species¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Avian	473,910	45,440	127,730
American white pelican	--	--	--
Bald eagle—nesting	1,270	--	0
Bald eagle—roost sites	3,890	--	1,490
Bald eagle—winter sites	55,420	31,980	46,400
Burrowing owl nesting	1,540	--	--
Columbian sharp-tailed grouse leks	430	--	10,330
Ferruginous hawk nesting	8,640	--	1,760
Greater sage-grouse severe winter	310,440	--	39,210
Greater sage-grouse leks	3,220	--	28,540
Mountain plover nesting	88,130	13,460	--
Peregrine falcon nesting	1,010	--	--
Sandhill crane	--	--	--
Fish	0	0	0
Colorado pikeminnow	--	--	--
Razorback sucker	--	--	--
Mammals	446,690	135,730	0
Black-footed ferret	446,690	135,730	--
Plants	2,450	1,800	0
Debris milkvetch	--	--	--
Duchesne buckwheat	--	--	--
Duchesne milkvetch	160	50	--
Gibbin's penstemon	540	380	--
Ligulate feverfew	340	240	--
Mountain clover	--	--	--
Narrowleaf evening primrose	380	490	--
Nelson milkvetch	130	--	--
Ownbey's thistle	--	--	--
Strigose Easter-daisy	--	--	--
Tufted cryptanth	410	170	--
Uinta Basin Spring-Parsley	250	220	--
Woodside Buckwheat	230	250	--

¹ Based on existing data at the BLM LSFO of known locations of Special Status Species. Calculations are provided as a measure to relate scale and extent of the effects from the alternative and are in no way complete or comprehensive of all Special Status Species known to occur or potential habitat that may exist within the RMPPA. Area for point data was determined by using a 0.25-mile buffer.

Source: BLM Little Snake Field Office, GIS files, 2005.

4.3.6.2 Alternative B

Disturbance From Casual Use

Implementing the statewide programmatic RMP conservation measures (specified in Appendix J) would directly protect and minimize disturbance to Special Status Species and their habitat from casual use, such as recreation activity and target shooting. Under Alternative B, no SRMAs would be designated, and managing the entire RMPPA as an ERMA would result in limited management of recreation use while providing access and minimal facilities. Such management could result in disturbance of Special Status Species from human presence and possible alteration of habitat from trampling in localized areas that receive frequent use, which could induce stress and affect reproduction. The level of disturbance would depend on the amount of visitor use in the area and probably would be greater in easily accessible areas, such as the Yampa River. Continuing to provide developed recreation sites (e.g., boat ramps, campgrounds, picnic sites) along the Yampa River, in Irish Canyon, and at Rocky Reservoir at the same service and use levels would result in the same impacts as specified under Alternative A; however, monitoring resource conditions and educating users on resource protection could minimize the potential for such impacts from casual use.

Increasing the area available to cross-county OHV use to 87 percent of the RMPPA (1,172,950 acres) would open areas previously closed or limited to OHV use, extending the potential for habitat degradation, incidental takes or losses, long-term habitat deterioration, and human disturbance described under Alternative A to 18 percent more area of the RMPPA. Areas open to over-the-snow vehicles (97 percent of the RMPPA) would be the same as under Alternative A. Open OHV use occurs in known habitat for federally endangered and threatened species (e.g., bald eagle and experimental populations of the black-footed ferret), as well as other Special Status Species as listed in Table 4-17. OHV closures (46,370 acres, 3 percent of the RMPPA) in the Diamond Breaks and Cross Mountain WSAs would provide direct protection and minimize disturbance to Special Status Species habitat and vital components from recreation activity associated with OHV use. Motorized access to areas designated as limited (10 percent of the RMPPA or 131,930 acres) that could be occupied by Special Status Species could result in disturbance from noise to species during sensitive periods as well as localized disturbance to habitat adjacent to routes. If any of the existing WSAs were released by Congress and subsequently opened to OHV use, potential impacts from cross-country travel would also occur in these areas. Conducting transportation planning on a case-by-case basis could eventually result in deteriorated ecological health of necessary habitat components for Special Status Species.

Disturbance From Permitted Uses

Under Alternative B, implementing the statewide programmatic RMP conservation measures (specified in Appendix J) would provide direct protection and minimize disturbance to Special Status Species and habitat from permitted activity. Site-specific consultation on all permitted activities that might affect federally threatened and endangered species would still need to occur; however, the process would be streamlined with the intent of decreasing processing times and providing a consistent approach to management of Special Status Species. In addition, protections and stipulations established for other resources under this alternative and protections

of sensitive species under BLM policy would provide a reprieve from potential effects as a result of permitted activities.

Increasing the amount of BLM-administered federal mineral estate open to oil and gas leasing consideration to 79 percent of the RMPPA (1,509,090 acres) would remove protective stipulations on areas previously restricted, eventually extending the potential for population decline described under Alternative A to 174 percent more area of the RMPPA. In addition, removal of NSO stipulations that specifically protect Special Status Species and their habitats during sensitive periods could lead to segmented management of Special Status Species and isolated instances of nest abandonment and disturbance during breeding. Removal of stipulations intended to protect sharp-tailed grouse and sage-grouse could cause abandonment and potentially destroy lek sites, nesting habitat, and severe winter habitat, which could result in slight to significant changes in those habitats, depending on the extent of disturbance over time. Removing surface disturbing stipulations in black-footed ferret habitat, which is not afforded protections under ESA because of the experimental nonessential designation, would allow activities to occur that eventually could deteriorate the condition of prairie dog towns and deplete food sources for ferrets and raptors. Site-specific relocation (SSR) would be required on 158,950 acres (12 percent of the RMPPA), which would protect any habitat that could directly or indirectly benefit Special Status Species. In addition, 89,240 acres (7 percent of the RMPPA) would be designated as NGD, and 71,220 acres (5 percent of the RMPPA) as subject to seasonal limitations, which would apply stipulations established to protect sensitive resources from oil and gas activity to all permitted ground disturbing activities. The number of wells drilled (3,031 wells) and associated ground disturbance that would convert areas to early seral vegetation would be the same as discussed under Alternative A. Approximately 638,800 acres in the coal planning area would be acceptable for further consideration of federal coal leasing, 92 percent (1,746,970 acres) would be available for locatable minerals, and 95 percent (1,802,490 acres) would be available for mineral material sales, which would have similar effects on Special Status Species.

Areas open to mineral activity would occur in known habitat for federally endangered and threatened species (e.g., Colorado pikeminnow and experimental populations of the black-footed ferret) as well as other Special Status Species listed in Table 4-17. Closing to oil and gas leasing 4 percent of the RMPPA mineral estate (78,190 acres) and applying NSO on 32,770 acres (2 percent of the RMPPA) and CSU on 153,890 acres (8 percent of the RMPPA) would directly protect and minimize disturbance to Special Status Species habitat, threatened and endangered species, and vital habitat components. However, if the Diamond Breaks, Cross Mountain Canyon, and West Cold Spring WSAs were released by Congress and subsequently made available to mineral leasing and development, impacts from minerals activity would also occur in these areas. BMPs, COAs, and conducting surveys for Special Status Plant Species habitat before ground disturbance would continue to minimize disturbance and protect known locations of Special Status Species, as described under Alternative A.

Increasing areas available for ROW development to 53 percent of the RMPPA (715,710 acres) would remove protective stipulations on areas previously restricted, extending the potential for habitat disruption described under Alternative A to 1 percent more area of the RMPPA. Case-by-case approval and the lack of ROW corridors could eventually result in deteriorated ecological health that may otherwise provide necessary habitat components for Special Status Species.

Construction and maintenance activities associated with the development could cause disturbances to species, including during sensitive periods. Excluding ROWs on 78,250 acres (6 percent of the RMPPA) and avoiding placement of ROWs on 555,440 acres (41 percent of the RMPPA) would minimize the potential for habitat deterioration and disturbance to Special Status Species.

Impacts on Special Status Species from management of commercial forest and woodlands and from SRPs for large events or events that involve surface disturbing activity would be the same as those discussed under Alternative A.

Changes to Habitat Condition

Retaining key habitat components, habitat restoration, and enhancing key habitat areas in accordance with the statewide programmatic RMP conservation measures (specified in Appendix J) would maintain or enhance habitat for Special Status Species in the long term. These restoration activities could cause localized, temporary changes and disturbances to Special Status Species occupying treated areas.

Using AMR in areas in which fire is not desired, conditional fire suppression in areas with threatened or endangered species or habitat considerations, and minimal to no fire suppression in areas in which fire is desired would allow fire to play a natural role in the ecosystem where necessary to foster habitats used by Special Status Species and would suppress fire in Special Status Species habitat where fire is not desirable. Protections for Special Status Species under this alternative would minimize any potential impacts on Special Status Species from fire suppression activity; however, suppression could cause localized, temporary changes to stream characteristics and disturbances to Special Status Species occupying treated areas as described in Alternative A.

Compared with Alternative A, vegetation treatments would increase to 6,550 acres annually, forest and woodland treatments would increase to 1,200 acres annually, and weed treatments would remain the same as under Alternative A (8,600 acres annually). Managing for DPC with an emphasis on commodity uses would most likely convert habitats to early seral stages, resulting in habitat that is less desirable to Special Status Species, including sage-grouse. Using vegetation treatments to increase forage could increase food sources for a variety of foraging species, including special status raptors, but could cause temporary or permanent disturbances to Special Status Species, especially plants, occupying treated areas, and treatments could remove sagebrush necessary for sage-grouse. Conducting weed, forest, and woodland treatments on a case-by-case basis would result in the same impacts as those described in Alternative A. Allowing construction of range improvements would also result in the same impacts as those described in Alternative A.

Table 4-17. Special Status Species Occurring in Open Areas Under Alternative B

Special Status Species¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Total acres open in the RMPPA	1,172,950	1,509,090	638,800
Avian	589,520	655,430	127,730
American white pelican	--	--	--
Bald eagle—nesting	1,430	--	0
Bald eagle—roost sites	10,080	--	1,490
Bald eagle—winter sites	63,240	--	46,400
Burrowing owl nesting	1,770	1,600	--
Columbian sharp-tailed grouse leks	470	3,310	10,330
Ferruginous hawk nesting	10,360	11,660	1,760
Greater sage-grouse severe winter	404,700	479,850	39,210
Greater sage-grouse leks	5,440	66,070	28,540
Mountain plover nesting	89,770	91,250	--
Peregrine falcon nesting	2,260	1,690	--
Sandhill crane	--	--	--
Fish	0	20 (miles)	0
Colorado pikeminnow	--	20	--
Razorback sucker	--	--	--
Mammals	455,830	457,210	0
Black-footed ferret	455,830	457,210	--
Plants	3,150	1,890	0
Debris milkvetch	50	40	--
Duchesne buckwheat	--	50	--
Duchesne milkvetch	210	150	--
Gibbin's penstemon	540	270	--
Ligulate feverfew	370	260	--
Mountain clover	0	0	--
Narrowleaf evening primrose	1,050	660	--
Nelson milkvetch	130	90	--
Ownbey's thistle	--	--	--
Strigose Easter-daisy	--	--	--
Tufted cryptanth	430	150	--
Uinta Basin Spring-parsley	--	--	--
Woodside buckwheat	370	220	--

¹ Based on existing data at the BLM LSFO of known locations of Special Status Species. Calculations are provided as a measure to relate scale and extent of the effects from the alternative and are in no way complete or comprehensive of all Special Status Species known to occur or potential habitat that may exist in the RMPPA. Area for point data was determined by using a 0.25-mile buffer.

Source: BLM Little Snake Field Office, GIS files, 2005.

4.3.6.3 Alternative C

Disturbance From Casual Use

Implementing the statewide programmatic RMP conservation measures and recommendations (specified in Appendix J) would directly protect and minimize disturbance to Special Status Species and habitat from casual use, such as recreation activity and target shooting. In addition, conducting monitoring would provide greater long-term habitat protections for Special Status Species. There would be five SRMAs under Alternative C (Little Yampa Canyon, Juniper Mountain, Cedar Mountain, south Sand Wash, and Serviceberry), which would increase areas of concentrated recreation use in areas that might be occupied by Special Status Species. Potential impacts from the 27,310-acre Little Yampa Canyon SRMA (which contains 4,370 acres of bald eagle habitat, 4,370 acres of sage-grouse habitat, and 20 miles of federally endangered pikeminnow critical habitat) would be similar to those identified in Alternative A. Taking measures to ensure protection of Special Status Species once impacts meet criteria outlined in Appendix F would reduce the extent of potential habitat damage and minimize potential impacts. Managing the Juniper Mountain SRMA (1,780 acres, all of which provide sage-grouse severe winter habitat) to provide for hunting and OHV uses could increase human activity in areas that could be occupied by Special Status Species sensitive to disturbance and during sensitive periods and could result in localized disturbance to habitat. However, modifying roads and trails to mitigate impacts and limiting OHV use to designated routes would mitigate disturbance from visitor use. Managing the Cedar Mountain SRMA (900 acres) for community recreation would concentrate recreation use adjacent to communities in areas in which there are no known Special Status Species. The 35,510-acre south Sand Wash SRMA designated for quality OHV use encompasses 220 acres of bald eagle habitat, 120 acres of burrowing owl nest sites, 80 acres of ferruginous hawk nesting sites, 540 acres of sage-grouse severe winter habitat, 180 acres of mountain plover habitat, and 1,150 acres of black-footed ferret habitat. Depending on the extent and timing of recreation activity, casual use in the SRMA could cause slight to significant changes to habitats that could be occupied by Special Status Species or provide necessary habitat components. Human activity would also increase in areas that could be occupied by Special Status Species sensitive to disturbance and during sensitive periods. Siting trailheads, parking, camping facilities, and designated trails away from known Special Status Species habitats or potential habitats could provide some reprieve from potential impacts. Managing the Serviceberry SRMA (12,380 acres that encompasses 40 acres of sharp-tailed grouse leks, 240 acres of ferruginous hawk nest sites, and 3,110 acres of sage-grouse severe winter habitat) to provide backcountry, nonmotorized hunting experiences would directly protect and minimize disturbances to Special Status Species and habitat from OHV use; however, short-term increased human activity during the hunting season could result in localized deterioration of habitat. Managing the remaining areas as an ERMA would result in limited management of recreation use while providing access and minimal facilities, which could increase surface disturbance and reduce habitat quality for Special Status Species. Continuing to provide developed recreation sites (e.g., boat ramps, campgrounds, picnic sites) along the Yampa River, in Irish Canyon, and at Rocky Reservoir and providing additional sites in the SRMAs would result in the same impacts as specified under Alternative A; however, monitoring resource conditions and educating users on resource protection could minimize the potential for such impacts.

Decreasing the area available to cross-county OHV use to 2 percent of the RMPPA (21,940 acres) would provide concentrated areas of OHV use primarily in south Sand Wash, minimizing the potential for habitat degradation, loss of species, long-term habitat deterioration, and human disturbance described under Alternative A. Areas open to over-the-snow vehicles (38 percent of the RMPPA) could potentially disturb Special Status Species sensitive to activity and noise during winter months, but the area would be reduced by added restrictions in severe winter range and other seasonally limited wildlife habitats. Open OHV use occurs within known habitat for experimental populations of the black-footed ferret, as well as other Special Status Species listed in Table 4-18. OHV closures (6 percent of the RMPPA, or 86,710 acres) in the Diamond Breaks and Cross Mountain WSAs, Limestone Ridge, Serviceberry SRMA Zone 2, Fly Creek area, portions of Vermillion Basin, and water impoundments in the Sand Wash HMA would directly protect and minimize disturbance to Special Status Species habitat and vital components from recreation activity associated with OHV use. Motorized access to areas designated as limited (92 percent of the RMPPA, or 1,242,600 acres) that could be occupied by Special Status Species could result in disturbance to species during sensitive periods from noise, and localized disturbance to habitat adjacent to routes. However, if any of the existing WSAs were released by Congress and subsequently designated as limited OHV use, localized impacts and disturbance would also occur in these areas. An access and transportation plan that restricts access to meet resource objectives, reduces habitat fragmentation, and limits access points and stream crossings would lead to better transportation management that minimizes direct disturbance to Special Status Species and habitat from dust and erosion that might deteriorate habitat occupied by Special Status Species.

Disturbance From Permitted Uses

Implementing the statewide programmatic RMP conservation recommendations, as well as the conservation measures (specified in Appendix J), would directly protect and minimize disturbance to Special Status Species and their habitat from permitted activity and improve existing habitats. In addition, monitoring, improving habitats, and eliminating or minimizing existing structures that could pose a risk to Special Status Species would provide greater long-term habitat improvements and protections for Special Status Species. Site-specific consultation on all permitted activities that might affect federally threatened and endangered species would still need to occur; however, the process would be streamlined with the intent of decreasing processing times and providing a consistent approach to managing Special Status Species. In addition, protections and stipulations established for other resources under this alternative and protections of sensitive species under BLM policy would provide reprieve from potential effects as a result of permitted activities.

Decreasing the amount of BLM-administered federal mineral estate open to oil and gas leasing consideration to 22 percent of the RMPPA (417,790 acres) would increase the area covered by protective stipulations, thereby eventually decreasing the potential for population declines as described under Alternative A on 24 percent less area. Stipulations would be similar to those identified in Alternative A. In addition, stipulations to restrict ground disturbing activity and require SSR in prairie dog complexes (which foster black-footed ferrets and provide food sources for other Special Status Species) and sage-grouse nesting and early brood rearing habitat during certain time periods would protect species during sensitive life stages; however, they would not prevent habitat degradation or loss from these activities outside timing limitations. In

addition, areas covered by NGD and seasonal limitations for all ground disturbing activities would increase from Alternative B. Approximately 273,690 acres (20 percent of the RMPPA) would be designated as NGD and 810,680 acres (60 percent of the RMPPA) as subject to seasonal limitations, which would apply stipulations established to protect sensitive resources from oil and gas activity to all permitted ground disturbing activities.

Under Alternative C, leaseholders whose lease or unit is within the critical sagebrush habitat area (Map 2-4) could opt into an agreement to limit habitat fragmentation in return for easing timing limitations (big game and sage-grouse only) and allowing year-round drilling. Should leaseholders opt for this agreement, a 5 percent surface disturbance threshold would be required, which could severely limit disturbance to habitat in these areas and provide overall long-term protection of wildlife habitat, especially for sagebrush obligate species, as a result of Reclamation Performance Standard (Appendix O) requirements. It is unknown, however, what level of long-term protection of habitat would occur, because the agreement is at each leaseholder's discretion. If leaseholders opt into this agreement, there could be a reduction in habitat loss and fragmentation due to oil and gas development, either by protecting existing habitat resources from new development or by ensuring that habitat values lost to previous disturbance are reclaimed before new disturbance is created. Requiring that previously disturbed lands meet the reclamation standards in Appendix O before any new disturbances above 5 percent would ensure that reclaimed areas have sufficient diversity and vigor to support Special Status Species populations. In addition, limiting disturbance to 5 percent would reduce the potential for habitat fragmentation. Requiring strategies to limit or mitigate habitat fragmentation in POD would maintain habitat in undisturbed blocks, protecting Special Status Species habitat. In addition, requiring operators to submit a POD would allow the operator and BLM to develop site-specific strategies to limit surface disturbance, habitat fragmentation, and other impacts from oil and gas related activities. However, removal of timing limitations during sensitive periods for sage-grouse and allowing year-round drilling disturbance could increase human activity and associated pumping noise during sensitive life stages, causing displacement (Braun 1986; TRC Mariah Associates Inc. 1997). A recent study on exploration fields in western Wyoming found that male sage-grouse populations avoided leks adjacent to drilling activity by an average of 51 percent, compared with 3 percent drops at undisturbed sites. The study also found declines in breeding males at lek sites within 3.1 miles of drilling rigs (NSO stipulation for lek sites is 0.25 mile). In addition, the effects on grouse behavior and populations continued even after oil and gas activity ended (Holloran 2005). Limiting disturbance to less than 5 percent and implementing strategies to limit or mitigate sagebrush fragmentation would increase the potential for large, undeveloped tracts of habitat. In May 2002, Lyons concluded that extreme early brood survival appeared to be the limiting factor in greater sage-grouse population stability on the Pinedale Mesa in Wyoming and suggested that disturbances (i.e., noise and predation) associated with well drilling and road traffic during breeding might result in reduced nest initiation rates and could be causing lower brood survival. As documented in Chapter 3, greater sage-grouse nesting and wintering habitat requirements are quite specific. Requiring PODs and limitations on disturbance could reduce loss of this habitat, but there could also be development activity during these sensitive seasons. Because successfully reclaimed areas would no longer count against the 5 percent disturbance limitation, increasing the rate of reclamation would be incentivized, which could lead leaseholders to speed up the reclamation process, as well as to better ensure that reclamation is successful.

The protections associated with NSO, CSU, and timing stipulations would provide greater protections for Special Status Species when applied to encompass all ground disturbing activity compared with Alternative A. SSR would be required on 137,780 acres (10 percent of the RMPPA), which would protect any habitat that could benefit Special Status Species either directly or indirectly. The number of wells drilled (3,031 wells) and associated ground disturbance that would convert areas to early seral vegetation would be similar to Alternative A; however, BMPs and reclamation requirements specified in Alternative C would reduce the potential for displacement and possible long-term habitat deterioration. Approximately 638,570 acres in the coal planning area would be available for further consideration of federal coal leasing, 85 percent (1,705,880 acres) would be available for locatable minerals, and 92 percent (1,742,370 acres) would be available for mineral material sales, which would have similar effects on Special Status Species. Areas open to mineral activity would occur in known habitat of federally endangered and threatened species (e.g., Colorado pikeminnow, bald eagle, and experimental populations of black-footed ferret), as well as other Special Status Species listed in Table 4-18. Closing to oil and gas leasing 9 percent of the RMPPA mineral estate (160,870 acres), and applying NSO stipulations on 216,040 acres (11 percent of the RMPPA) and CSU on 184,840 acres (10 percent of the RMPPA) would directly protect and minimize disturbance to Special Status Species habitat, threatened and endangered species, and vital habitat components. If the Diamond Breaks, Cross Mountain Canyon, and West Cold Spring WSAs were released by Congress, the areas would continue to be closed to mineral activity, and Special Status Species in these locations would not be subject to such ground disturbing activity. BMPs, COAs, and conducting surveys for Special Status Plant habitat before ground disturbance would continue to minimize disturbance and protect known locations of Special Status Species, as described under Alternative A.

Allowing ROW development on 83 percent of the RMPPA (1,116,580 acres) would increase the potential for habitat disruption as described under Alternative A because 74 percent more acres will be available for development. Encouraging ROWs to be located in existing corridors, such as major roads and existing transmission lines and pipelines, would concentrate ground disturbance and human activity in existing corridors, minimizing the potential for habitat deterioration and species disturbance to areas outside existing corridors. Construction and maintenance activities associated with the development could cause disturbances to species, including during sensitive periods. Excluding ROWs on 91,560 acres (7 percent of the RMPPA) and avoiding placement of ROWs on 141,260 acres (11 percent of the RMPPA) would minimize the potential for habitat deterioration and disturbance to Special Status Species.

Impacts on Special Status Species from management of SRPs for large events or events that involve surface disturbing activity would be the same as those described under Alternative A. Managing forest and woodland communities for ecological health using fire and other treatments and allowing product sales would improve habitat diversity and the ecological health and condition of forests and woodlands that could provide necessary habitat components for Special Status Species; however, such treatments could cause temporary disturbances to Special Status Species occupying treated areas.

Changes to Habitat Condition

Retaining key habitat components, habitat restoration, and enhancing key habitat areas in accordance with the statewide programmatic RMP conservation measures (specified in Appendix J) would maintain or enhance habitat for Special Status Species in the long term. These restoration activities could cause localized, temporary changes and disturbances to Special Status Species occupying treated areas.

Effects on Special Status Species from fire management (including using AMR where fire is not desired, conditional fire suppression in areas with threatened or endangered species or habitat considerations, and minimal to no fire suppression in areas in which fire is desired), as well as potential impacts from fire suppression activity, would be the same as those discussed under Alternative B.

Compared with Alternative A, vegetation treatments would be anticipated to increase to 3,310 acres annually, forest and woodland treatments to occur at the same level (800 acres annually), and weed treatments to increase to 10,600 acres annually. Managing for DPC with an emphasis on wildlife habitat, livestock grazing, watershed, and biodiversity values, while maintaining or enhancing habitat for Special Status Species, could achieve a healthy mosaic of communities beneficial to a variety of species, including necessary habitat components for Special Status Species. Using vegetation treatments to restore diversity of seral stages and species, sage-grouse habitat, juniper encroachment, winter forage species, and mountain shrub would eventually improve the ecological health and condition of rangelands, sagebrush, and shrub communities that could provide necessary habitat components for Special Status Species and sagebrush obligate species. Annually restoring ponderosa, lodgepole, and aspen would eventually improve habitat diversity and the ecological health and condition of forests and riparian/wetland areas that may provide necessary habitat components for Special Status Species. Preventing the spread of noxious weeds, focusing on eliminating new infestations, and maximizing cooperative agreements for control of invasive species would more aggressively improve the ecological health and condition of areas infested with noxious weeds, which could create better and possibly additional habitat components necessary for Special Status Species. Preventing further spread of new infestations would reduce the extent of habitat affected throughout the LSFO that could be necessary for Special Status Species; however, treatments could cause temporary disturbances to Special Status Species occupying treated areas.

Using range developments to improve rangeland diversity, condition, and sustainability could improve the ecological health, reduce erosion, and improve conditions of rangelands, riparian zones, and wetlands that could provide necessary habitat components for Special Status Species. However, potential improvements would be focused on necessary habitat components, such as control of pinyon-juniper encroachment and decadent sagebrush.

Table 4-18. Special Status Species Occurring in Open Areas Under Alternative C

Special Status Species¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Total acres open in the RMPPA	21,940	417,790	638,570

Special Status Species¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Avian	830	18,030	127,590
American white pelican	--	--	--
Bald eagle—nesting	--		0
Bald eagle—roost sites	--	2,030	1,350
Bald eagle—winter sites	--	--	46,400
Burrowing owl nesting	120	--	--
Columbian sharp-tailed grouse leks	--	--	10,330
Ferruginous hawk nesting	--	--	1,760
Greater sage-grouse severe winter	530	8,100	39,210
Greater sage-grouse leks	--	660	28,540
Mountain plover nesting	180	370	--
Peregrine falcon nesting	--	6,870	--
Sandhill crane	--	--	--
Fish	0	19 (miles)	0
Colorado pikeminnow	--	19	--
Razorback sucker	--	--	--
Mammals	21,940	59,500	0
Black-footed ferret	21,940	59,500	--
Plants	0	1,980	0
Debris milkvetch	--	--	--
Duchesne buckwheat	--	60	--
Duchesne milkvetch	--	--	--
Gibbin's penstemon	--	150	--
Ligulate feverfew	--	380	--
Mountain clover	--	130	--
Narrowleaf evening primrose	--	330	--
Nelson milkvetch	--	--	--
Ownbey's thistle	--	130	--
Strigose Easter-daisy	--	--	--
Tufted cryptanth	--	380	--
Uinta Basin Spring-parsley	--	--	--
Woodside buckwheat	--	420	--

¹ Based on existing data at the BLM LSFO of known locations of Special Status Species. Calculations are provided as a measure to relate scale and extent of the effects from the alternative and are in no way complete or comprehensive of all Special Status Species known to occur or potential habitat that may exist within the RMPPA. Area for point data was determined by using a 0.25-mile buffer.

Source: BLM Little Snake Field Office, GIS files, 2005.

4.3.6.4 Alternative D

Disturbance from Casual Use

Protections to Special Status Species and habitat from casual use by implementing the statewide programmatic RMP conservation measures and recommendations (specified in Appendix J) would be the same as those described in Alternative C. There would be eight SRMAs under Alternative D (the five SRMAs in Alternative C plus three additional—Fly Creek, Dinosaur North, and Cold Springs), which would increase areas of concentrated recreation use in areas that could be occupied by Special Status Species. Potential impacts from the 29,380-acre Little Yampa Canyon SRMA and 1,780-acre Juniper Mountain SRMA would be the same as those described in Alternative C; however, restricting motorized access to the river would minimize impacts on federally endangered pikeminnow critical habitat as a result of erosion, dust, and runoff and disturbance to riparian-dependent Special Status Species and their food sources. Potential impacts from the Cedar Mountain SRMA (900 acres), south Sand Wash SRMA (35,510 acres), and Serviceberry SRMA (12,380 acres) would be the same as those described under Alternative C. Managing the Fly Creek SRMA (12,340 acres that encompasses 10 acres of sharp-tailed grouse lek sites, 300 acres of sage-grouse severe winter habitat, 30 acres of sandhill crane habitat) to provide backcountry, non-motorized hunting experiences would provide direct protection and minimize disturbances to Special Status Species and habitat from OHV use. However, short-term increased human activity during the hunting season may introduce disturbance during sensitive periods and result in localized deterioration of habitat. The 45,620-acre Dinosaur North SRMA contains bald eagle roost sites (250 acres), sage-grouse severe winter habitat (1,870 acres), peregrine falcon nesting habitat (320 acres), and less than 3 miles of pikeminnow critical habitat. The Cold Springs SRMA encompasses 30,470 acres, which includes ferruginous hawk nesting habitat (150 acres), sage-grouse severe winter habitat (5,650 acres), and Special Status Plant Species habitat (110 acres). Both SRMAs would be managed to provide quality, primitive recreational experiences in largely natural settings, which is not anticipated to receive heavy or intense use that would affect Special Status Species, and impacts would not be anticipated. Impacts from managing the remainder of the area as an ERMA with resource protections (such as monitoring resource conditions and educating users on resource protection) would be the same as those described in Alternative C.

Not allowing cross-county OHV in the RMPPA would remove the potential for habitat degradation, incidental takes or losses, long-term habitat deterioration, and human disturbance described in Alternative A. Areas open to over-the-snow vehicles (36 percent of the RMPPA) could potentially disturb Special Status Species sensitive to activity and noise during winter months, but the area would be further reduced by added restrictions in severe winter range and other seasonally limited wildlife habitats. OHV closures (22 percent of the RMPPA or 289,650 acres) would directly protect and minimize disturbance to Special Status Species habitat and vital components from recreation activity associated with OHV use. These areas include the seven existing WSAs (Map 3-26), Limestone Ridge ACEC, Dinosaur North, Fly Creek, and Cold Springs Mountain SRMAs, Serviceberry SRMA Zone 2, a portion of Little Yampa Canyon SRMA Zone 1, suitable WSR corridors, the Cross Mountain, Diamond Breaks, and Pinyon Ridge backcountry areas, and water impoundments in the Sand Wash HMA. Motorized access to areas designated as limited (80 percent of the RMPPA or 1,079,440 acres) that could be occupied by Special Status Species could result in disturbance to species during sensitive periods from

noise, and localized disturbance to habitat adjacent to routes. If any of the existing WSAs were released by Congress, the areas would continue to be closed to OHV use, and Special Status Species in these locations would not be subject to such ground disturbing activity. Impacts from developing an access and transportation plan that restricts access to meet resource objectives, reduces habitat fragmentation, and limits access points and stream crossings would be the same as those discussed in Alternative C.

Disturbance from Permitted Uses

Protections to Special Status Species and habitat from permitted activity by implementing the statewide programmatic RMP conservation measures and recommendations (specified in Appendix J) would be the same as those described in Alternative C. Site-specific consultation on all permitted activities that might affect federally threatened and endangered species would be streamlined, and provide a consistent approach to managing Special Status Species, as discussed under Alternative C. In addition, protections and stipulations established for other resources under this alternative, and protections of sensitive species under BLM policy, would provide reprieve from potential effects as a result of permitted activities.

Decreasing the amount of BLM-administered federal mineral estate open to oil and gas leasing consideration to 19 percent of the RMPPA (364,880 acres) would increase the area covered by protective stipulations, eventually decreasing the potential for population function declines described under Alternative A on 34 percent less area. Stipulations would be similar to those identified under Alternative C; however, there would be increased protections for raptor nest sites, sage-grouse leks, and severe winter range. The raptor NSO area would be increased, which would protect a larger area around raptor nests and associated potential protections for Special Status Species occurring in conjunction with these areas. Increasing the NSO buffer around sage-grouse leks and closing severe winter range during sensitive periods would provide greater protections for sage-grouse. Although the White-Tailed Prairie Dog ACEC would be designated, protections of prairie dog complexes and associated benefits to the black-footed ferret would be the same as those under Alternative C. The protections associated with NSO, CSU, and timing stipulations would provide greater benefits to Special Status Species when applied to encompass all ground disturbing activity under this alternative. SSR would be required on 297,00 acres (22 percent of the RMPPA), which would protect any habitat that could directly or indirectly benefit Special Status Species. In addition, areas covered by NGD and seasonal limitations for all permitted ground disturbing activities would increase from Alternative B. About 632,940 acres (47 percent of the RMPPA) would be designated as NGD, and 825,690 acres (61 percent of the RMPPA) as seasonal limitations, which would apply stipulations established to protect sensitive resources from oil and gas activity to all permitted ground disturbing activities. Although ground disturbance as a result of wells drilled would result in impacts similar to those under Alternative A, there would be a 25 percent reduction in number of wells (2,273 total wells) and associated surface disturbance. About 638,570 acres in the coal-planning area would be acceptable for further consideration of federal coal leasing, 69 percent (1,313,060 acres) would be available for locatable minerals, and 72 percent (1,359,770 acres) would be available for mineral material sales, which would have similar effects on Special Status Species. Areas open to mineral activity would occur within known habitat for federally endangered and threatened species (e.g., the bald eagle and experimental populations of the black-footed ferret) as well as other Special Status Species listed in Table 4-19. Closing 14 percent of the RMPPA mineral estate (275,630 acres)

and applying NSO on 459,940 acres (24 percent of the RMPPA) and CSU on 94,210 acres (5 percent of the RMPPA) to mineral activity would directly protect and minimize disturbance to Special Status Species habitat, threatened and endangered species, and vital habitat components. If the Diamond Breaks, Cross Mountain Canyon, and West Cold Spring WSAs were released by Congress, the areas would continue to be closed to mineral activity, and Special Status Species in these locations would not be subject to such ground disturbing activity. BMPs, COAs, and conducting surveys for Special Status Plant Species habitat before ground disturbance would continue to minimize disturbance and protect known locations of Special Status Species, as described under Alternative A.

Increasing the area available for ROW development to 62 percent of the RMPPA (834,510 acres, 18 percent more acres) could increase the potential for habitat disruption, as described under Alternative A. Impacts from encouraging ROWs along existing corridors would be the same as those under Alternative C. Increasing areas that exclude ROWs to 499,700 acres (37 percent of the RMPPA) and avoiding placement of ROWs on 15,190 acres (1 percent of the RMPPA) would provide protection across a greater area from habitat deterioration and disturbance to Special Status Species from ROW construction and maintenance activity.

Impacts on Special Status Species from management of SRPs for large events or events that involve surface disturbing activity would be the same as those described under Alternative A. Impacts from managing forest and woodland communities for ecological health using fire and other treatments, and from allowing product sales, would be the same as those described under Alternative C.

Changes to Habitat Condition

Improvements to Special Status Species habitat conditions from implementing the statewide programmatic RMP conservation measures (specified in Appendix J) would be the same as those discussed under Alternative C.

Effects on Special Status Species from fire management (including using AMR where fire is not desired, conditional fire suppression in areas with threatened or endangered species or habitat considerations, and minimal or no fire suppression in areas where fire is desired) as well as potential impacts from fire suppression activity would be the same as those described under Alternative B.

Compared to Alternative A, vegetation treatments are anticipated to increase to 7,550 acres annually, forest and woodland treatments would increase to 1,200 acres annually, and weed treatments would increase to 10,600 acres annually. Improvements to Special Status Species habitat conditions from managing for DPC with an emphasis on wildlife habitat, livestock grazing, watershed, and biodiversity values while maintaining or enhancing habitat for Special Status Species would be the same as those described under Alternative C. Improvements to ecological health and condition from using treatments for vegetation, forest and woodlands, and weeds to restore diversity of seral stages and species, sage-grouse habitat, juniper encroachment, winter forage species, and mountain shrub would be the same as those described under Alternative C, but would be applied to a greater area.

Using range improvement developments to maintain sustainable natural diversity of plant communities could improve ecological health, reduce erosion, and improve conditions of rangelands, riparian zones, and wetlands that could provide necessary habitat components for Special Status Species; however, potential improvements would be used when identified through the rangeland health assessment process, which ensures improvements are necessary to maintain a healthy range condition.

Table 4-19. Special Status Species Occurring Within Open Areas Under Alternative D

Special Status Species ¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Total Acres Open Within the RMPPA	0	364,880	638,570
Avian	0	2,750	127,590
American White Pelican	--	--	--
Bald Eagle--Nesting	--	--	0
Bald Eagle--Roost Sites	--	--	1,350
Bald Eagle--Winter Sites	--	--	46,400
Burrowing Owl Nesting	--	--	--
Columbian Sharp-tailed Grouse Leks	--	--	10,330
Ferruginous Hawk Nesting	--	--	1,760
Greater Sage-Grouse Severe Winter	--	--	39,210
Greater Sage-Grouse Leks	--	--	28,540
Mountain Plover Nesting	--	2,750	--
Peregrine Falcon Nesting	--	--	--
Sandhill Crane	--	--	--
Fish	0	0	0
Colorado Pikeminnow	--	-	--
Razorback Sucker	--	-	--
Mammals	0	51,920	0
Black-footed Ferret	--	51,920	--
Plants	0	320	0
Debris Milkvetch	--	--	--
Duchesne Buckwheat	--	--	--
Duchesne Milkvetch	--	140	--
Gibbin's Penstemon	--	0	--
Ligulate Feverfew	--	100	--
Mountain Clover	--	--	--
Narrowleaf Evening Primrose	--	60	--
Nelson Milkvetch	--	--	--
Ownbey's Thistle	--	--	--
Strigose Easter-daisy	--	--	--

Special Status Species ¹	Acres Open to OHV	Areas Open to Oil and Gas	Open Coal Suitable Areas
Tufted Cryptanth	--	10	--
Uinta Basin Spring-parsley	--	--	--
Woodside Buckwheat	--	10	--

Note: ¹ Based on existing data at the BLM LSFO of known locations of Special Status Species. Calculations are provided as a measure to relate scale and extent of the effects from the alternative, and are in no way complete or comprehensive of all Special Status Species known to occur or potential habitat that may exist within the RMPPA. Area for point data was determined by using a 0.25-mile buffer.

Source: BLM LSFO, GIS files, 2005.

4.3.7 Impacts on Wild Horses

This section discusses impacts of management actions of other resources and resource uses on wild horses. Impacts on wild horses generally result from activities that affect available habitat (forage and water condition and availability) and the wild and free-roaming nature of a herd. Forage conditions could generally be affected by surface disturbing activities, and use of forage by other grazing animals. Surface disturbance or restrictions on surface disturbance in the Sand Wash Basin HMA could affect forage conditions. Likewise, management actions that disturb or restrict access, or reduce disturbance to water resources and adjacent riparian habitat areas, could also affect wild horse habitat.

The wild and free-roaming character of wild horses is also integral to their preservation. Management actions that result in undisturbed natural areas with limited human presence or intervention preserve this character. In these areas, wild horses can be managed and viewed with limited impediments on their movement across the landscape. Management actions that alter the landscape and increase human disturbances and presence could reduce the wild and free-roaming nature of wild horses by disrupting their use of habitat.

The following criteria were used in the analysis to determine if an impact on wild horses would be significant:

- ❑ Available habitat components (e.g., forage, water, cover, space) becoming insufficient to achieve and maintain a viable, healthy wild horse herd managed in a thriving, natural ecological balance with the other range uses.
- ❑ Surface disturbances and artificial barriers compromising the wild and free-roaming nature of the Sand Wash Basin wild horse herd, affecting its viability.
- ❑ External factors resulting in herd genetic diversity being depleted to the point that the herd is no longer self-sustaining.

The analysis was based on the following assumptions:

- ❑ The wild horse population would continue to increase through recruitment of foals at 20 to 22 percent annually.
- ❑ Wild horse removals (gathers) would occur every 3 to 5 years.
- ❑ The Sand Wash Basin wild horse herd would be managed within the AML range through removals and the selected application of additional population control practices.

Impacts on wild horses would primarily result from wild horse management and surface disturbing activities. Resources and resources uses with management actions that result in surface disturbance include transportation and access, travel management, energy and minerals, and livestock grazing. Impacts from management actions related to establishing the wild horse AML, cultural and paleontological resource management, locatable, mineral material and non-energy leasable minerals, management of rangelands according to statewide Standards and Guides, and woodland management do not vary by alternative, and are discussed in the following paragraphs.

Continuing to manage wild horses in the Sand Wash Basin HMA would be in compliance with the Wild Free Roaming Horses and Burro Act of 1971. Maintaining the wild horse population between 163 and 362 would provide a genetically viable wild horse population. Gathering excess wild horses (above 362) would reduce resource competition for remaining horses. Gathers would subject all horses to stress and potential injury. The remaining wild horses would have more forage, water, and available space, and be healthier and more viable. In the Sand Wash Basin HMA, wild horses would be protected from unauthorized capture, branding, harassment, or death.

The use of forage by livestock and wildlife, and also surface disturbing activities, can reduce the amount and availability of forage and water for wild horses by removing vegetation or causing disturbance. Managing rangelands to meet Standards and Guides would continue to provide forage needed for wild horses, livestock, and wildlife; however, grazing use adjustments occur after monitoring indicates an adjustment is necessary. Livestock grazing could result in some site-specific cases of increased competition for or overuse of forage and water. The extent of the competition or overuse would vary based on the time between monitoring of findings and adjustments to grazing use or wild horse populations. Monitoring of grazing use by all grazing animals would reduce impacts on wild horses.

Management actions associated with cultural and paleontological resource management, development of locatable minerals, mineral materials, and non-energy leasable minerals, and the harvest of woodland resources could cause local displacement to wild horses during the management activity. This temporary displacement would result in a loss of their wild and free-roaming nature, and a short-term decrease in forage. Natural revegetation from onsite seed sources or required reclamation would ensure that there were no long-term decreases in forage for wild horses.

Under all alternatives, impacts on wild horses would not be anticipated as a result of implementing management actions for air quality, visual resources, and social and economic values.

4.3.7.1 Alternative A

Human use of the RMPPA resources can cause physical and spatial disturbance to wild horses. Human activity causes wild horses to alter their traditional use areas. Avoidance of humans and disturbance could force wild horses into smaller, less desirable grazing areas of the HMA. Increasing human activity increases the magnitude of this impact. Long-term or regular presence of human activity could change wild horse usage patterns, resulting in overuse in some areas of

the HMA. Long-term impacts on wild horse distribution and usage patterns would reduce the horses' wild and free-roaming nature.

Increasing OHV use and allowing cross-country OHV use on 145,130 acres in the HMA (96 percent of HMA) could result in the consistent displacement of wild horses from preferred habitats. In addition, not restricting motorized vehicles at key watering sources could displace wild horses from these water sources, potentially reducing their health.

Managing areas as limited to existing roads and trails on 6,260 acres (4 percent of HMA) of fragile soils in the HMA would, during use, temporarily displace wild horses from areas adjacent to routes. It could also lead to route proliferation as new user-created routes would be perceived as existing routes by other users. Enforcement in areas designated as limited to existing roads and trails can be problematic since it is legal for users to travel these new routes. Route proliferation could result in increased loss of forage due to the creation of new routes, as well as increase the displacement of wild horses, increasing stress on the horses. However, limiting use to the existing routes would generally maintain forage for wild horses away from routes in these areas by reducing surface disturbance.

Managing no areas of the HMA as open to oil and gas leasing with standard stipulations would eliminate long-term impacts from wild horse disturbance and displacement. Precluding oil and gas drilling or development operations from March 1 to December 1 within a 1-mile radius at wild horse water sources (Wild Horse Spring, Shepherder Spring, Coffee Pot Spring, Two Bar Spring, and Dugout Draw Spring) could reduce stress to horses from oil and gas development in these critical areas. This restriction would allow wild horses to use available water sources and would increase distribution, helping prevent overuse of rangelands. In addition, closing wild horse foaling areas to motor vehicle and helicopter use associated oil and gas development between March 1 and June 30 would decrease displacement from these disturbances during the critical foaling season. The seasonal closure could maintain foal survival rates.

NSO stipulations on 1,450 acres (1 percent of HMA) in the southeastern portion of the HMA would eliminate long-term impacts from wild horse disturbance and displacement. It would also reduce vegetation removal and help conserve forage and water resources for wild horses; however, NSO stipulations could also prohibit construction of range improvements in this area, which could limit management opportunities for water developments for wild horses.

Cross-country OHV use would decrease the quantity and quality of available forage by removing vegetation and compacting soils. Surface disturbance associated with oil and gas development, such as roads and well pads, would remove forage for wild horses. Controlling surface disturbing activities on 6,260 acres of fragile soils in the HMA would reduce vegetation removal and help conserve forage for wild horses in these areas, but could limit construction of range improvements that could benefit wild horses.

Vegetation treatments in the HMA, including treatments for ecologic health, rangeland treatments for livestock, or noxious weed treatments, would displace wild horses and result in a short-term loss of forage. In the long term, vegetation treatments improve overall vegetation health, although vegetation communities in Sand Wash Basin do not have the same capacity for increased forage as other places in the RMPPA. If vegetation treatments were adequately

protected from forage consumption in the short term following the treatment, the amount of grass in these areas could increase the quantity or quality of forage available for wild horses.

Wildfires and prescribed fires would displace wild horses and cause a short-term reduction in available forage. Suppressing wildfires fire would help maintain vegetation cover and conserve forage in the short term. Suppression activities, such as fire lines and staging areas, would result in surface disturbance and short-term losses in forage. Vegetation in areas of continued fire suppression would convert to late seral vegetation, decreasing grass production in the long term. In addition, continued long-term suppression could increase the potential for larger, more intense fires, and a substantial loss of forage.

4.3.7.2 Alternative B

Impacts from physical and spatial disturbance would be the same as those described under Alternative A. Increasing areas managed as open to cross-country OHV use (140 more acres) and oil and gas leasing with standard stipulations (146,360 acres, 97 percent of the HMA) (see Table 4-20 and Table 4-21) would increase displacement and forage loss compared to Alternative A. Increased road development, fencing, and the construction of ancillary features that support oil and gas development would decrease the wild and free-roaming nature of the horses. Increased vehicle traffic while developing and maintaining oil and gas developments would also displace wild horses and could increase wild horse mortality from vehicle collisions.

Table 4-20. Sand Wash Basin HMA Acres of OHV Designation Comparison Between Alternatives B and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in HMA	145,270	6,280	0
Percent of HMA	96%	4%	0%
Acres in HMA Different from Alternative A	+140	-140	0
Percent Change of HMA from Alternative A	< 1% increase	2% decrease	No Change

Table 4-21. Sand Wash Basin HMA Acres of Oil and Gas Leasing Category Designation Comparison Between Alternatives B and A

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in HMA	146,360	380	240	0
Percent of HMA	97%	< 1%	< 1%	0%
Acres in HMA Different from Alternative A	+146,360	-6,710	-1,210	0
Percent Change of HMA from Alternative A	All acres are increase from Alt. A	95% decrease	83% decrease	No Change

Removing the seasonal spring closure in foaling areas to OHV use (as compared to Alternative A), and to oil and gas operations, would allow human use during critical seasons and in critical locations. The subsequent displacement of wild horses at the end of winter, when energy levels are low, and while foaling is occurring, could force horses into smaller, less desirable grazing areas. In the long term, wild horse health would decrease, and foal and mare mortality rates would increase compared to those under Alternative A.

Decreasing NSO stipulations by 1,210 acres compared to Alternative A (Table 4-21) could increase surface disturbance. In addition, removing restrictions for surface disturbing activities on fragile soils could indirectly decrease forage conditions for wild horses, but it could also increase flexibility in constructing range improvements in these areas compared to Alternative A.

Impacts from fire management would be the same as those under Alternative A; however, not using fire suppression in some areas could increase both short-term forage loss and long-term forage increases. In addition, there could be a decrease in forage loss as a result of suppression activities. In the long term, allowing fire in desired areas could increase vegetation cover and diversity, improving forage for wild horses. Vegetation treatments to increase forage availability would also increase the amount of forage for wild horses compared to Alternative A. Applying Special Status Species conservation measures to control fugitive dust would maintain the quality (palatability) of forage for wild horses adjacent to routes and roads.

4.3.7.3 Alternative C

Impacts from surface disturbance would be less than those described under Alternative A as a result of managing less area as open to OHV (see Table 4-22). Impacts from open OHV use (16,080 acres) would be concentrated in the southern portion of the HMA. Five of the fifteen critical water sources would be adjacent to these open acres. The presence of motorized vehicles at key watering sources could displace the horses away from their water sources, which could reduce herd health.

Impacts from limiting OHV use to existing routes would be similar to those discussed under Alternative A; however limiting OHVs on 89 percent of the HMA (135,480 acres) to existing or designated routes (see Table 4-22) would reduce surface disturbance in the area and maintain forage for wild horses. In addition, as a baseline of existing roads and trails is developed, BLM could identify and close or rehabilitate newly created routes, reducing the potential for displacement. Adaptive OHV designations would allow for consideration of seasonal OHV closures in wild horse foaling areas. In the long term, this seasonal closure could be applied if mortality rates and herd populations become a concern.

Table 4-22. Sand Wash Basin HMA Acres of OHV Designation Comparison Between Alternatives C and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in HMA	16,080	135,480	0
Percent of HMA	11%	89%	0%

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in HMA Different from Alternative A	-129,050	+129,060	0
Percent Change of HMA from Alternative A	89% decrease	2,110% increase	No Change

Stipulations provide seasonal protections to wild horses in areas open to oil and gas leasing (see Table 4-23). Closing wild horse foaling areas to associated motor vehicle and helicopter use from March 1 to June 30 would eliminate displacement from oil and gas disturbances during the critical foaling season. The seasonal closure could maintain foal survival rates. Precluding oil and gas drilling or development operations from March 1 to December 1 within a 1-mile radius at wild horse water sources (Wild Horse Spring, Shepherd Spring, Coffee Pot Spring, Two Bar Spring, and Dugout Draw Spring) could reduce stress to horses from oil and gas development in these critical areas. This restriction would allow wild horses to use available water sources and would increase distribution, helping prevent overuse of rangelands.

Considering other seasonal OHV closures in wild horse foaling areas on an as-needed basis for all activities based on site-specific transportation planning results, consistency with other resource restrictions, and resource conflicts could eliminate displacement as a result of OHV use during a critical season and in important areas. These adaptive restrictions allow for consideration of restrictions, if conditions warrant. The restrictions could help maintain or increase survival rates of mares and foals, as well as reduce stress to horses from oil and gas development in critical areas compared to Alternative A.

Due to incomplete inventory data, 9,400 acres in the HMA would be managed as limited to existing roads and trails until route designation can take place. This could lead to route proliferation as new user-created routes would be perceived as existing routes by other users. Route proliferation could result in increased soil erosion and loss/degradation of vegetation. However, as a baseline of existing roads and trails is developed, BLM could identify and close or rehabilitate newly created routes.

Table 4-23. Sand Wash Basin HMA Acres of Oil and Gas Leasing Category Designation Comparison Between Alternatives C and A

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in HMA	0	7,410	1,910	0
Percent of HMA	0%	5%	1%	0%
Acres in HMA Different from Alternative A	0	+320	+460	0
Percent Change of HMA from Alternative A	No Change	5% increase	32% increase	No Change

Prohibiting surface occupancy on 1,910 acres (1 percent of the HMA) would reduce displacement of wild horses and reduce vegetation removal, conserving forage. Prohibiting surface occupancy in this area could also prohibit construction of range improvements that could limit management opportunities for water developments for wild horses compared to Alternative A.

Reseeding with native species could improve vegetation health and increase forage quantity and quality for wild horses compared to Alternatives A and B. Impacts from vegetation treatments would be the same as those described under Alternative A, but forage increases could be less, as the emphasis is on increasing vegetation diversity. Impacts from fire management actions would be the same as those described under Alternative B, increasing long-term forage availability. Impacts from applying Special Status Species conservation measures would be the same as those under Alternative B. Impacts from soils management actions would be the same as those under Alternative A, maintaining forage resources in areas with fragile soils.

4.3.7.4 Alternative D

Designating the Sand Wash Basin HMA as the Sand Wash Basin Wild Horse Range would afford additional protection because resolving conflicts concerning wild horses would take priority over conflicts concerning other resources. Managing this area as a Wild Horse Range could limit recreation and other activities during critical life periods, reducing displacement and forage loss compared to Alternative A. In addition, managing 84,970 acres (56 percent) of the HMA as open to oil and gas leasing with NSO stipulations could increase forage for wild horses and decrease displacement compared to Alternative A (Table 4-24).

Table 4-24. Sand Wash Basin HMA Acres of Oil and Gas Leasing Category Designation Comparison Between Alternatives D and A

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in HMA	0	930	84,970	20
Percent of HMA	0%	1%	56%	< 1%
Acres in HMA Different from Alternative A	0	-6,160	+83,520	+20
Percent Change of HMA from Alternative A	No change	87% decrease	5,760% increase	All are increase from Alternative A

Impacts from physical and spatial disturbance from OHV use and oil and gas development would be the same as those described under Alternative A; however, managing no areas as open OHV would prevent displacement and surface disturbance (Table 4-25).

Limiting OHV use to designated routes to 151,540 acres (see Table 4-25) would cause less disturbance compared to Alternative A. Managing the area as limited to designated routes maintains forage for wild horses and reduces disturbance to horses. Wild horses would not be affected by OHV use on 20 acres of the HMA, which would be closed to OHV use. In addition,

the entire HMA would be closed to motorized vehicle use and all permitted activities during March 1 to June 30 (foaling period), which would maintain foal survival rates.

Table 4-25. Sand Wash Basin HMA Acres of OHV Designation Comparison Between Alternatives D and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in HMA	0	151,540	20
Percent of HMA	0%	100%	> 1%
Acres in HMA Different from Alternative A	-145,130	+151,380	+20
Percent Change of HMA from Alternative A	100% decrease	All acres but 160 are increase from Alternative A	All acres are increase from Alternative A

Designation of the Wild Horse Range would allow wild horses primary consideration within the HMA. If wild horses were determined to be adversely affected by travel management, travel management could be limited in whatever manner determined necessary to encourage the continuation of a viable, healthy, wild horse herd. This action could include restrictions to reduce impacts on forage conditions or the horses' wild and free-roaming nature compared to Alternatives A, B, and C.

Because of increased protections from oil and gas development within NSO areas, forage loss associated with oil and gas activities would be minimal and concentrated in areas within the HMA. Restrictions associated with white-tailed prairie dog colonies account for some of the NSO acreage. As white-tailed prairie dog habitat expands, there would be less forage available for wild horses. Wild horse habitat conditions could be reduced if white-tailed prairie dogs were in areas used by wild horses.

In addition, closing mineral drilling or development operations from March 1 to December 1 within a 1-mile radius of specific water sources for wild horses (Wild Horse Spring, Shepherd Spring, Coffee Pot Spring, Two Bar Spring, and Dugout Draw Spring) would reduce stress to horses from oil and gas development use in these critical areas. Allowing horses to use available water would increase distribution and help prevent overuse in certain areas.

Compared to Alternative A, long-term forage availability would increase as a result of several management actions. Impacts from fire management actions would be the same as those described under Alternative B, increasing long-term forage availability. Impacts from soils management actions would be the same as those under Alternative A, maintaining forage resources in areas with fragile soils. Impacts from vegetation treatments would be similar to those noted in Alternative A, but the magnitude of increases in forage would not be greater than Alternatives A, B, or C because of the acreage proposed to be treated (given the proposed treatment acreages are distributed evenly across the LSFO); however, the improvements in vegetation might not increase forage for wild horses because the emphasis of vegetation treatments would be on diverse uses. Managing for desired plant communities for biodiversity

values would maintain forage resources, but compared to Alternative A, increases would not be anticipated because the desired plant community would be one that improves watershed and biodiversity values.

If AUMs are converted from livestock to wild horses, flexibility in grazing management would be reduced (e.g., limiting season of use or managing for proper distribution), which would result in more growing season use, and areas of heavy and severe use, leading to loss of perennial vegetative cover and increased soil erosion. This conversion could lead to short-term and long-term decreased habitat conditions for wild horses compared to Alternative A.

Impacts from applying Special Status Species conservation measures would be the same as those described under Alternative B. Reseeding with native species could maintain overall structure and resiliency of vegetation health and thereby improve or increase long-term forage for wild horses compared to Alternative A.

4.3.8 Impacts on Wildland Fire Management

This section describes potential impacts on wildland fire management from implementing management actions for other resource programs. Impacts on resources and resource uses resulting from implementation of the wildland fire management program are discussed in those particular resource sections in this chapter. Impacts on wildland fire management generally result from activities that affect fire intensity, frequency, and suppression efforts.

Impacts on wildland fire management would be considered significant if the following were to occur:

- ❑ Management actions alter vegetative cover (standing and non-standing), resulting in a substantial upward shift in the condition classes of the RMPPA.
- ❑ Management actions substantially increase the potential for wildland fire in areas where it is not desired.
- ❑ Management actions substantially inhibit an AMR to wildland fire or appropriate treatments to prevent wildland fire.

The analysis is based on the following assumptions:

- ❑ Fire is an important functional, natural disturbance in many of the ecological systems found in the RMPPA.
- ❑ A direct relationship exists between the density of human use within the RMPPA and the frequency of human-caused fires.
- ❑ A direct relationship exists between fuel loading and potential fire intensity.

Impacts on wildland fire management that are common to all the alternatives would primarily include changes in fire frequency and intensity, and the ability to employ fire suppression methods, all of which would affect management of fire within the RMPPA. Activities that would have the greatest effect on fire frequency include recreational activity and mineral exploration and development. These activities introduce additional ignition sources into the RMPPA, which increase the probability of wildland fire occurrence and the need for fire suppression activities. Fire intensity can be affected by activities that decrease fuel loading, such as vegetation

treatments and harvesting of timber products, and activities that alter the composition and structure of vegetation communities. High-intensity fires generally result in a greater loss of vegetation cover, changes to soil chemistry, damage to root structures, and a greater ability for non-native species to become established. The ability to use certain fire suppression techniques can be affected by land use restrictions designed to protect sensitive resources. Such restrictions are associated with the management of WSAs, sensitive viewsheds, cultural and paleontological resources, and Special Status Species.

Vegetation and weed treatments would serve to decrease both standing and non-standing vegetation (fuel load) across the RMPPA, which would decrease the intensity of wildland fires and allow fires to be more easily controlled. These activities would also modify the composition and structure of vegetation communities by creating mosaic vegetation patterns and natural fuel breaks, and by promoting healthy, diverse vegetation communities that generally fuel low-intensity fires. Specifically, efforts to reduce incursion of non-native annual grasses (primarily cheatgrass), encroachment of shrubby vegetation, buildup of biomass in forested areas, and proliferation of noxious and invasive weeds would help to achieve this effect.

Recreational activities in the RMPPA could significantly affect wildland fire management. The recreational opportunities that exist in the RMPPA attract increasing numbers of visitors, which increases the probability of unintentional fire starts and the need for fire suppression activities. Maintaining developed recreation sites would encourage the use of campfires in the RMPPA, which are a primary cause of human-caused wildland fires. Careless smoking and the exhaust systems on motorized vehicles could also result in unintentional ignitions. The various highways, roads, and trails that provide motorized access to the public lands within the RMPPA facilitate travel and increase the distribution of visitors throughout the RMPPA, increasing the extent of related effects. OHV use allows visitors to access even the most remote areas of the RMPPA, which can create access difficulties for fire suppression equipment in wildland fire events.

Activities associated with mineral exploration and development would increase human presence and the use of heavy equipment in the RMPPA, which would introduce additional ignition sources and increase the probability of wildland fire occurrence and the need for fire suppression activities. With increased development and attendant infrastructure (e.g., powerlines, compressors, pipelines, and fuel tanks) comes a corresponding increase in the potential for fire suppression activities within wildland-urban interface (WUI) areas. Suppression activities within WUI areas can be more dangerous, time-consuming, and expensive than suppression in undeveloped areas. In addition, surface disturbance caused by development activities would contribute to the modification of the composition and structure of vegetation communities (including increases in noxious weed proliferation) within the vicinity of developed areas, which could be more likely to fuel high-intensity fires; however, mineral development areas could also provide increased accessibility to remote areas for fire suppression equipment, and provide fuel breaks in the case of wildland fire events. ROW corridors could provide fuel breaks that would aid in suppression efforts.

Grazing by livestock and wild horses would reduce fire frequency by reducing fine fuels (e.g., grasses) that serve as ignition sources. Although this could result in fewer fires in the RMPPA, decreasing the probability of ignition could also provide more time for the accumulation of larger fuel sources (e.g., shrub vegetation) between fires, which could increase the intensity of wildland

fires. Implementing actions to ensure that grazing allotments meet the Standards and Guides would prevent severe overgrazing, which would help maintain fine fuel cover and the occurrence of low-intensity fires. The standards would also promote healthy, diverse vegetation communities that generally fuel low-intensity fires. Maintaining the AML for the Sand Wash Basin HMA would also serve to reduce the effects of grazing.

Management of 78,250 acres of WSAs would affect fire management, as the WSA Interim Management Policy would limit the use of fire suppression equipment to hand tools. This management action could inhibit fire suppression efforts and the ability to control large, intense wildland fires. Similarly, protection measures afforded to cultural and paleontological resources could preclude certain types of fire suppression activities in the vicinity of those resources. This latter impact would occur in small, localized areas of the RMPPA where such resources are known to exist.

The harvesting of forest and woodland products would reduce fuel accumulations in wooded areas and subsequently reduce wildland fire intensity. This activity would reduce overall canopy bulk density, which would inhibit the movement of fire through the canopy; however, this would affect forest and woodland areas, which comprise 309,556 acres of the RMPPA.

Maintaining air quality to comply with the Regional Haze Regulations could restrict the use of prescribed fire within the RMPPA. If visibility within the five federal Class I areas that occur within 100 kilometers of the RMPPA is impaired, the use of prescribed fire could be suspended.

Impacts on wildland fire management would not be anticipated as a result of implementing the following management actions for air quality, soil resources, visual resource management, water resources, and social and economic values.

4.3.8.1 Alternative A

Activities associated with wildland fire management would likely have the greatest effect on the ability to control wildland fires. Using prescribed fire to improve resource habitat and condition could reduce fuel loading and promote healthy, diverse vegetation communities, both of which would decrease the intensity of wildland fires and facilitate suppression efforts. Using maximum fire suppression in areas with high resource values, structures, commercial forests, oil and gas developments, cultural values, and habitat for sensitive species would reduce fire size and intensity in these areas and increase the ability to control fires and protect important resources from fire damage. This management action would also directly facilitate achievement of the goals of the fire program; however, implementing fire suppression across the RMPPA would continue to limit and exclude fire from functioning in its natural role in some areas, resulting in further departure from the historic fire regime, and would indirectly result in a longer fire-return interval, the continued buildup of fuel loads, and the promotion of vegetation communities that would more likely fuel high-intensity fires. Fire-dependent plant communities might also deteriorate if fire was prevented from occurring within these communities.

Conducting annual vegetation and weed treatments on a total of 7,410 acres across the RMPPA would decrease fuel loading, which would decrease the intensity of wildland fires and allow fires to be more easily controlled. In addition, these activities would promote healthy, diverse

vegetation communities, which generally burn with less intensity than modified and degraded vegetation communities.

Recreation opportunities under this alternative would continue to affect fire frequency by encouraging general use throughout the RMPPA and introducing additional ignition sources into the area. Management of the Little Yampa/Juniper Canyon SRMA (19,290 acres) would emphasize boating, camping, hiking, and sightseeing opportunities in this area, inadvertently increasing the probability of wildland fire occurrence through increased human presence, use of vehicles, and campfires. Other developed recreation sites, such as the campgrounds at Irish Canyon and Rocky Reservoir, and the picnic sites at Irish Canyon and Cedar Mountain would have similar effects. Allowing cross-country OHV use in most of the RMPPA (991,920 acres) would attract OHV users and increase fire frequency by increasing the number and distribution of ignition sources across the RMPPA. Such use would also damage and degrade vegetation communities and indirectly increase the introduction and spread of noxious weeds, which could increase fire susceptibility.

About 549,800 acres of the federal mineral estate would be open to oil and gas leasing consideration, increasing development activities that would introduce additional ignition sources into the RMPPA, and consequently increase the probability of wildland fire occurrence. Related disturbance of about 49,216 acres would result in degraded vegetation communities that could more likely fuel high-intensity fires; however, developed areas could provide increased accessibility to remote areas for fire suppression equipment, and provide fuel breaks in the case of wildland fire events. About 638,800 acres would be acceptable for further consideration of federal coal leasing, which would have similar effects on fire management.

Development of ROWs through the lands and realty program would result in clearing vegetation to make way for linear features such as roads, pipelines, and transmission lines. Such development would create fuel breaks across the RMPPA that could be effective in preventing the spread of wildland fires. Excluding ROWs on 108,470 acres in the RMPPA would prevent these effects from being realized in these areas.

Managing 6,330 acres of commercial forest land, and 37,600 acres of woodland to produce a variety of forest and woodland products would reduce fuel accumulations in these areas and subsequently reduce wildland fire intensity. This activity would reduce overall canopy bulk density, which would inhibit the movement of fire through the canopy; however, this effect would be limited to forest and woodland areas, which comprise 309,556 acres of the RMPPA.

4.3.8.2 Alternative B

Management actions associated with the wildland fire program would categorize wildland fire management strategies to represent a continuum of AMR. Compared to Alternative A, this management action would provide more flexibility in determining the areas in which fire suppression should be conducted and the extent to which it should be conducted and which areas should be subject to Wildland Fire Use. This would help prioritize resources for suppression consideration and facilitate fire management.

Vegetation and weed treatments would be conducted on a total of 12,050 acres annually, and the areas would be managed to achieve DPC objectives to meet the overall goals and objectives for the RMPPA, which would help promote healthy vegetation communities and thereby reduce wildland fire intensity. However, vegetation treatments under this alternative would be emphasized to increase forage production, which could reduce the degree of impact compared to Alternative A. Furthermore, the amount of fine fuels would likely increase in some areas and thereby increase the potential for wildland fire occurrence.

The effects on wildland fire resulting from recreation management actions would be similar to those identified for Alternative A, except the Little Yampa/Juniper Canyon area would not be managed as a SRMA. Cross-country OHV use would be allowed on an additional 181,030 acres (18 percent increase compared to Alternative A), which could slightly increase fire frequency.

The effects on wildland fire resulting from management of mineral resources would be the same as those identified for Alternative A. Applying NGD restrictions to 89,240 acres to protect fish and wildlife habitat, Special Status Species, SMAs (e.g., WSAs and ACECs), SRMAs, and cultural resources could preclude the use of heavy equipment for fire suppression activities in these areas. Fire suppression techniques would likely be limited to hand tools. Although fire suppression would still occur where necessary to protect life, property, and sensitive resources, it could be more difficult to control wildland fires in some areas; however, such restrictions would also help mitigate the degradation of vegetation communities caused by development activities in these areas, thus reducing the potential for high-intensity wildland fires. Applying seasonal limitations to 71,220 acres to protect wildlife habitat and other sensitive resources could modify the location, timing, and the extent of prescribed fire, which would make it more difficult to use prescribed fire to treat vegetation, reduce fire hazards, and allow fire to function in its ecological role.

The effects on wildland fire resulting from the development of ROWs would be similar to those identified for Alternative A, except 78,250 acres would be excluded from ROW development (a 28 percent decrease), which would slightly increase the extent to which ROWs could be used as fuel breaks to control wildland fires.

The effects on wildland fire from the management and production of forest products would be the same as those identified for Alternative A.

If Congress released the seven existing WSAs from further wilderness consideration, the Interim Management Policy would no longer apply, and the areas would be managed for multiple use consistent with the goals and objectives of the RMP. As a result, the use of fire suppression equipment would likely not be limited to hand tools.

4.3.8.3 Alternative C

The effects resulting from management of the wildland fire program would be the same as those identified for Alternative B.

The effects on wildland fire resulting from vegetation management actions would be similar to those identified for Alternative A, except the extent of vegetation and weed treatments would be increased by 2,000 acres per year (27 percent increase). Vegetation communities would be

managed to prevent the spread of noxious weeds and achieve DPC objectives that emphasize wildlife habitat, livestock grazing, watershed, and biodiversity values. These actions would increase the extent to which vegetation communities were managed to achieve a diversity of seral stages, and to exhibit their historic range and natural variability, which would increase the extent of vegetation communities that are more likely to fuel low-intensity fires.

The effects on wildland fire resulting from recreation management actions would be similar to those identified for Alternative A, except the Little Yampa/Juniper Canyon SRMA would be expanded and four additional SRMAs would be designated, increasing the total acreage of SRMAs by 77,870 acres (304 percent increase). Additional recreation sites (e.g., campgrounds, boat launch, and picnic sites) would also be developed in association with these SRMAs, which would increase fire frequency by encouraging use of the RMPPA and introducing additional ignition sources into the area. Cross-country OHV use would be limited to 21,940 acres (98 percent decrease compared to Alternative A), which would greatly reduce effects related to fire management.

The effects on wildland fire resulting from management of mineral resources would be the same as those identified for Alternative A.

The effects on wildland fire resulting from the application of NGD restrictions to protect fish and wildlife habitat, Special Status Species, SMAs (WSAs and ACECs), SRMAs, and cultural resources would be similar to those identified for Alternative B, except 273,100 acres would be subject to such restrictions (206 percent increase), which would considerably increase the extent of related limitations on fire suppression activities, but would also increase the degree of mitigation measures that could serve to reduce fire intensity. In addition, 810,680 acres would be subject to seasonal limitations (1,038 percent increase), which would considerably decrease flexibility in using prescribed fire compared to Alternative B.

The effects on wildland fire resulting from the development of ROWs would be similar to those identified for Alternative A, except 91,560 acres would be excluded from ROW development (16 percent decrease), which would slightly increase the extent to which ROWs could be used as fuel breaks to control wildland fires.

The effects on wildland fire resulting from the management and production of forest products would be similar to those identified for Alternative A, except management of forest lands and woodland areas would emphasize forest and woodland health, with product sales representing a secondary priority, which would likely result in a lower level of harvest and could reduce the degree of fuel reductions.

If Congress released the seven existing WSAs from further wilderness consideration, the Interim Management Policy would no longer apply and the areas would be managed with NGD restriction. As a result, the use of fire suppression equipment would still be limited to hand tools and the effects on wildland fire management would remain the same.

4.3.8.4 Alternative D

The effects resulting from management of the wildland fire program would be the same as those identified for Alternative B.

The effects on wildland fire resulting from vegetation management actions would be similar to those identified for Alternative C, except the extent of vegetation and weed treatments would increase to 14,050 acres (49 percent increase compared to Alternative C, and 89 percent increase compared to Alternative A). Vegetation communities would be managed to prevent the spread of noxious weeds and to achieve DPC objectives that emphasize wildlife habitat, watershed, and biodiversity values. Compared to Alternatives A and C, these actions would increase the extent to which vegetation communities were managed to achieve a diversity of seral stages, and to exhibit their historic range and natural variability. This management action would increase the extent of vegetation communities that are more likely to fuel low-intensity fires.

The effects on wildland fire resulting from recreation management actions would be similar to those identified for Alternative A, except the Little Yampa/Juniper Canyon SRMA would be expanded, and eight additional SRMAs would be designated, increasing the total acreage of SRMAs by 245,460 acres (1,172 percent increase). Additional recreation sites (e.g., campgrounds, boat launch, and picnic sites) would also be developed in association with these SRMAs, which would increase fire frequency by encouraging use of the RMPPA and introducing additional ignition sources into the area. There would be no cross-country OHV use, which would eliminate related effects on fire management.

The effects on wildland fire resulting from management of mineral resources would be similar to those identified for Alternative A, except development would be anticipated to decrease by 25 percent because of surface use restrictions. As a result, fewer ignition sources would be introduced into the RMPPA and less vegetation would be disturbed and degraded, thereby reducing related effects on fire management.

The effects on wildland fire resulting from the application of NGD restrictions to protect fish and wildlife habitat, Special Status Species, SMAs (WSAs and ACECs), SRMAs, and cultural resources would be similar to those identified for Alternative B, except 632,940 acres would be subject to such restrictions (609 percent increase). This would considerably increase the extent of related limitations on fire suppression activities, but also increase the degree of mitigation measures that could serve to reduce fire intensity. In addition, 825,690 acres would be subject to seasonal limitations (1,059 percent increase), which would considerably decrease flexibility in using prescribed fire compared to Alternative B.

The effects on wildland fire management resulting from the development of ROWs would be similar to those identified for Alternative A, except 499,700 acres would be excluded from ROW development (361 percent increase), which would considerably decrease the extent to which ROWs could be used as fuel breaks to control wildland fires.

The effects on wildland fire management resulting from the management and production of forest products would be the same as those identified for Alternative C.

If Congress released the seven existing WSAs from further wilderness consideration, the Interim Management Policy would no longer apply, and the areas would be managed with NGD restriction. As a result, the use of fire suppression equipment would still be limited to hand tools and the effects on wildland fire management would remain the same.

4.3.9 Impacts on 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 unmitigated surface disturbance such as cross-country OHV travel, wildfires, unauthorized collection, and inadvertent vandalism and trampling. Direct and indirect impacts on cultural resources result from any surface disturbing activity. 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 cross-country OHV travel, open use areas, wildfires, 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 RMPPA are unknown, and the alternatives do not identify specific areas for surface disturbing activities. Impacts on cultural resources from cross-country OHV use were analyzed using a model based on BLM's current understanding of cultural resource site distribution in selected areas of the RMPPA (see explanation of the cultural sensitivity model in Chapter 3). Although not precise, the model helps identify quantifiable differences among alternatives and assists with the RMP-level planning.

For this analysis, impacts on cultural resources would be significant if cultural resources protected by federal or State law were physically altered (inadvertently or intentionally), destroyed, or lost.

The analysis was based on the following assumptions:

- BLM will follow 36 CFR 800, Section 106 (including Native American consultation), and the Colorado Protocol when dealing with federal undertakings; therefore, adverse effects to known cultural resources will be appropriately mitigated. The Archeological Resources Protection Act of 1979 (ARPA), as amended, provides enforcement and legal remedies for all unauthorized removal of archaeological resources from federal land.
- Human occupation of North America over the last 10,000 years has left its mark on all landforms.
- Although there is limited information on cultural resources in the RMPPA, prehistoric and historic current archaeological sensitivity models developed in conjunction with the Class I cultural resources inventory, which are based on frequency of industry and BLM projects, depict the potential for cultural resource sites within the RMPPA.
- Cultural resource protection and mitigation measures apply to all proposed federal or federally-assisted undertakings and to leases granted by BLM, and would be applied at project design and implementation phases.
- Cultural resource inventories, either federal undertakings or related programs, would result in the continued identification of cultural resources. The cultural resource data acquired through these inventories and evaluations would increase overall knowledge of cultural resources in the region.
- Impacts on known cultural resource sites from authorized uses would be mitigated after appropriate Section 106 and protocol consultation requirements are met. Mitigation can include avoidance, redesign, or data recovery.

- The number of sites that could be affected by various actions directly correlates with the degree, nature, and quantity of surface disturbing activities within the RMPPA, and the cultural sensitivity of the area.

Through compliance with Section 106, there would be no significant impacts on cultural resources from federal undertakings such as oil and gas development, coal mine development, construction within ROWs, recreation site development, prescribed fire, vegetation treatment projects that require Class III inventories, wild horse gathers, forest and woodland product harvest, and special recreation permitting or construction of range improvements. Compliance with Section 106 for these types of activities 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.

The dispersed nature of livestock grazing creates challenges in applying Section 106 to all areas of potential disturbance caused by livestock. Areas where livestock congregate can affect cultural resources by altering their context. Cattle congregating and rubbing could damage standing structures and pictograph panels through abrasion. Trampling at spring sources and along stream banks could remove protective vegetation cover and increase compaction, creating indirect impacts to cultural resources by accelerating natural erosion and exposing artifacts to illegal surface collection and vandalism. These types of impacts would be localized to individual sites. Impacts on specific areas would be identified and mitigated through the permitting process. Without mitigation, these impacts could be significant, but in most cases impacts from these activities would be mitigated on a case-by-case basis.

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.

Other cultural resource impacts from wildfire vary based on the type of material that composes the cultural resources, as well as the temperature and duration of exposure to heat. Generally, fire in itself would not affect buried cultural materials. Studies show that even a few inches of soil cover (4 inches) are sufficient to protect cultural materials (Oster n.d.). However, fire can damage some of the most fragile and unrecorded sites in the RMPPA, including wickiups, tree stands, and eagle traps. Wildfires that burn hot and fast through a site could have less of an effect on certain types of cultural materials than fires that smolder in the duff or burn for a long period of time, allowing heat from the fire to penetrate the surface. Prehistoric and historic resources potentially affected by wildfire could be inorganic (e.g., lithic/rock, ceramics, cans, glass, rock art) or organic (e.g., basketry, wooden structures, dendroglyphs). Organic materials would be more at risk as they tend to burn or alter at lower temperatures than inorganic items. Wildfire

impacts on inorganic cultural resources include fracturing, shattering, and changes in color and internal luster, which might reduce an artifact's ability to render information about the past. Hotter temperatures and longer exposure to fire would more likely affect lithic materials. When these materials are likely to be present, it might be necessary to take protective measures. Historic earthworks such as trails, roads, irrigation ditches, and canals would be less sensitive to fire. Fire could damage rock art through soot smudging and discoloration from smoke, which obscure the rock art images; degradation of the rock surface from spalling, exfoliation, and increased weathering; changes in organic paints caused by heat; and damage to rock varnish, which could destroy its potential to date the art (Tratebas 2004; Kelly and McCarthy 2001).

Wildfire also has the potential to affect the dating potential of cultural data from both organic and inorganic material (Deal n.d., Buenger 2003; Loyd et al. 2002; Shackley and Dillon 2002; Solomon 2002). Wildfire increases visibility of cultural sites as a result of vegetation burn-off, and consequently increases the potential for vandalism. Wildfire could cause physical damage to sites from snags or trees falling on them, and could indirectly lead to loss of cultural data as a result of increased damage from rain, changes in drainage patterns, soil erosion, and flooding after a fire. Field procedures for identifying cultural sites for protection and avoidance from fire-related activities (e.g., flagging site perimeters) could attract local, illegal artifact collectors to vulnerable site localities.

Without sufficient law enforcement associated with recreational activities, actions such as off-road travel, inadvertent vandalism, and pot hunting would result in a loss of cultural resource information, which could be a significant impact. As most recreation activities are dispersed in nature and do not require permitting, these impacts would be mitigated on a case-by-case basis as they are discovered.

Cultural resource inventories and evaluations required before transferring lands from federal ownership during land tenure adjustments would ensure all identified cultural resources are documented, evaluated, and mitigated before ownership changes. BLM would retain lands obtained in exchanges that might contain important cultural and historic resources, providing protection under federal management laws and policies. However, patent reservations will not be used as a mitigation technique.

Impacts on cultural resources would not be anticipated as a result of implementing management actions for air quality, soil resources, water resources, fish and wildlife habitat, Special Status Species, paleontological resources, SMAs, visual resources management, or social and economic values.

4.3.9.1 Alternative A

Development of a cultural resource management plan would guide overall data collection efforts, resulting in a consistent approach to cultural resource protection. This plan would be developed to make the most of data gathering, data analysis, development, enhancement, and protection of cultural resources and their management to the fullest extent possible.

Improved vehicle access could increase contact with cultural resource sites by visitors who could intentionally damage sites by collecting surface artifacts, vandalizing, illegally digging, or

otherwise excavating the sites. Portions of this data loss could affect NHRP eligible and potentially eligible sites, resulting in significant impacts; however, increased access could also allow for the increased presence of law enforcement and cultural resource personnel to monitor sites and areas, which could deter vandalism or other damage to cultural resources.

Unlike permitted uses, cultural resource inventories were not completed before designating areas as open to OHV use. As a result, impacts have occurred which have not been mitigated. Over 70 percent of historic and prehistoric areas of current high cultural sensitivity would be open to cross-country OHV use (Table 4-26). The Cultural Resources Class I Overview performed in 1987 (La Point) indicated an average of 17 cultural resource sites per section throughout the LSFO, with an average of 30 percent of those sites eligible or potentially eligible for inclusion in the NRHP. This body of data is continually expanding (McDonald and Metcalf 2006); however, for the purposes of discussing impacts the 1987 data will suffice to calculate the number of cultural resources impacted by cross-country travel in open OHV areas. Cross-country OHV travel on 991,920 acres would continue to decrease vegetation density, increase erosion, and generally break, spread, or disturb cultural resources at the surface, which could result in significant impacts on up to 7,904 sites eligible for NRHP listing.

Studies have shown that damage to cultural resource sites is mainly concentrated within several hundred yards of roads (Sullivan et al. 2002). Limiting OHV use to existing routes or designated routes to 13 percent of historic and prehistoric areas with current high cultural sensitivity (Table 4-26) would decrease impacts compared to reducing access in areas open to OHV use. Although reducing access by closing roads or restricting travel could protect cultural resources, areas limited to designated or existing routes must undergo site-specific transportation planning to designate routes, which would include the Section 106 process. If this process does not occur, limiting OHV use to existing or designated routes could still result in significant impacts caused by use of routes that contain or are adjacent to cultural resource sites. In addition, visitors can unintentionally damage sites by camping or driving across cultural resource sites.

Table 4-26. Historic and Prehistoric Current Cultural Sensitivity Acres of OHV Designation - Alternative A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Historic High Sensitivity	344,410	89,800	15,260
Percent of Historic High Sensitivity in RMPPA	77%	20%	3%
Acres in Prehistoric High Sensitivity	303,130	88,520	10,620
Percent of Prehistoric High Sensitivity in RMPPA	75%	22%	3%

For vegetation (including forest, woodland, and range) treatments that do not require a Class III inventory, treatments involving surface and shallow subsurface disturbance would likely introduce organic materials to lower soil layers, and contaminate surface or shallow subsurface

cultural resource sites containing early historic or prehistoric datable organics such as charcoal, wood, or preserved plant materials. Plant and pollen contamination would lead to incorrect or inaccurate analytical results by researchers studying remains preserved at sites. Surface and shallow subsurface effects could include horizontal and vertical displacement of the upper portion of soils containing cultural resources, compromising depositional context and integrity, and damaging or destroying artifacts.

Efforts to reduce fire risk through the use of prescribed fire and other treatment methods would ensure the long-term protection of cultural resources. Stabilization and restoration of riparian systems would reduce stream bank erosion and ensure that cultural resources buried near streams remained intact.

4.3.9.2 Alternative B

Impacts from OHV use would be the same as those identified under Alternative A; however, managing an additional 181,030 acres as open to OHV, and decreasing the areas closed to OHV use by 26,110 acres, could increase the loss of cultural resources in the RMPPA (Table 4-27). Using the same assumptions discussed under Alternative A, the increase in acres open to OHV use, especially open to cross-country OHV use, could result in damage to or destruction of up to 9,347 cultural resource sites eligible for NRHP listing, which would be a significant impact.

Table 4-27. Historic and Prehistoric Current Cultural Sensitivity Acres of OHV Designation Comparison Between Alternatives B and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Historic High Sensitivity	381,450	64,790	3,230
Percent of Historic High Sensitivity in RMPPA	85%	14%	1%
Acres in Historic High Sensitivity Different from Alternative A	+37,040	-25,010	-12,030
Percent Change of Historic High Sensitivity from Alt. A	11% increase	28% decrease	79% decrease
Acres in Prehistoric High Sensitivity	364,180	34,490	3,600
Percent of Prehistoric High Sensitivity in RMPPA	91%	9%	1%
Acres in Prehistoric High Sensitivity Different from Alternative A	+61,050	-54,030	-7,020
Percent Change of Prehistoric High Sensitivity from Alternative A	20% increase	61% decrease	66% decrease

Prioritizing new cultural resource field inventories in the Sand Wash Basin area and Vermillion Basin could identify cultural resources and sites, thereby increasing cultural resource knowledge. This would increase the cultural knowledge base and improve cultural resource management in this area compared to Alternative A.

Expanding the cultural resources interpretive program could provide more cultural resource sites for public use and education, but would require inventories to recover scientifically important data before allowing public use of the areas. The inventories completed to support the expanded interpretive program could increase the understanding of cultural resources in the area. In addition, increasing public interpretation of cultural resources could decrease incidents of inadvertent vandalism.

Proactive cultural resource management through site use allocation determines management of cultural resource sites for their varied values before threats could occur. Compared to Alternative A, allocating cultural resource sites to management uses would allow for cultural resource values to be managed based on varied values. Managing most 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. 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.

Impacts from vegetation treatments (including forest, woodland and range management) that do not require a Class III inventory would be the same as those noted under Alternative A.

4.3.9.3 Alternative C

Impacts from OHV use would decrease compared to Alternative A by reducing the areas managed as open to OHV use (Table 4-28). However, with the same assumptions presented under Alternative A, managing 21,940 acres as open to OHV use could result in the damage or destruction of up to 175 cultural resource sites eligible for the NRHP, which would be a significant impact. If transportation planning and the associated Section 106 process did not occur in the south Sand Wash SRMA, cross-country OHV use in this area would result in significant damage to cultural resources as only 639 acres have been surveyed at a Class III level, with four known cultural resources recorded. Impacts from managing OHV use limited to designated or existing routes in localized areas adjacent to routes would be the same as those discussed under Alternative A.

Table 4-28. Historic and Prehistoric Current Cultural Sensitivity Acres of OHV Designation Comparison Between Alternatives C and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Historic High Sensitivity	8,400	421,620	19,450
Percent of Historic High Sensitivity in RMPPA	2%	94%	4%

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Historic High Sensitivity Different from Alternative A	-336,010	+331,820	+4,190
Percent Change of Historic High Sensitivity from Alt. A	98% decrease	370% increase	27% increase
Acres in Prehistoric High Sensitivity	6,960	380,860	14,450
Percent of Prehistoric High Sensitivity in RMPPA	2%	95%	4%
Acres in Prehistoric High Sensitivity Different from Alternative A	-296,170	+292,340	+3,830
Percent Change of Prehistoric High Sensitivity from Alternative A	98% decrease	330% increase	36% increase

Impacts from new cultural resource field inventories that emphasize a cultural resource interpretive program and cultural site use allocation would be the same as those discussed in Alternative B. Impacts would decrease compared to Alternative A.

Impacts from vegetation treatments (including forest, woodland, and range management) that do not require a Class III inventory would be the same as those discussed in Alternative A, except impacts could occur on 4,110 acres annually.

4.3.9.4 Alternative D

Impacts from new cultural resource field inventories and cultural site use allocation would be the same as those noted in Alternative B. Impacts from developing a cultural resource management plan would be the same as those noted in Alternative A. In addition, emphasizing the conservation and scientific study of cultural sites over a cultural resource interpretive program would protect cultural resources from public use and associated incidental vandalism until scientific study is completed.

Managing no open OHV areas and 289,650 acres as closed to OHV use would significantly reduce impacts on cultural resources compared to Alternative A (Table 4-29). Impacts from managing areas as limited to designated or existing routes for OHV use are the same as those identified in Alternative A. Cultural resource sites on approximately 85 percent of historic and prehistoric current cultural high sensitivity areas would still be affected by OHV use limited to designated or existing routes in localized areas adjacent to routes. While this alternative would reduce impacts on cultural resources more than any other alternative, the potential for significant impacts would remain under this alternative. There would be no impacts from OHV use on approximately 15 percent of historic and prehistoric current cultural high-sensitivity areas.

Table 4-29. Historic and Prehistoric Current Cultural Sensitivity Acres of OHV Designation Comparison Between Alternatives D and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Historic High Sensitivity	0	375,560	73,940
Percent of Historic High Sensitivity in RMPPA	0	84%	16%
Acres in Historic High Sensitivity Different from Alt A	-344,410	+285,760	+56,680
Percent Change of Historic High Sensitivity from Alt. A	100% decrease	318% increase	385% increase
Acres in Prehistoric High Sensitivity	0	353,550	56,390
Percent of Prehistoric High Sensitivity in RMPPA	0	88%	12%
Acres in Prehistoric High Sensitivity Different from Alternative A	-296,840	+265,030	+45,770
Percent Change of Prehistoric High Sensitivity from Alternative A	100% decrease	299% increase	431% increase

Impacts from vegetation treatments (including forest, woodland, and range management) that do not require a Class III inventory would be the same as those noted in Alternative A, except impacts could occur on 8,750 acres annually. This would be a 113 percent increase compared to Alternative C because of the increases in acres to be treated.

4.3.10 Impacts on 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 resources include the physical destruction or damage of fossil-bearing geological formations (the type of rock where a fossil originates is very telling of the fossil itself) and resulting loss of vertebrate fossils or other scientifically significant fossil resources. Without removing some rock surrounding fossils, they 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. 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 substantial direct or indirect damage or destruction to or loss of vertebrate fossils or other scientifically significant fossil resources.

The analysis was based on the following assumptions:

- ❑ Scientifically significant fossils would continue to be discovered throughout the RMPPA. Most discoveries would occur in Class I and II Paleontological Areas.
- ❑ Inventories conducted before surface disturbance in high-probability areas would result in the identification and evaluation of previously undiscovered resources, which BLM would manage accordingly.
- ❑ Unmitigated surface disturbing activities could 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. Impacts from other resource management actions noted in this analysis would not be anticipated to be significant. Impacts from management actions related to paleontological inventories, fire, cultural resources, and land tenure adjustments do not vary by alternative.

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 RMPPA. 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 or 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. Inadvertent damage to vertebrate fossils or other scientifically significant paleontological resources would generally be a significant impact.

Wildland fire suppression activities (e.g., construction of fire lines, bulldozing of access roads, and general movement of heavy equipment) could disturb the surface, often creating impacts on mineral soils. In addition, some methods of vegetation treatment could disturb the surface. While such surface disturbance could damage or destroy paleontological resources, most areas throughout the RMPPA with paleontological resources present at the surface would not be conducive to wildland fire ignition or spread, or would not be conducive to supporting significant vegetation.

Paleontological resources could be identified during cultural resource inventories, recordation, evaluations, and data recovery excavations, as well as a part of paleontological assessments that

are required before transferring lands from federal jurisdiction. These management actions could result in the identification and documentation of paleontological resources. For land tenure agreements, ensuring that resources are documented, evaluated, and mitigated before ownership is changed would ensure that lands with scientifically significant paleontological resources are retained or obtained, providing protection under federal management policies.

Under all alternatives, impacts on paleontological resources would not be anticipated as a result of implementing management actions for air quality, wild horses, livestock grazing, visual resources, and social and economic values.

4.3.10.1 Alternative A

Performing paleontological resource inventories in paleontological potential Class I and II areas would allow for mitigation needs to be identified and implemented at all phases of development. Implementing mitigation on a case-by-case basis would ensure paleontological resource values are protected from damage that could result from surface disturbing activities. In addition, developing a paleontological management plan would allow for area-specific paleontological resource management actions to better preserve paleontological resources in the area.

Allowing cross-country OHV use on 883,220 acres of paleontological potential Class I and II areas (Table 4-30) would decrease vegetation density and increase erosion, and could generally break, spread, and otherwise disturb paleontological resources at the surface. The significance of this impact would depend on the scientific significance of the fossils that could be affected. Mitigation of paleontological resource damage would be accomplished through data recovery efforts implemented on a case-by-case basis when the damage is discovered. Limiting OHV use to existing or designated routes (195,370 acres) could result in similar impacts, but only in areas adjacent to trails affected by route widening, route braiding, and route pioneering. Use on existing routes could also result in amplified erosion impacts on localized areas, which could expose paleontological resources to weathering and discovery. Paleontological resources on 30,360 acres of paleontological potential Class I and II areas would be protected from these impacts as a result of OHV closures.

Table 4-30. Class I and Class II Paleontological Potential Acres in OHV Designations Under Alternative A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Class I	407,460	81,500	14,620
Percent of Class I	81%	16%	3%
Acres in Class II	475,760	113,870	15,740
Percent of Class II	57%	14%	2%

The potential for significant paleontological resource impacts 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 clearances before being established. Paleontological resources could be moved from their original locations, damaged, destroyed, vandalized, or stolen. These impacts could 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.

Soils management actions that prevent or minimize soil erosion beyond expected rates, as well as requiring that soil performance standards and objectives be met for all surface disturbing activities, would maintain soil erosion within expected rates, which could protect or at least decrease degradation of paleontological resources. Because paleontological resources are usually discovered in eroded areas, reducing erosion could reduce the potential for more resources to be discovered.

In addition to the impacts common to all alternatives from surface disturbing activities, such activities could result in the identification and recovery of paleontological resources. Allowing oil and gas surface occupancy or ground disturbing activities on 543,620 acres (Table 4-31) would increase the potential for identifying paleontological resources in these areas.

Table 4-31. Class I and Class II Paleontological Potential Acres in Oil and Gas Leasing Category Designation Under Alternative A

	Open with Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in Class I	229,680	26,870	82,740	6,460
Percent of Class I	46%	5%	16%	1%
Acres in Class II	220,400	66,670	96,070	5,740
Percent of Class II	26%	8%	11%	1%

Location of ROWs could increase the number of identified paleontological sites; however, this excludes unsuitable areas (33,890 acres of paleontology potential Class I and II areas). In areas where surface disturbing activities would not be permitted, there would be a reduced need for data recovery efforts, and an associated reduction in the potential for site identification and recordation associated with development compared to areas where development could occupy the surface. Preventing oil and gas leasing or development surface occupancy could protect paleontological resources from oil and gas development on 191,010 acres (Table 4-31). Managing 13,920 acres of paleontology potential Class I and II areas as an NSO for coal development would reduce the need for data recovery efforts, and an associated reduction in the potential for site identification and recordation associated with development compared to areas where development could occupy the surface.

4.3.10.2 Alternative B

Limiting required paleontological resource inventories to Class I and II Paleontological Areas devoid of thick soils and vegetation and steep, unsafe cliffs would limit inventories to where most paleontological resources are exposed because of naturally weathering bedrock.

Implementing mitigation on a case-by-case basis would ensure that paleontological resource values are protected from damage resulting from surface disturbing activities. Inadvertently discovered paleontological resources would be protected to the extent possible. While discovery of resources in this manner often results in incidental impacts during the inadvertent discovery, management actions addressing such discoveries would protect those resources to the extent possible.

Although impacts from dispersed OHV use would be the same as those identified in Alternative A, the acres on which they occur would increase by over 117,250 acres (Table 4-32) because fewer acres would be closed or limited. This increase is a result of decreases in areas where OHV use is both limited and closed. Potential impacts from OHV use along routes would decrease compared to Alternative A as a result of a 93,580-acre decrease compared to Alternative A. Paleontological resources protected from these impacts resulting from OHV closures would decrease 23,670 acres compared to Alternative A.

Table 4-32. Class I and Class II Paleontological Potential Acres in OHV Designation Comparison Between Alternatives B and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Class I	452,850	46,480	4,240
Percent Class I	90%	9%	1%
Acres Class I Different from Alternative A	+45,390	-35,020	-10,380
Percent Class I Change from Alternative A	11% increase	43% decrease	71% decrease
Acres in Class II	547,620	55,310	2,450
Percent of Class II	65%	7%	0%
Acres Class II Different from Alternative A	+71,860	-58,560	-13,290
Percent Class II Change from Alternative A	15% increase	51% decrease	84% decrease

Impacts on paleontological resources from recreation management actions would be the same as those identified in Alternative A.

Requiring that soil performance standards and objectives be met for all surface disturbing activities would maintain erosion within expected rates, which could protect or at least decrease degradation of paleontological resources. Since paleontological resources are usually discovered in eroded areas, reducing erosion could reduce the potential for more resources to be discovered. Not requiring soil performance standards and objectives to be met when allowing surface disturbing activities or surface occupancy on fragile soil areas could lead to increased erosion in these areas, which could result in damage to paleontological resources but could also result in identification of more paleontological resources exposed through eroding bedrock.

Impacts from surface disturbing activities, beyond the impacts common to all alternatives, would be similar to those identified in Alternative A, except the magnitude of the potential impact would increase. Impacts from allowing oil and gas surface occupancy or ground disturbing activities would increase because of the additional 1,253,180 acres of paleontology potential Class I and II areas open to oil and gas leasing with standard or CSU stipulations (compared to Alternative A [see Table 4-33]), which would increase the potential to identify paleontological resources in these areas compared to Alternative A.

Table 4-33. Class I and Class II Paleontological Potential Acres in Oil and Gas Leasing Category Designation Comparison Between Alternatives B and A

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in Class I	433,800	39,470	23,870	6,460
Percent Class I	86%	8%	5%	1%
Acres Class I Different from Alternative A	+204,120	+12,600	-58,870	0
Percent Class I Change from Alternative A	89% increase	47% increase	71% decrease	No Change
Acres in Class II	731,780	48,130	8,160	5,740
Percent of Class II	87%	6%	1%	1%
Acres Class II Different from Alternative A	+511,380	-18,540	-87,910	0
Percent Class II Change from Alternative A	232% increase	28% decrease	92% decrease	No Change

Location of ROWs could also result in the identification of more paleontological sites, which would not occur in unsuitable areas (12,210 acres of paleontology potential Class I and II areas). Compared to Alternative A, there is a 21,680-acre decrease in unsuitable areas (64% decrease from Alternative A). Impacts from areas where surface disturbing activities would not be permitted would be similar to those noted for Alternative A, except the acres affected would change. Surface occupancy and ground disturbance would be precluded on 44,230 acres (a decrease in 82 percent compared to Alternative A). On the 32,770 acres (2 percent of RMPPA) managed as NSO/NGD, paleontological resources would receive indirect protection from surface disturbance. Areas where oil and gas leasing or development surface occupancy is precluded would decrease by 146,780 acres in Class I and II areas compared to Alternative A. In these areas, there would be a reduced need for data recovery efforts, and an associated reduction in the potential for site identification and recordation associated with development, compared to areas open for oil and gas development. Class I and II areas with NSO stipulations for coal development would be the same as Alternative A.

4.3.10.3 Alternative C

Impacts from paleontological resource management actions would be the same as those identified in Alternative B.

The impacts from dispersed OHV use would be similar to those identified in Alternative A, but the acres affected by those impacts would decrease compared to Alternative A. This change is a result of a decreases in acres open to cross-country OHV use on 95 percent in Class I areas and 99 percent in Class II areas (see Table 4-34). In addition, there is a 10,380-acre increase in acres closed to OHV use in Class I and II areas compared to Alternative A. In these areas, paleontological resources are protected from these impacts as a result of OHV closures. Potential impacts from OHV use along routes would be increased compared to Alternative A (see Table 4-34). While paleontological resources could be impacted from OHV use on designated or existing routes (851,470 acres more than Alternative A), the general impact on paleontological resources from OHV use would decrease compared to Alternative A because most of the Class I and II areas would not be managed as open to cross-country OHV use as under Alternatives A and B. The potential for impacts on paleontological resource is less when OHV use and associated impacts are limited to areas adjacent to routes.

Table 4-34. Class I and Class II Paleontological Potential Acres in OHV Designation Comparison Between Alternatives C and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Class I	18,940	461,230	23,400
Percent Class I	4%	92%	5%
Acres Class I Different from Alternative A	-388,520	+379,730	+8,780
Percent Class I Change from Alternative A	95% decrease	466% increase	60% increase
Acres in Class II	2,420	585,610	17,340
Percent of Class II	<1%	70%	1%
Acres Class II Different from Alternative A	-473,340	+471,740	+1,600
Percent Class II Change from Alternative A	99% decrease	414% increase	10% increase

Impacts from concentrated recreation use would be the same as those identified in Alternative A, except for impacts from increased recreation management presence. Concentrating recreation use by providing developed recreation sites would decrease unmitigated impacts on paleontological resources compared to Alternative A as a result of reduced dispersed use areas. Impacts from management of soils would be the same as those identified in Alternative A.

Impacts from surface disturbing activities, beyond the impacts common to all alternatives, would be similar to those identified in Alternative A, except the magnitude of the potential impact would decrease. Impacts from allowing oil and gas surface occupancy or ground disturbing activities would decrease because there are 92,460 acres fewer than Alternative A that are open to oil and gas leasing with standard stipulations (see Table 4-35), which would decrease the potential to identify paleontological resources in these areas compared to Alternative A.

Table 4-35. Class I and Class II Paleontological Potential Acres in Oil and Gas Leasing Category Designation Comparison Between Alternatives C and A

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in Class I	176,860	63,780	102,640	11,290
Percent Class I	35%	13%	20%	2%
Acres Class I Different from Alternative A	-52,820	+36,910	+19,900	+4,830
Percent Class I Change from Alternative A	23% decrease	137% increase	24% increase	75% increase
Acres in Class II	180,760	100,180	97,140	18,170
Percent of Class II	22%	12%	12%	2%
Acres Class II Different from Alternative A	-39,640	+33,510	+1,070	+12,430
Percent Class II Change from Alternative A	18% decrease	50% increase	1% increase	217% increase

Concentrating new ROWs in corridors would reduce surface disturbance and associated impacts on paleontological resources compared to Alternative A because new disturbances would be allowed when necessary. However, continued location and development of ROWs could increase the number of identified sites, which would not occur in unsuitable areas (17,330 acres of paleontology potential Class I and II areas), and to a lesser degree in avoidance areas (77,560 acres of paleontology potential Class I and II areas). Compared to Alternative A, there is a 16,560-acre decrease in unsuitable areas and a 77,560-acre increase in avoidance areas. Impacts from areas where surface disturbing activities would not be permitted would be similar to those noted for Alternative A, except the acres protected would increase. Surface occupancy and ground disturbance would be precluded on 38,230 acres more than Alternative A. On the 199,780 acres managed as NSO, paleontological resources would receive indirect protection from surface disturbance. In these areas, there would be a reduced need for data recovery efforts and an accompanying reduction in the potential for site identification and recordation associated with development compared to areas open for oil and gas development.

4.3.10.4 Alternative D

Impacts from paleontological resource management actions would be the same as those identified in Alternative B, except developing a paleontological management plan would allow for area-specific paleontological resource management actions to better preserve paleontological resources in the area.

The impacts from dispersed OHV use would be similar to those in Alternative A, but the magnitude of the impacts would be less than any of the alternatives. This change is a result of the no areas as open to cross-country OHV use (see Table 4-36). In addition, there is a 122,570-acre increase in acres closed to OHV use in Class I and II areas compared to Alternative A. In these areas, paleontological resources would be protected from impacts. Potential impacts from OHV use along routes would be increased compared to Alternative A (see Table 4-36). While there

could be more impacts on paleontological resources because of OHV use on routes (778,480 acres more than Alternative A), the general impact on paleontological resources from OHV use would decrease compared to Alternative A because most of the Class I and II areas would be managed as limited to existing or designated routes rather than open to cross-country OHV use as in Alternatives A and B. The potential for impacts on paleontological resources would decrease when OHV use and associated impacts become limited to areas adjacent to routes.

Table 4-36. Class I and Class II Paleontological Potential Acres in OHV Designation Comparison Between Alternatives D and A

	Open to Cross-Country OHV Use	OHV Use Limited to Existing or Designated Routes	Closed to OHV Use
Acres in Class I	0	453,990	70,820
Percent Class I	0	87%	12%
Acres Class I Different from Alternative A	-407,460	+357,490	+56,200
Percent Class I Change from Alternative A	100% decrease	439% increase	384% increase
Acres in Class II	0	534,860	82,110
Percent of Class II	0	64%	10%
Acres Class II Different from Alternative A	-475,760	+420,990	+66,370
Percent Class II Change from Alternative A	100% decrease	370% increase	422% increase

Impacts from recreation management actions would be the same as those identified in Alternative A, except for impacts from increased recreation management presence. Concentrating recreation use by providing recreation developments and increased SRMAs decreases unmitigated impacts on paleontological resources more than Alternatives A, B, or C. Impacts from management of soils would be the same as those in Alternative A.

Impacts from surface disturbing activities would be the similar to Alternative A, except the magnitude of the potential impact would decrease. Impacts from allowing oil and gas surface occupancy or ground disturbing activities would decrease because there are 139,640 acres fewer than Alternative A open to oil and gas leasing with standard stipulations (see Table 4-37), which would decrease the potential to identify paleontological resources in these areas compared to Alternative A.

Table 4-37. Class I and Class II Paleontological Potential Acres in Oil and Gas Leasing Category Designation Comparison Between Alternatives D and A

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres in Class I	158,920	23,970	189,250	63,760
Percent Class I	32%	5%	38%	13%

	Open w/ Standard Stipulations	Open – CSU	Open – NSO	Closed to Leasing
Acres Class I Different from Alternative A	-70,760	-2,900	+106,510	+57,300
Percent Class I Change from Alternative A	31% decrease	11% decrease	129% increase	887% increase
Acres in Class II	151,520	51,680	254,040	72,140
Percent of Class II	18%	6%	30%	9%
Acres Class II Different from Alternative A	-68,880	-14,990	+157,970	+66,400
Percent Class II Change from Alternative A	31% decrease	22% decrease	164% increase	1,157% increase

Concentrating new ROWs in corridors would reduce surface disturbance and associated impacts on paleontological resources compared to Alternative A, because new disturbances would be allowed to occur when necessary; however, continued location and development of ROWs could increase the number of identified sites. ROW development would not occur in unsuitable areas (355,100 acres of paleontology potential Class I and II areas) and to a lesser degree in avoidance areas (10,760 acres of paleontology potential Class I and II areas).

Impacts from areas where surface disturbing activities would not be permitted would be similar to those noted for Alternative A, except the acres affected would change. Surface occupancy and ground disturbance would be precluded on 388,180 acres more than under Alternative A. With more acres than any other alternative, managing 459,940 acres (24 percent of RMPPA) as NSO or NGD would indirectly provide paleontological resources protection from surface disturbance. In these areas, there would be a reduced need for data recovery efforts and an accompanying reduction in the potential for site identification and recordation associated with development compared to areas open for oil and gas development.

4.3.11 Impacts on Special Management Designations

Special management area designations provide management and protection for unique natural, historic, scenic, or recreational resources in the planning area. SMA management prescriptions generally provide more protection for the resources for which they are created and the public who enjoy them. Impacts on other resources and resource users from the implementation of SMA management prescriptions are discussed in those particular resource sections. Existing conditions concerning SMA resources are described in Section 3.1.12, which is organized in the following order: Wilderness Study Areas (WSAs), Lands with Wilderness Characteristics Outside Existing WSAs, Areas of Critical Environmental Concern (ACECs), and Wild and Scenic Rivers (WSRs). Significance criteria, methods and assumptions for analysis, and impacts that are common to all alternatives are included at the beginning of each resource topic.

4.3.11.1 Impacts on Wilderness Study Areas

Impacts on the wilderness characteristics of naturalness, opportunities for solitude, primitive/unconfined recreation, and special features are considered in this analysis. Impacts are limited to potential changes in wilderness characteristics for the WSAs.

Impacts on WSAs would be considered significant if management actions “impair the suitability of WSAs for preservation as wilderness.”

The analysis is based on the following assumptions:

- WSAs in the RMPPA would continue to be managed under the WSA Interim Management Policy (IMP) H-8550-1 until Congress either designates or releases all or portions of the WSAs from any further consideration.
- WSAs, if released by Congress, would still contain wilderness characteristics.

There are several impacts that would not vary by alternative. Managing wildfire in WSAs by using conditional fire suppression would allow fire to play its natural role in the ecosystem, which could cause short-term impacts on the naturalness and opportunity for primitive/unconfined recreation; however, in the long-term such actions would likely result in protections to the wilderness values. Continuing to manage the seven existing WSAs under the IMP would protect the wilderness characteristics related to naturalness, and the opportunity for solitude and primitive/unconfined recreation from surface disturbance. If Congress released any WSA areas from wilderness study, the wilderness values of the area could significantly be impacted because no direct protections would be afforded these values; any protections would be indirect and would result from management of other resources. Impacts on WSAs would not be anticipated as a result of implementing management actions for air quality, soil resources, water resources, fish and wildlife habitat, Special Status Species, wild horses, cultural and heritage resources, paleontological resources, livestock grazing, forestry, and social and economic values.

Alternative A

Closing the Cross Mountain and Diamond Breaks WSAs to OHV use, including over-the-snow vehicles, would protect the wilderness characteristics in these areas by restricting activities that could impact opportunities for solitude and primitive/unconfined recreation. Managing OHV use in the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSAs as limited to existing roads and trails would provide some protection to the wilderness characteristics and mitigate impacts associated with OHV. However, impacts from route proliferation could occur in these areas as new user-created routes would be perceived as existing routes, resulting in degradation of solitude, naturalness, and opportunities for primitive/unconfined recreation. Allowing over-the-snow vehicle use would result in short-term, temporary impacts on the wilderness characteristics. If any of these WSAs were released from wilderness study, significant impacts would occur on the wilderness characteristics by managing these areas consistent with surrounding OHV management, which would be open and/or limited to existing roads and trails.

Surface disturbance could affect the naturalness, and opportunity for solitude and primitive/unconfined recreation opportunities in the West Cold Springs, Ant Hills, Chew Winter

Camp, Peterson Draw, and Vale of Tears WSAs, if any of these areas were released from wilderness study. Impacts related to loss of wilderness characteristics could be significant, depending on the amount of activity.

If the Diamond Breaks WSA were released from wilderness study, the Colorado portion would receive minimal protection through management as a recreational management unit. Impacts on naturalness and opportunities for solitude and primitive/unconfined recreation could occur throughout the WSA area if surface disturbing activities were to occur.

If the Cross Mountain WSA were released from wilderness study, impacts could occur from an increase in activities that could affect the naturalness and opportunity for solitude and primitive/unconfined recreation. The Cross Mountain Canyon ACEC would be expanded to 3,000 acres if the WSA were released, which would serve to protect these wilderness characteristics within this ACEC; however, the ACEC would encompass only 21 percent of the existing WSA area. The remainder of the area would receive minimal protection through management as a SRMA. If any WSA areas were released from wilderness study and managed as open to leasing, mineral entry and development, or mineral material sales, impacts would occur on wilderness characteristics from surface disturbance caused by well pads and roads created for mineral exploration and development.

If any WSA areas were released from wilderness study, and if managed as suitable for ROW, impacts from surface disturbance could occur on these areas' wilderness characteristics. Identifying and eliminating noxious weeds on a case-by-case basis could allow weeds to spread, potentially deteriorating the naturalness of the affected WSAs.

Alternative B

Impacts on WSAs from travel management, and identifying and eliminating noxious weeds on a case-by-case basis, would be the same as those identified for Alternative A.

Impacts on WSAs from OHV use and over-the-snow vehicles would be similar to those under Alternative A. If the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSAs were released from wilderness study, CSU stipulations in these areas would provide minimal protection to the wilderness characteristics; however, significant impacts on wilderness characteristics would likely occur from the surface disturbance caused by allowing development activities.

Impacts could occur, from increased potential for surface disturbance and development, on the naturalness and opportunity for solitude and primitive/unconfined recreation opportunities in any of the WSAs if these areas were released from wilderness study under Alternative B. These areas would have no special management and surface disturbing activities would be allowed. Impacts from a loss of wilderness characteristics could be significant depending on the amount of activity within the area.

Alternative C

The IMP which directs WSA management does not allow for any impairing activities to occur within these areas; however, if any of the WSAs were released from wilderness study by

Congress, the adaptive management approach would be implemented in these areas. If monitoring indicates that adverse effects were occurring, protective management would be implemented to preserve wilderness characteristics. Management actions for WSAs under this alternative would provide protection to the wilderness characteristics in and surrounding WSAs, even if released; however, certain actions would still be allowed that could affect these characteristics.

Closing the Cross Mountain and Diamond Breaks WSAs to OHV use, including over-the-snow vehicles, would protect the wilderness characteristics in these areas. Managing OHV use in the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSAs areas as limited to existing roads and trails would provide minimal protection to the wilderness characteristics from OHV use. Allowing over-the-snow vehicle use would result in short-term, temporary impacts to the wilderness characteristics in these areas from increased user conflicts from the noise and odors. If the Diamond Breaks WSA were released from wilderness study, impacts could occur on the wilderness characteristics by allowing OHV use on designated routes; however, this designation would minimize the impacts of OHV use on the area. Managing limited areas through adaptive management will allow for existing routes to remain open to use until indicators show a need for the development and implementation of a transportation plan, at which time further decisions would be made through a collaborative process. This adaptive management could reduce impacts on the wilderness characteristics.

If the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSA areas were released from wilderness study, they would be managed as ROW avoidance areas. Although management of any new ROW development would place a priority on locating these ROWs outside sensitive areas, there is a potential that impacts to the wilderness characteristics could still occur from surface disturbance activities associated with such development actions.

Managing the Cold Springs Mountain area to protect wilderness characteristics by closing the area to all mineral leasing actions, limiting OHV use to designated routes, and managing as a ROW avoidance area (wind energy projects would be considered on a case-by-case basis) would restrict surface disturbing activities and enhance the protection of the wilderness characteristics within the West Cold Springs WSA. If the West Cold Springs WSA were released from wilderness study, these actions would preserve wilderness characteristics in the WSA.

Closing to oil and gas leasing and to locatable mineral exploration and development WSAs and areas surrounding certain WSAs (Dinosaur North and Cold Springs Mountain wilderness characteristics areas adjacent to the West Cold Springs WSA, and WSAs situated north of Dinosaur National Monument) would reduce surface disturbance. This management action would protect wilderness characteristics related to naturalness and the opportunity for solitude and primitive/unconfined recreation in an additional 72,930 acres surrounding these WSAs. If the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSAs were released from wilderness study, these actions would also serve to protect the wilderness characteristics in and surrounding these WSAs.

If the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSAs were released from wilderness Study, managing the areas as VRM Class II would restrict

surface disturbing activities in these areas, which would protect the naturalness and opportunity for solitude and primitive/unconfined recreation.

Proactively working to prevent the spread of noxious weeds could protect the naturalness of WSAs.

Alternative D

Management actions that reduce surface disturbing activities, provide restrictions on OHV use, and provide protective management for wilderness characteristics in WSAs, if they were released from wilderness study by Congress, and areas surrounding the WSAs that possess wilderness characteristics, would provide the greatest amount of protection of all the alternatives to the wilderness characteristics.

Managing all of the existing WSAs as closed to OHV use, including over-the-snow vehicles, would provide maximum protection for the wilderness characteristics. If any of the WSAs were released from wilderness study, they would be managed as closed to OHV use and all mineral leasing actions, as VRM Class II, and as ROW exclusion areas, which would preserve the wilderness characteristics in these areas. If released, the West Cold Springs area would be managed as part of the Cold Springs Mountain SRMA, and the Ant Hills, Chew Winter Camp, Peterson Draw, and/or Vale of Tears WSAs would be managed as part of the Dinosaur North SRMA. These SRMAs would be closed to OHV use and would restrict surface disturbance, which would protect wilderness characteristics.

Managing the Dinosaur North and Cold Springs Mountain SRMAs, and the Cross Mountain and Diamond Breaks backcountry areas, as closed to OHV use, as closed to all mineral actions, as VRM Class II, and as ROW exclusion areas with no wind energy development would further protect wilderness characteristics within the WSAs, if they are released by Congress from further consideration as wilderness, by increasing the area where surface disturbing activities areas are prohibited. These actions would preserve the naturalness of these areas and expand the opportunities for solitude and primitive/unconfined recreation.

Impacts on WSAs from proactively working to prevent the spread of noxious weeds would be the same as those in Alternative C.

4.3.11.2 Impacts to Lands with Wilderness Characteristics

This section addresses impacts from RMP management actions to lands with wilderness characteristics outside the existing WSAs. Wilderness characteristics considered in this analysis include naturalness, opportunities for solitude, and opportunities for primitive/unconfined recreation. Impacts noted in this section are limited to potential changes in wilderness characteristics for the various identified areas.

Impacts to lands with wilderness characteristics outside existing WSAs would be considered significant if there was any degradation of the individual wilderness characteristics (naturalness and outstanding opportunities for solitude or primitive recreation) to the degree the value would no longer be present within the specific area.

The analysis is based on the assumption that lands identified as having, or as likely to have, wilderness characteristics contain wilderness values (e.g., naturalness, outstanding opportunities for solitude or primitive recreation).

Some minor land management developments and improvements could be compatible with lands likely to have wilderness characteristics. Impacts to wilderness characteristics could occur if rangeland improvements were developed within any of the lands with wilderness characteristics outside existing WSAs. These impacts would likely be localized and short-term in duration; however, the extent of the impacts could be more severe depending on the type, location, and size of the range improvement. These impacts would not vary by alternative.

Impacts to lands with wilderness characteristics outside existing WSAs would not be anticipated as a result of implementing management actions for air quality, soil resources, water resources, fish and wildlife habitat, Special Status Species, wild horses, cultural and heritage resources, paleontological resources, forestry, and social and economic values.

Alternative A

The Vermillion Basin, Dinosaur North, Cold Springs Mountain, and the Little Yampa/Juniper Canyon areas have been determined to contain wilderness characteristics outside existing WSAs. Management of these areas would allow for some activities that could significantly impact the areas wilderness characteristics resulting from surface disturbing activities. Such activities in the Vermillion Basin, Dinosaur North, and Cold Springs Mountain areas that could result in surface disturbance activities include various levels of mineral development and lands and realty development (i.e., communication sites, ROWs, and wind energy). Similar actions would also be allowed in the Little Yampa/Juniper Canyon area; however, management associated with SRMA designation would place NSO stipulations on oil and gas developments, limiting disturbance in this area. OHV use would also be managed as open to cross-country OHV travel in all of these areas, except for the majority of the Cold Springs Mountain area, and part of the Vermillion Basin area where OHV use would be limited to existing roads and trails, and the portions of the Little Yampa/Juniper Canyon area within the SRMA where OHV use is limited to designated roads and trails (see Map 2-45). Allowing these activities to occur over the life of the plan could cause significant impacts on the wilderness characteristics in all of these areas based on the anticipated level of mineral development or increase in motorized recreation. The significance of these impacts is also based on the irretrievable and irreversible nature of development, which could result in the area losing its wilderness characteristics.

Portions of the Little Yampa/Juniper Canyon area could be leased to coal mining, which would affect the wilderness characteristics of this area, if developed. Surrounding areas would be leased with NSO stipulations that could restrict some of the surface disturbance that would occur in the area if coal was developed.

Identifying and eliminating noxious weeds on a case-by-case basis could allow weeds to spread, affecting the naturalness of the affected lands with wilderness characteristics.

Alternative B

Impacts from the management of the Dinosaur North, Cold Springs Mountain, and Little Yampa/Juniper Canyon areas would be the same as those in Alternative A. Impacts from identifying and eliminating noxious weeds on a case-by-case basis would also be the same as those in Alternative A.

Impacts in the Vermillion Basin area would be similar to those in Alternative A, except the area would be withdrawn from mineral entry; however, Vermillion would still be open to new oil and gas leasing with CSU stipulations to use state-of-the-art technology to reduce visual intrusions, and leasing in larger blocks to protect natural values, all with the intent to maximize opportunities to successfully reclaim the area at the end of the production period. CSU stipulations would allow focusing development near existing trails, ROWs, canyons, and washes, and clustering wells where feasible; however, because of the existing landscape, naturalness, opportunity of solitude and primitive/unconfined recreation, and the potential for mineral and ROW development, the level of surface disturbance that could occur would result in significant impacts on wilderness characteristics. These impacts would also be significant because of the irretrievable and irreversible nature of development over the life of the plan. The majority of the Vermillion Basin area would be managed as VRM Class III (48,800 acres), with the Vermillion Bluffs area managed as VRM Class II (590 acres) to protect the scenic values in the area. ROWs would be available on a case-by-case basis, including communication sites and wind energy development, which could reduce the scenic qualities of these areas. However, the Vermillion Bluffs and fragile soil areas would be managed as avoidance areas to reduce some surface disturbance in these areas. OHV use in the entire basin would be limited to designated roads and trails.

Alternative C

Adaptive management under Alternative C would allow development activities to occur, but if monitoring indicates that adverse effects are occurring, protective management to preserve wilderness characteristics would be implemented. Management actions under this alternative would provide additional protection to the wilderness characteristics in the Vermillion Basin, Dinosaur North, Cold Springs Mountain, and Little Yampa/Juniper Canyon areas; however, some actions would still be allowed that could affect these characteristics.

Management of Dinosaur North area would restrict surface disturbance and impacts on wilderness characteristics by closing the area to oil and gas leasing, withdrawing the area from mineral entry, limiting OHV use to designated routes, and managing the area as VRM Class II and as a ROW avoidance area with no wind energy. Management of the Little Yampa/Juniper Canyon area and the effects of restricting surface disturbance would be similar, except the area would be open to mineral material sales, which could affect the naturalness and opportunity for solitude if mineral sales operations occurred. Portions of the Little Yampa/Juniper Canyon area could be leased to coal mining, which would cause significant impacts on the wilderness characteristics of this area, if developed. Surrounding areas would be leased with NSO stipulations, which could restrict some of the surface disturbance that would occur in the area if coal was developed.

Impacts on the Vermillion Basin area would be similar to those described in Alternative A; however, greater protections would be afforded the wilderness characteristics from management actions placed on oil and gas development. Although the area would be open to new oil and gas, leasing specific stipulations would be imposed that would direct the size, time, and location of new leases. Despite these stipulations and mitigations, oil and gas development would result in a significant impact to wilderness characteristics. Additional protections would be afforded from management that withdrew the area from mineral entry, restricted OHV use to limited or designated routes in some areas and closed OHV in others, and based lands and realty decisions on a case-by-case analysis with avoidance areas being applied in the Vermillion Bluffs and fragile soil areas. Managing most of the area as VRM III would still allow for some surface disturbance actions to occur that could impact the scenic quality of the area; however, the Vermillion Bluffs area would be managed as VRM II mitigating surface disturbing activities in that area.

Managing the Cold Springs Mountain area to protect wilderness characteristics by closing to oil and gas leasing, withdrawing the area from mineral entry, and limiting OHV use to designated routes would restrict surface disturbance in the area; however, the area would be managed as VRM Class III and as a ROW avoidance area, and wind energy could be leased on a case-by-case basis, which could affect the scenic and wilderness values of the area if wind energy leases are developed.

Proactively working to prevent the spread of noxious weeds could protect the naturalness of areas with wilderness characteristics.

Alternative D

Designating the Vermillion Basin, Dinosaur North, and Cold Springs Mountain areas as backcountry SRMAs; managing all of these areas as closed to OHV use, closed to oil and gas leasing, and withdrawn from mineral entry; and designating them as VRM Class II and managing them as ROW exclusion areas with no wind energy development would provide the greatest amount of protection, compared to the other alternatives, for the naturalness of these areas, and would expand the opportunities for solitude and primitive/unconfined recreation in these areas.

Impacts on these areas from proactively working to prevent the spread of noxious weeds would be the same as those in Alternative C.

4.3.11.3 Impacts to Areas of Critical Environmental Concern

Interdisciplinary team meetings were held to discuss citizen ACEC nominations and the effectiveness of current ACEC management areas. The decisions of those meetings are described in Appendix G, and were used in this analysis. Impacts identified for ACECs are specific to the area, and are based on the effect management actions would have on the relevant and important values of an ACEC, which are identified in Appendix G.

Impacts on ACECs would be considered significant if management actions fail to “prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.”

The analysis is based on the assumption that although management actions for most resources and resource uses have field-office-wide application, ACEC management prescriptions apply only to those lands within each specific ACEC, as outlined.

Impacts that would not vary by alternative would include activities or developments of State or private inholdings that would not be significantly affected by ACEC management prescriptions, nor would these activities or developments affect the criteria necessary to maintain designations. If surveys found any Colorado BLM Sensitive Plant Species before surface disturbing activities occurred, the relevant and important values related to these species would be protected through avoidance or species-specific protective measures of these areas.

Impacts on ACECs would not be anticipated as a result of implementing management actions for air quality, fish and wildlife habitat, wild horses, cultural and heritage resources, paleontological resources, recreation, forestry, and social and economic values.

Alternative A

Management actions within the Limestone Ridge ACEC (1,400 acres) that restrict surface disturbance by leasing oil and gas exploration and development with NSO stipulations, withdrawing the area from mineral entry, managing as unsuitable for ROW (consistent with valid and existing rights), and closing the area to OHV use provide protection to the sensitive plant species, remnant plant species, and scenic quality relevant and important values of this ACEC.

By implementing management actions that limit surface disturbance in the Irish Canyon and Lookout Mountain ACECs from oil and gas operations through CSU stipulations, managing the ACEC as unsuitable for ROW (consistent with valid and existing rights), and limiting OHV use to designated roads and trails, the relevant and important values related to sensitive plants, remnant plant associations, geologic values, cultural resources, and scenic qualities would be protected. In addition, the relevant and important values of the ACEC would be protected by implementing avoidance areas around areas where inventories conducted prior to surface disturbance activities found sensitive plant and remnant vegetation associations and known geologic values and cultural resources

Restricting surface disturbance in the Cross Mountain Canyon ACEC (650 acres) by leasing oil and gas exploration and development with NSO stipulations and closing the area to mineral material sales, managing it as a ROW exclusion area (consistent with valid and existing rights), and closing the area to OHV use would protect the relevant and important values related to sensitive plants, remnant plant species, and scenic qualities. Because the ACEC is within the Cross Mountain WSA (14,270 acres), indirect impacts to the relevant and important values would occur from restrictions placed on surface disturbance by managing the WSA as VRM Class I and closed to locatable mineral exploration and development. If this WSA were released by Congress these indirect protections would be lost. However, the ACEC would be expanded to 3,000 acres in order to mitigate the loss of the WSA and to continue protection of the relevant and important values of the ACEC.

No surface disturbing activities would be allowed that could alter any prairie dog complex, making it unsuitable for reintroduction of the black-footed ferret. Avoidance of white-tailed

prairie dog towns and colonies within black-footed ferret reintroduction areas would preserve existing towns and colonies and eliminate direct mortality in 72,020 acres of the LSFO. These actions would reduce impacts on relevant and important values in the area considered as a White-Tailed Prairie Dog ACEC (under Alternative D only).

Relevant and important values related to sensitive plants and plant communities would receive species-specific protection through surveys and avoidance. Sensitive plants and plant communities that occur within areas open to cross-country OHV use (780 acres) could be affected by cross-country OHV travel and proliferation of routes. These actions would reduce impact on relevant and important values in the area considered as a Natural Systems ACEC (under Alternative D only).

Identifying and eliminating noxious weeds on a case-by-case basis could allow weeds to spread to the point that the relevant and important values would be affected in existing ACECs, and areas considered as potential ACECs. Improving vegetation conditions to reduce livestock/big game conflicts could result in protecting the relevant and important values related to sensitive plants and remnant plant species within the existing ACECs. However, if the vegetation and forage conditions were improved to accommodate livestock production, impacts could occur on the sensitive plant/remnant plant species values in ACECs where grazing takes place.

Limiting OHV use to designated roads and trails in the Irish Canyon and Lookout Mountain ACECs would protect sensitive plants, remnant plant species, and cultural (Irish Canyon) relevant and important values from restricting the disturbance caused by cross-country OHV use. Minor impacts could occur on plant species along these designated routes from the fugitive dust that could adversely affect these plant species.

Full fire suppression in areas with high resource values, such as existing ACECs, would serve to protect the relevant and important values related to sensitive plants and remnant plant species with these areas. However, because of the buildup of fuels from years of suppression, if a catastrophic fire event were to occur within any of the ACEC areas, these values could be affected.

Alternative B

Under Alternative B, all ACEC designations would be removed, and no new ACECs would be designated; however, the relevant and important values of these areas would still be present. Impacts described under this alternative identify how management associated with other resources could impact those relevant and important values, such as sensitive plants, remnant plant associations, scenic qualities, geologic, and cultural resources. The primary type of management actions that could affect the relevant and important values include surface disturbance from mineral exploration and development, development of ROWs, and impacts from livestock grazing, vegetation treatments, and cross-country OHV use.

The scenic relevant and important values in the Limestone Ridge and Lookout Mountain areas could be significantly affected if surface disturbance from development were to occur. Mineral and ROW developments could cause irreparable harm to the scenic values in these areas, particularly because of the existing, undeveloped nature of these areas, and because Lookout

Mountain would be managed as an observation point. The geologic, cultural, and scenic relevant and important values in the Irish Canyon area could be significantly affected if development were to occur because of the surface disturbance that would be allowed in this area. Special Status Plant Species would be protected through conservation measures.

In large part, the relevant and important values of the Cross Mountain Canyon ACEC would be protected because of it is within the Cross Mountain WSA. However, if the Cross Mountain WSA were released from by Congress, the Cross Mountain Canyon area would have no specific management or protection allocated to the scenic relevant and important values. Consequently, significant impacts on the relevant and important values in this area could occur from surface disturbance that could cause irreparable harm to the scenic values. Special Status Plant Species would be protected through conservation measures (Appendix J).

Protective management for the black-footed ferret and associated habitat would not be implemented under this Alternative. This management could result in irreparable harm to the relevant and important values related to the protection of this species, which would result in significant impacts on these values in the area considered as a potential White-Tailed Prairie Dog ACEC (Alternative D only).

Impacts on the relevant and important values in the area considered as a potential Natural Systems ACEC (Alternative D only) would be the same as those in Alternative A.

Relevant and important values in the existing Irish Canyon ACEC could be affected by allowing surface disturbance within a 0.25 mile of perennial water sources. Similarly, the relevant and important values of the ACEC would likely be impacted from management that would not restrict surface disturbance and allow surface occupancy in fragile soil areas.

Impacts on the relevant and important values related to sensitive plants and remnant plant species would be similar to those under Alternative A, except these values could receive protection in the Limestone Ridge, Irish Canyon, and Lookout Mountain areas by requiring plant surveys before land exchange or before allowing surface disturbing activities. Stipulations and implementation of fugitive dust control methods on permitted actions and activities to prevent adverse effects on federal candidate plant species would also provide protection for the relevant and important values related to sensitive plants and remnant plant species in these areas. These values would be further protected by including management direction in travel management plans that avoid adverse impacts on Special Status Plant Species. Identifying and eliminating noxious weeds on a case-by-case basis could allow weeds to spread to the point that relevant and important values related to sensitive plants and remnant plant species would be affected.

Alternative C

Under Alternative C, only the Irish Canyon ACEC designation would remain. The ACEC designations would be removed from Limestone Ridge, Lookout Mountain, and Cross Mountain Canyon areas, and no new ACECs would be designated; however, relevant and important values still exist in these areas.

Stipulations on surface disturbances in the Limestone Ridge area (CSU/SSR), as well as proposing the area for withdrawal, managing the area as VRM II and as a ROW exclusion area

(consistent with valid and existing rights), and closing the area to OHV use would protect the relevant and important values related to sensitive plants, remnant plant species, and scenic qualities, without ACEC designation.

Restricting surface disturbance in the Lookout Mountain area by leasing oil and gas exploration and development with CSU/SSR stipulations and limiting OHV use to designated routes would protect the relevant and important values related to sensitive plants, remnant plant species, and scenic qualities, without ACEC designation. Minor impacts could occur on plant species along these designated routes because of the fugitive dust that could adversely affect these plant species.

Limiting surface disturbance in the Irish Canyon ACEC by closing the area to oil and gas exploration and development, limiting OHV use to designated roads and trails, managing as VRM Class II, and managing the area a ROW exclusion area (consistent with valid and existing rights) would protect the relevant and important values related to sensitive plants, remnant plant communities, scenic, cultural, and geologic values. Minor impacts could occur on plant species along these designated routes from fugitive dust that could adversely affect these plant species.

The Cross Mountain Canyon ACEC designation would be removed under Alternative C; however, because of its location within and management associated with the Cross Mountain WSA, the relevant and important values of the ACEC would in large part be protected. If the Cross Mountain WSA were released from Congress, the Cross Mountain Canyon area would be managed as an ACEC, and restricting surface disturbing activities by closing the area to oil and gas operations, withdrawing the area from mineral entry, closing the area to OHV use, and managing as a VRM Class II and ROW exclusion area would be implemented to protect the relevant and important values. Protections to the relevant and important values of the area would also be provided from management associated with suitable WSR segment 3 of the Yampa River. Specific management prescriptions that would occur within a 0.25 mile of each side of the river include closing the area to OHV use and to oil and gas leasing and also recommending withdrawal from mineral entry. Such actions would reduce surface disturbance within the area and provide indirect protections to the ACECs sensitive plants, threatened and endangered species (Colorado pikeminnow) and scenic relevant and important values.

No surface disturbing activities would be allowed that could significantly alter any prairie dog complex, making it unsuitable for reintroduction of the black-footed ferret. Avoidance of white-tailed prairie dog towns and colonies within black-footed ferret reintroduction areas would preserve existing towns and colonies and eliminate direct mortality in 72,020 acres of the LSFO.

Relevant and important values related to sensitive plants and remnant plant species could receive some protection in the Limestone Ridge and Lookout Mountain areas by requiring plant surveys before land exchange or before allowing surface disturbing activities, and by stipulations and implementation of fugitive dust control methods on permitted actions and activities to prevent adverse effects on federal candidate plant species. These values would be further protected by including management direction in travel management plans to avoid adverse impacts on Special Status Plant Species, to implement fire management practices, and other protections to enhance these species, and to require that topsoil be replaced following completion of work to preserve seed bank and associated mycorrhizal species.

Proactively working to prevent the spread of noxious weeds could reduce the likelihood that noxious weeds would spread to the point where relevant and important values could be affected.

Improving vegetation conditions to reduce livestock/big game conflicts could protect the relevant and important values related to sensitive plants and remnant plant species in the Irish Canyon ACEC, Limestone Ridge, Lookout Mountain, and Cross Mountain Canyon areas; however, if the vegetation and forage conditions were improved to accommodate livestock production, values in ACECs where grazing takes place could be affected.

Alternative D

Under Alternative D, ACEC designations in the Limestone Ridge, Lookout Mountain, Irish Canyon, and Cross Mountain Canyon areas would be retained (20,910 total acres), and the White-Tailed Prairie Dog (271,730 acres) and the Natural Systems ACECs (17,740 total acres) would be designated. The Natural Systems ACECs consist of the areas and approximate acres shown in Table 4-38 and are shown on Map 2-9. In this analysis, all of these ACECs are referred to as the Natural Systems ACECs because special management through the ACEC designation is the same for all of these areas.

Table 4-38. Natural Systems ACEC areas and Acreage

ACEC	Acreage
Cold Desert Shrublands ACEC	1,210
Gibben's Beardtongue ACEC	5,500
Bull Canyon ACEC	3,390
G Gap ACEC	2,230
Little Juniper Canyon ACEC	20
Bassett Spring ACEC	110
No Name Spring ACEC	80
Pot Creek ACEC	2,240
Whiskey Springs ACEC	2,760
Willow Spring ACEC	100
Deception Creek ACEC	110

Restricting surface disturbance in the Limestone Ridge ACEC (1,400 acres) by closing the area to oil and gas exploration and development, withdrawing it from mineral entry, managing it as VRM Class II, managing it as a ROW exclusion area (consistent with valid and existing rights), and closing it to OHV use would protect the relevant and important values related to sensitive plants, remnant plant communities, and scenic values.

Restricting surface disturbance in the Irish Canyon ACEC (11,910 acres) by closing the area to oil and gas exploration and development, withdrawing it from mineral entry, managing it as VRM Class II, managing it as a ROW exclusion area (consistent with valid and existing rights), and limiting OHV use to designated routes would protect the relevant and important values related to sensitive plants, remnant plant communities, and scenic, cultural, and geologic values.

Minor impacts could occur on plant species along these designated routes because of the fugitive dust that could adversely affect these plant species.

Limiting surface disturbance in the Lookout Mountain ACEC (6,950 acres) by limiting OHV use to designated roads and trails, managing the ACEC as NSO for oil and gas, withdrawing it from mineral entry, managing it as VRM Class II, and managing it as a ROW exclusion area would protect the relevant and important values related to sensitive plants, remnant plant communities, and scenic values. Minor impacts could occur on plant species along these designated routes because of the fugitive dust that could adversely affect these plant species.

Restricting surface disturbance in the Cross Mountain Canyon ACEC (650 acres) by closing the area to oil and gas exploration and development, withdrawing from mineral entry, managing as VRM Class I, managing as a ROW exclusion area (consistent with valid and existing rights), and closing the area to OHV use would protect the relevant and important values related to threatened and endangered species, sensitive plants, and scenic qualities. Protections to the relevant and important values of the area would also be provided from management associated with suitable WSR segment 3 of the Yampa River, as described in Alternative C.

Designating the White-tailed Prairie Dog ACEC (271,730 acres) would protect relevant and important values by limiting surface disturbance through managing oil and gas leasing with NSO stipulations, withdrawing the ACEC from mineral entry, and managing the ACEC as a ROW exclusion area would preserve existing towns and colonies and eliminate direct mortality. Limiting OHV use to designated roads and trails would reduce direct mortality and disturbance of the animal. In addition, no surface disturbing activities would be allowed that could significantly alter any prairie dog complex, making it unsuitable for reintroduction of the black-footed ferret. Management actions set forth in the Special Status Species section of Chapter 2 of this document to protect the endangered black-footed ferret would directly protect white-tailed prairie dog habitat. Avoidance of occupied black-footed ferret habitat would preserve existing prairie dog towns and colonies and eliminate direct mortality in 72,020 acres of the LSFO.

Designating the Natural Systems ACECs (17,750 total acres) would protect relevant and important values by managing surface disturbance through site-specific relocation, leasing oil and gas operations with CSU stipulations, withdrawing the areas from mineral entry, and managing as ROW avoidance areas would protect the relevant and important values related to sensitive plants and plant communities. Managing the ACECs as limited to designated roads and trails would provide additional protection to these values. Minor impacts could occur on plant species along these designated routes because of the fugitive dust that could adversely affect these plant species.

Proactively working to prevent the spread of noxious weeds could reduce the likelihood that noxious weeds would spread to the point where relevant and important values could be affected. Managing to reduce livestock/big game conflicts to improve vegetative and forage conditions by focusing on decreasing livestock use, could protect and enhance the relevant and important values related to sensitive plants and remnant plant species and associations within the Irish Canyon, Limestone Ridge, Lookout Mountain, Cross Mountain Canyon, and Natural Systems ACECs, and would also protect white-tailed prairie dog habitat in the White-tailed Prairie Dog ACEC.

4.3.11.4 Impacts to Wild and Scenic Rivers

This section discusses impacts to WSRs that would occur from actions associated with the management of other resources. Analysis of impacts to WSRs is limited to a 0.25 mile each side of the river and is based on any potential change to the outstandingly remarkable values (ORV) tentative classification or free-flowing nature of the river segment or corridor area. Documentation of the process used to determine suitability can be found in Appendix D. ORVs include:

- Scenic—Diversity of view, special features, seasonal variations, and cultural
- Recreation—Diversity of use, experience quality, length of season, access, level of use, attraction, sites and facilities, and associated opportunities
- Geologic—Feature abundance, diversity of features, educational/scientific importance
- Fish—Habitat quality, diversity of species, values of species, abundance of fish, natural reproduction, size and vigor of fish, quality of experience, cultural/historic importance, recreational importance, access
- Wildlife—Habitat quality, diversity of species, abundance of species, natural reproduction, size and vigor of fish, quality of experience, cultural/historic importance, recreational importance, access
- Historic—Significance, site integrity, education/interpretation, and listing in or eligibility for listing in NRHP
- Cultural—Significance, current uses, number of cultures, site integrity, education/interpretation, and listing in or eligibility for listing in NRHP
- Ecological—Species diversity, ecological function, rare communities, and educational/scientific.

Impacts on WSRs would be considered significant if any of the following were to occur:

- Impairment of the ORVs or the free-flowing nature of the suitable WSR segments to the point that these areas no longer meet criteria for inclusion in the National Wild and Scenic Rivers System (NWSRS)
- Any action that would change the tentative classification of suitable WSR segments.

Impacts on WSRs would not be anticipated as a result of implementing management actions for air quality, soil resources, fish and wildlife habitat, wild horses, fire, cultural and heritage resources, paleontological resources, livestock grazing, forestry, lands and realty, and social and economic values.

Alternative A

Managing the Beaver Creek, Vermillion Creek, and the three Yampa River segments as eligible for inclusion in the NWSRS would protect the free-flowing nature, associated ORVs, and tentative classifications as wild, scenic, or recreational until suitability is determined.

WSA management, combined with management of the Cross Mountain Canyon ACEC, would reduce surface disturbing activities, which would indirectly protect the ORVs in the eligible Yampa River segment 3 related to fish species, recreation, geology, and scenic values. Management actions that would restrict surface disturbance and provide indirect protections to

the eligible segment would include closing the WSA portion to OHV use and mineral leasing, and managing both the WSA and ACEC as VRM Class I and ROW exclusion areas. If the WSA were released from wilderness consideration, protections to the river segments from ORVs would be provided by management associated with the Cross Mountain Canyon Management. Other protection management would be associated with the ACEC that provide protections for the Colorado pikeminnow, humpback chub, bonytail chub, and State-protected razorback sucker would also indirectly protect the fish and recreation ORVs within the eligible Yampa River segment 3 (Cross Mountain Canyon) related to Colorado pikeminnow habitat.

WSA management of the West Cold Springs area would reduce surface disturbing activities surrounding part of the eligible Beaver Creek segment, which would indirectly protect the ORVs related to the Colorado River cutthroat trout species by managing the section that falls within the WSA as VRM Class I, ROW exclusion area, limiting OHV use to existing roads and trails, and closed to mineral leasing.

Management of the Irish Canyon ACEC would reduce surface disturbing activities, which would indirectly protect the ORVs in the eligible Vermillion Creek segment by limiting OHV use to designated roads and trails, leasing oil and gas with CSU stipulations, and managing the ACEC as a ROW exclusion area.

VRM Class I management of WSAs would indirectly protect the ORVs of the eligible Yampa River segment 3 (Cross Mountain WSA) and part of the Beaver Creek segment (West Cold Springs WSA). Not designating any of the other areas surrounding the eligible river segments with any VRM class, not restricting surface disturbing activities from mineral activities or ROW, and managing the majority of the areas as open to OHV use could affect the eligibility of the Yampa segments 1 and 2, and the portion of the Beaver Creek segment that does not fall within the West Cold Springs WSA.

Establishing NSO stipulations from within 500 feet to a 0.25 mile along 31 miles of eligible river segments (depending on type and use of source, soil type, and slope steepness) would restrict surface disturbance activities within and in proximity to the river segment, indirectly impacting the tentative classification by providing additional protections and indirectly ensuring protection of ORVs within these proximities to the eligible river segments. Identifying and eliminating noxious weeds on a case-by-case basis could allow weeds to spread to the point that scenic and recreation ORVs could be affected within eligible river segments.

Alternative B

Under alternative B, there would be no WSR segments that would be carried forward as suitable; however, ORVs would still exist without designation and could still be impacted. The following identifies indirect impacts that would occur on ORVs based on management associated with decisions for other resources and resource uses.

Scenic ORVs could be affected by allowing surface disturbance within a 0.25 mile of perennial water sources. Identifying and eliminating noxious weeds on a case-by-case basis could allow weeds to spread to the point that scenic and recreation ORVs could be affected.

VRM Class I management of WSAs would protect the ORVs of the eligible Yampa River segment 3 (Cross Mountain Canyon) and part of the Beaver Creek segment (West Cold Springs WSA); however, not designating any of the other areas surrounding the eligible river segments under any VRM class, not restricting surface disturbing activities from mineral activities or ROW, and managing the majority of the areas as open to OHV use could affect the ORVs of the Yampa segments 1 and 2 and the portion of the Beaver Creek segment that does not fall within the West Cold Springs WSA.

Protection of the Colorado pikeminnow, humpback chub, bonytail chub, and State-protected razorback sucker by designation of the Cross Mountain Canyon ACEC would also protect the ORVs within the eligible Yampa River segment 3 (Cross Mountain Canyon) related to Colorado pikeminnow habitat. These impacts would be the same as those in Alternative A.

Requiring NSO stipulations on oil and gas leases in areas within critical or occupied habitat of Colorado pikeminnow would protect the ORVs related to this species in the Yampa River segments 1 and 2. Yampa River segment 3 is within the Cross Mountain WSA and would be closed to leasing; however, if this WSA were released from wilderness study, these actions would protect the ORVs related to this species in the Yampa River segment 3.

Protective measures from requiring all new pipelines and other controlled surface uses that cross any critical or occupied habitat of the Colorado River fishes (See Appendix J) would enhance protection to the ORVs related to Colorado pikeminnow, and Colorado River cutthroat trout habitat in part of the Beaver Creek segment and in the Yampa River segments 1 and 2. Part of the Beaver Creek segment and Yampa River segment 3 fall within WSA boundaries, which would be managed as a ROW exclusion area; however, if either of these WSAs were released from wilderness study, these actions would protect the ORVs related to these fish species in the remaining part of Beaver Creek and Yampa River segment 3.

Avoiding aerial application of chemical fire retardant or foam and excluding surface disturbing activities within 300 feet of any body of water that could intercept critical or occupied habitat of the Colorado River fishes, and minimizing impacts of herbicide applications on critical or occupied habitat of the Colorado River fishes, would protect the ORVs related to Colorado pikeminnow habitat and Colorado River cutthroat trout habitat in Beaver Creek and all three Yampa River segments.

Alternative C

Managing the Yampa River segments 1, 2, and 3 as suitable for inclusion in the NWSRS in Alternative C would protect the ORVs and the tentative classification as shown in Table 4-39. Management actions that serve to protect these values are described below.

Table 4-39. Alternative C Tentative Classification and ORVs for Wild and Scenic Rivers

Suitable Wild and Scenic River Segment	Outstandingly Remarkable Values	Tentative Classification
Yampa River segment 1	Fish (Colorado pikeminnow) and recreation	Recreational
Yampa River segment 2	Fish (Colorado pikeminnow) and recreation	Scenic

Suitable Wild and Scenic River Segment	Outstandingly Remarkable Values	Tentative Classification
Yampa River segment 3	Fish (Colorado pikeminnow), recreation, geology, and scenic values	Wild

WSA management of the Cross Mountain area would restrict surface disturbing activities, which would provide indirect protections to the ORVs in the suitable Yampa River segment 3. Management actions that would provide these protections include closing the WSA to OHV use and mineral leasing, and managing the area as VRM Class I and as a ROW exclusion area. Similarly, indirect protections would be afforded to the suitable Yampa River segments 1 and 2 (5,170 acres) by managing these areas as closed to mineral leasing, withdrawn from mineral location and mineral material sales, as VRM Class II, ROW avoidance areas, and limited to designated routes OHV use in the Little Yampa Canyon SRMA. These management actions would also protect the tentative classification of the suitable Yampa segments. If the Cross Mountain WSA were released from wilderness study, the suitable Yampa River segment 3 (1,090 acres) would be managed under these same actions.

Managing WSAs as VRM Class I would provide the greatest amount of protection for the ORVs in the suitable Yampa segment 3 (Cross Mountain WSA). If the Cross Mountain WSA were released from wilderness study, managing the suitable Yampa River segments 1, 2, and 3 as VRM Class II would restrict surface disturbing activities, which would protect the ORVs and tentative classification of these river segments.

Monitoring the site disturbance, user conflicts, public health and safety, and other resource impacts within the Yampa River corridor, and regulating the use of sites and access point based on this monitoring, would indirectly enhance protection of ORVs and tentative classification in the suitable Yampa River segments.

Protective measures from requiring all new pipelines and other controlled surface uses that cross any critical or occupied habitat of the Colorado River fishes (See Appendix J) would provide indirect protections to the ORVs related to Colorado pikeminnow in the suitable Yampa River segments. Avoiding aerial application of chemical fire retardant or foam, and excluding surface disturbing activities within 300 feet of any body of water that could intercept critical or occupied habitat of the Colorado River fishes, would provide similar indirect protections to the ORVs related to Colorado pikeminnow habitat in the suitable Yampa River segments. Indirect impacts to the ORVs of suitable river segments would also occur from herbicide applications, as well as from erosion and habitat restoration associated with tamarisk and Russian olive control.

Establishing up to a 0.25-mile NSO stipulation of 22 miles of suitable river segments (depending on type and use of source, soil type, and slope steepness) would indirectly ensure protection of ORVs within these proximities to the three Yampa River segments, regardless of tentative classification. Proactively working to prevent the spread of noxious weeds could reduce the likelihood that noxious weeds would spread to the point where scenic and recreation ORVs could be affected.

Alternative D

Managing the Beaver Creek, Vermillion Creek, and Yampa River segments 1, 2, and 3 as suitable for inclusion in the NWSRS would protect the ORVs and the tentative classification as shown in Table 4-40. Management actions that serve to protect these values are described below.

Table 4-40. Alternative D Tentative Classification and ORVs for Wild and Scenic Rivers

Suitable Wild and Scenic River Segment	Outstandingly Remarkable Values	Tentative Classification
Beaver Creek	Fish (Colorado River cutthroat trout)	Wild
Vermillion Creek	Cultural and geological	Scenic
Yampa River segment 1	Fish (Colorado pikeminnow) and recreation	Recreational
Yampa River segment 2	Fish (Colorado pikeminnow) and recreation	Scenic
Yampa River segment 3	Fish (Colorado pikeminnow), recreation, geology, and scenic values	Wild

Managing all of the suitable WSR segments (8,480 total acres) as closed to OHV use, as closed to oil and gas leasing and withdrawn from mineral entry, as VRM Class II areas (except the Yampa River segment 3 that falls within the Cross Mountain WSA and the part of the Beaver Creek segment that falls within the West Cold Springs WSA, both of which would be VRM Class I), and as ROW exclusion areas would protect the ORVs and tentative classification of all of the suitable segments. In addition to these actions, for sites within the suitable Yampa River segments 1 and 2, where habitat loss is a risk, remedial actions would be implemented to ensure that the suitability of the spawning Colorado pikeminnow habitat is maintained or enhanced. The Suitable Yampa segment 2 would also be closed to livestock grazing during June and July.

Establishing up to a 0.25-mile NSO stipulation for 31 miles of suitable river segments (depending on type and use of source, soil type, and slope steepness) would indirectly ensure protection of ORVs within these proximities to the five suitable segments. Proactively working to prevent the spread of noxious weeds could reduce the likelihood that noxious weeds would spread to the point where scenic and recreation ORVs could be affected.

Management of the Irish Canyon ACEC and would further reduce surface disturbing activities, which would indirectly protect the ORVs in the suitable Vermillion Creek segment by limiting OHV use to designated roads and trails, closing the area to oil and gas exploration and development, and managing as an ROW exclusion area (subject to valid and existing right) in areas surrounding this segment.

Management of the Cross Mountain WSA, combined with management of the Cross Mountain Canyon ACEC, would enhance protection for the ORVs in the suitable Yampa River segment 3 by further restricting surface disturbing activities. These effects would be similar in a portion of the suitable Beaver Creek segment from the management of the West Cold Springs WSA.

Monitoring the site disturbance, user conflicts, public health and safety, and other resource impacts within the Yampa River corridor, and regulating the use of sites and access point as

guided by this monitoring, would indirectly enhance protection of ORVs and tentative classification in the suitable Yampa River segments.

Impacts on the Yampa River segments from Species Status Species conservation measures and recommendations (Appendix J) would be the same as those identified for Alternative C. Monitoring watershed conditions and lake and stream habitat, and improving or maintaining watershed conditions and lake and stream habitat, in Colorado River cutthroat trout areas would enhance protection of the ORVs related to this species in the suitable Beaver Creek segment.

4.3.12 Impacts to Visual Resources

This section describes potential impacts on visual resources from other management actions. Impacts on visual resources are determined through consistency of the management actions with VRM class objectives listed in Section 3.1.13 and the glossary. Generally, VRM Class I and II areas would be more sensitive to changes in scenery because of the high value visual resources in these areas, making them more susceptible to impacts if changes to the landscapes occurred. This analysis focuses on impacts from BLM-proposed management actions that would create visual obstructions to otherwise natural visual landscapes and, conversely, on actions that directly or indirectly protect visual resources from such visual obstructions.

Impacts were determined to be significant if actions would result in not meeting the objectives of the designated VRM Class.

The analysis was based on the following assumptions:

- ❑ The scenic vistas within the planning area would increase in value over the next 20 years.
- ❑ Scenic resources would become increasingly important to residents and visitors in the area.
- ❑ VRM class objectives apply to all resources. Class objectives would be adhered to through project design, avoidance, or mitigation.

Degradation of visual qualities would primarily occur from surface disturbing activities, such as those associated with construction of ROWs (e.g., pipelines, transmission lines, and communication lines), oil and gas facilities (e.g., well pads, mud pits, and roads) and vegetation treatments (e.g., thinning, cutting, and prescribed burning). The development of permanent structures would degrade scenic quality and in some cases could become the dominant feature of the landscape. The degree of impact would depend on the amount of development and the effectiveness of mitigation measures (e.g., siting, painting, and screening). Other activities, such as vegetation manipulation and OHV use, would affect scenic quality by removing soil and vegetation, thereby creating temporary, short-term intrusions on the landscape.

Protection of scenic quality and landscape character would primarily occur from the implementation of management actions designed to protect natural resources. Management of soil, water, vegetation, and fish and wildlife would generally limit the extent of surface disturbing activities, associated vegetation removal, and facility construction, and would be achieved through the designation of protective buffers, area closures, restrictions on surface use, and the implementation of mitigation measures.

In accordance with BLM Policy (IM 2000-096), WSAs would be managed as VRM Class I, which would preserve the existing character of the landscape on 78,250 acres under all alternatives. Any changes to the landscape would be very minimal and not attract attention. Compliance with soils standards and soils mitigation measures, such as preventing the creation of new roads, could indirectly reduce impacts on visual components of the landscape. This mitigation would increase the potential for landscapes in Class I and II areas to preserve or retain their existing visual character. Weed treatments could alter the existing visual character of the landscape through the killing or removal of vegetation. Depending on the extent and type of treatment, visual impacts would range in severity, but would likely be short-term and not obvious to the casual observer.

Under all alternatives, sale or exchange of BLM lands would remove all VRM designations, which currently serve to protect the visual character of the landscape. Acquisitions would be managed for scenic quality, which would increase the potential for protection of viewsheds and visual characteristics, depending on which VRM classes are applied to the newly acquired lands. ROW corridors and roads could create noticeable linear features across the landscape. ROW exclusion and avoidance areas would mitigate this impact by eliminating certain areas from ROW use. Communication sites, wind mills, and solar energy developments include tall structures, usually at high points such as mountain tops and ridgelines. These developments are usually highly visible, and contrast with natural viewsheds and landscapes.

Under all alternatives, vegetation treatments and harvesting of commercial forest and woodland products alter the existing visual character of the landscape through removal, thinning, burning, or onsite alteration of vegetation. Depending on the extent and type of the treatment or harvest, visual impacts would range in severity from those that are small in extent or barely noticeable, to changes that are widespread or obvious. Increasing the mosaic and size of individual treatments could keep impacts consistent within VRM Class I and II objectives of preserving or retaining the existing character of the landscape. Vegetation and forestry impacts would be most noticeable in the short term, decreasing over the long-term as vegetation grows back.

Under all alternatives, fire suppression, prescribed burning, and other fire management activities could affect visual resources by removing vegetation and surface disturbance. In the long term, vegetation recovery reduces impacts, restoring visual characteristics. Fire suppression reduces the short-term visual effects of natural wildland fire; however, the long-term buildup of fuels could cause uncharacteristically larger or intense wildfires that could cause views to deteriorate across the landscape. Fuels treatments could reduce the accumulation of fuels that cause these uncharacteristically large or intense wildfires, but these treatments would increase short-term changes to characteristic landscapes through vegetation removal and thinning. Creating mosaics in treatment patterns could prevent these impacts from becoming significant in Class I and II areas, where changes to visual character should not attract the attention of the casual observer. Conditional fire suppression and prescribed fire use would increase short-term impacts of natural fires, but over the long term would reduce changes to the visual character of the landscape by creating a more consistent natural fire regime.

Impacts on visual resources would not be anticipated as a result of implementing management actions for air quality, cultural and heritage resources, paleontological resources, and social and economic values.

4.3.12.1 Alternative A

VRM Classes applied under this alternative might not protect characteristic landscapes in the RMPPA. Lack of VRM Class designation on 94 percent of the RMPPA would not protect characteristic viewsheds from visual obstructions. Modification of the existing landscape character could occur from surface disturbing actions and habitat alterations and treatments.

Allowing oil and gas leasing with standard stipulations on 549,800 acres could cause visible surface disturbance and result in development of structures that would contrast with the existing character of the landscape. Any visual impacts would be mitigated on a site-specific basis as applied during project approvals. NSO stipulations on 192,190 acres would result in minor temporary changes to visual characteristics. CSU stipulations on 116,210 acres could reduce some impacts from oil and gas development; however, visual resource mitigation would be applied on a site-specific basis during project approvals. Mineral entry, mineral material sales, coal leasing, and oil shale development could disturb ground surfaces or have surface structures that would change the visual character of the landscape.

Designating 991,920 acres as open to OHV use could cause visual quality to deteriorate through road proliferation and vegetation loss across the LSFO. The level of change to the landscape could be significant in localized areas if OHV use and cross-country OHV travel continued to increase as expected. Limiting some areas to existing or designated routes would eliminate cross-country OHV travel impacts on visual resources on 286,855 acres, but 32,170 of those acres would be in VRM Class I areas where travel and road features could contrast with the goals of the VRM class. Closing 72,480 acres to OHV use would eliminate such impacts on most WSAs.

Managing to protect relevant and important values on 20,910 acres of existing ACECs, ORVs on eligible WSR segments, and recreation values on 19,290 acres of an existing SRMA would indirectly help maintain the landscape character by reducing surface disturbing activities. If Congress releases WSAs from their protective status, there would be a potential for projects to occur that could attract the attention of the casual observer and dominate the landscape.

4.3.12.2 Alternative B

Although VRM Classes would be designated, 1,223,610 acres would be managed as VRM Class IV, which would not adequately protect characteristic landscapes from surface disturbance and development. Areas designated as VRM Class IV would allow major modifications of the existing landscape character and allow a considerable level of change to the landscape. VRM Class II designation would retain visual characteristics on 590 acres, allowing for modifications that would be limited. VRM Class III designation would partially retain visual characteristics on 48,800 acres, which allows for moderate modification of the landscape.

Allowing oil and gas leasing with standard stipulations on 1,509,090 acres (174 percent increase compared to Alternative A) would cause surface disturbance and result in development of structures that can change the existing character of the landscape. NSO stipulations on 32,770 acres (83 percent decrease compared to Alternative A) would reduce impacts on these areas to minor, temporary changes to the visual characteristics. CSU stipulations, such as screening, color matching, burying powerlines, and reclamation on 153,890 acres could reduce impacts on the

existing character of the landscape. This alternative poses a greater threat to visual resources than Alternative A. Mineral entry, mineral material sales, coal leasing, and oil shale development would have the same impact as that identified for Alternative A, except in the Vermillion Basin where more mineral entry could occur, and in coal development areas where additional areas are managed as open for coal leasing consideration.

Designating 1,172,950 acres as open to OHV use could cause road proliferation and vegetation loss across the RMPPA compared to Alternative A. Limiting some areas to existing or designated routes would eliminate cross-country OHV travel on 131,930 acres (54 percent decrease compared to Alternative A); 32,170 of those acres would still be in VRM Class I areas, the same as in Alternative A. Closing 46,370 acres to OHV use would eliminate all impacts on specific areas, but this is 36 percent fewer closed acres than Alternative A. With fewer closed and limited areas, this alternative would have the most significant impact on visual resources of any alternative, but by a small margin over Alternative A.

The removal of the existing ACECs (20,910 acres) and the SRMA (19,290 acres) and their associated management actions would remove actions that directly and indirectly protect characteristic landscapes. These impacts on 20,260 acres of the former ACECs could attract attention, but not dominate the landscape, consistent with a VRM Class III designation, which would be in place. The other 650 acres in the former Cross Mountain ACEC would retain a VRM Class I designation because of the WSA restriction in that area, which would preserve visual characteristics.

Impacts on visual resources from lands with wilderness characteristics outside existing WSAs would be the same as those identified for Alternative A, except in the Vermillion Basin, which would be designated as VRM Class III in most areas, which would allow for surface disturbing activities with a moderate level of change to existing visual character. The Vermillion Bluffs area would be designated as VRM Class II, which would retain the existing character of that landscape. The determination that no eligible WSR segment would be considered suitable would remove administrative protection of these areas and their characteristic landscapes, which could increase surface disturbance and the potential for projects that could attract the attention of the casual observer and dominate the landscape.

Removal of fragile soil protection measures and NSO stipulations near perennial water sources could allow the potential for facilities and surface disturbance that could affect the visual character of the landscape in these specific areas. Range improvement projects would have the same impact as that under Alternative A.

4.3.12.3 Alternative C

Most of the RMPPA becomes VRM Class III under this alternative, as opposed to mostly Class IV under Alternative B or no designations under Alternative A. This would partially retain visual characteristics on 991,460 acres, which constitutes 74 percent of the RMPPA, where the level of change allowed to characteristic landscapes would be moderate. VRM Class II designation would retain visual characteristics on 96,490 acres, or roughly 7 percent of the RMPPA, and 184,890 acres managed as VRM Class IV would have the same impact as under Alternative A,

wherein a major modification of the existing landscape character would be allowed, and the level of change allowed to the characteristic landscape would be high.

Allowing oil and gas leasing with standard stipulations on 417,790 acres would cause surface disturbance and allow development of structures that can change the existing character of the landscape. Acreage for this area would be a 24 percent reduction from Alternative A, and a 72 percent reduction from Alternative B. NSO stipulations on 216,040 acres (12 percent increase compared to Alternative A) would reduce impacts on these areas to minor, temporary changes to visual characteristics. CSU stipulations such as screening, color matching, burying powerlines, and reclamation on 184,840 acres could reduce some impacts on the existing character of the landscape. Allowing operators to opt into a plan to reduce sagebrush habitat fragmentation could further reduce visual impacts in critical sagebrush areas. Also, limiting disturbance through leased units to 1 percent of the size of the unit in Vermillion Basin would also reduce visual impacts in this area. This alternative reduces the impact on visual resources from oil and gas development, as compared to Alternative A. Mineral entry, mineral material sales, coal leasing, and oil shale development would have the same impact as that identified for Alternative B, except that withdrawing additional areas from mineral entry and mineral material sales would reduce impacts on visual resources as compared with Alternatives A and B.

Impacts from vegetation treatments would occur on an average of 4,110 acres annually. Harvesting of commercial forest and woodland products would not affect visual resources as under Alternatives A and B. Impacts from fragile soil protection measures and NSO stipulations near perennial water sources would be the same as those identified for Alternative A. Impacts from fire management activities would be the same as those identified for Alternative B.

Designating 21,940 acres as open to OHV use would reduce the amount of acres available for cross-country OHV travel in the LSFO by 98 percent compared with Alternative A, which would eliminate the visual impacts of cross-country OHV travel in most of the RMPPA. Because of incomplete inventory data, 1,039,500 acres would be managed as limited to existing roads and trails until route designation can take place. This could lead to route proliferation as new user-created routes would be perceived as existing routes by other users. Enforcement in areas designated as limited to existing roads and trails can be problematic since it is legal for users to travel these new routes. Route proliferation could result in degradation of scenic values and naturalness. However, as a baseline of existing roads and trails is developed, BLM could identify and close or rehabilitate newly created routes. Approximately 1,242,600 acres total would be limited to existing or designated routes, which would eliminate cross-country OHV travel impacts on over three times the area as Alternative A; 32,170 of those acres would still be in VRM Class I areas, the same as under Alternative A. About 86,710 acres would be closed, which would be a 20 percent increase compared to Alternative A. With more closed and limited areas, and fewer open areas, this alternative would have less impact on visual resources compared to Alternatives A and B.

Managing to protect relevant and important values in the Irish Canyon ACEC through VRM Class II objectives would help maintain the landscape character on 11,910 acres by reducing surface disturbing activities. The removal of the Limestone Ridge and Lookout Mountain ACEC designations and associated management actions on 8,350 acres would remove actions that indirectly protect visual resources; however, the Lookout Mountain ACEC would be designated

as VRM Class II and III, which would protect visual resources from actions that dominate the landscape. The 650 acres in the Cross Mountain ACEC would retain a VRM Class I designation because of the WSA restriction in that area, which would preserve visual characteristics.

If the Diamond Breaks, Cross Mountain, and Ant Hills WSAs were released by Congress from wilderness consideration, the areas would be managed as VRM Class II, which would retain the existing character of the landscape, but allow for changes to visual characteristics that do not attract the attention of the casual observer. If released, the West Cold Springs WSA would be managed as VRM Class III, which would allow changes to the landscape as long as they did not dominate views of the casual observer. If released, the remaining WSAs would have the same impact as that identified for Alternative A, wherein there is a potential for projects that could attract the attention of the casual observer and dominate the landscape.

Impacts on visual resources in areas with wilderness characteristics outside existing WSAs would decrease from Alternative A. Most of Vermillion Basin and all of the Cold Springs Mountain area would be designated as VRM Class III, which would allow for surface disturbing activities with a moderate level of change to existing visual character. The Vermillion Bluffs area and the Dinosaur North areas would be designated as VRM Class II, which would retain the existing character of the landscape.

This alternative would have five SRMAs totaling 77,870 acres, which could afford some protection of visual resources in some areas. The Little Yampa Canyon and Juniper Mountain SRMAs would be designated as VRM Class II only for areas within the line of sight from the river within the SRMA. The Dinosaur North area, although not a SRMA under this alternative, would also be designated as VRM Class II, which would retain the existing character of the landscape, but allow for changes to visual characteristics that do not attract the attention of the casual observer. South Sand Wash (except for Zone 3) would be designated as VRM Class IV, which would not provide any protection from surface disturbing activities, which is essentially the same impact as currently under Alternative A for those areas. The remaining SRMAs would be Class III, which would protect visual resources from actions that dominate the landscape while still allowing many surface disturbing activities to impact visual characteristics.

Management of WSRs would offer more protection from visual impacts compared to Alternative B. Impacts would be the same as Alternative A for the Yampa Segments 1, 2, and 3. Beaver Creek and Vermillion Creek would have the same impacts as Alternative B, wherein administrative protection would be removed, possibly exposing these areas to surface disturbance and a potential for projects that could attract the attention of the casual observer and dominate the landscape.

Range improvement projects would have the same impact as those identified for Alternative A, except fewer projects would likely occur, which would increase the potential of retaining the existing character of the landscape.

4.3.12.4 Alternative D

Alternative D would apply more protection for VRM classes than any other alternative. VRM Class II designation would retain visual characteristics on 184,600 acres (157 percent more than

Alternative C). VRM Class III designation would partially retain visual characteristics on 905,130 acres, about 67 percent of the RMPPA, where the level of change allowed to characteristic landscapes would be moderate. About 183,280 acres managed as VRM Class IV, which would still have the same impact as that identified for Alternative A, wherein a major modification of the existing landscape character would be allowed and the level of change allowed to the characteristic landscape would be high.

Allowing oil and gas leasing with standard stipulations on 364,880 acres would cause surface disturbance and allow for development of structures that can change the existing character of the landscape. This area would be a 34 percent reduction from Alternative A, a 76 percent reduction from Alternative B, and a 13 percent reduction from Alternative C. NSO stipulations on 459,940 acres (139 percent increase compared to Alternative A) would reduce impacts on these areas to minor, temporary changes to visual characteristics. CSU stipulations such as screening, color matching, burying powerlines, and reclamation on 94,210 acres could further reduce some impacts on the existing character of the landscape.

Impacts on visual resources from vegetation treatments would occur on an average of 8,750 acres per year. Harvesting of commercial forest and woodland products would not affect visual resources compared to Alternatives A and B, which is the same impact as that identified for Alternative C.

Managing to protect relevant and important values would indirectly help maintain the landscape character on 310,390 acres by reducing surface disturbing activities. Because VRM objectives would not be protected on 183,280 acres designated as VRM Class IV, there is a potential for projects to occur in some of these areas, which could attract the attention of the casual observer and dominate the landscape. Limestone Ridge, Irish Canyon, and Lookout Mountain would specifically be managed as VRM Class II, which would retain the existing character of the landscape, and wherein approved projects would not attract the attention of the casual observer. The 650 acres in the Cross Mountain Canyon ACEC require visual resources to be managed as Class I, which would preserve the existing character of the landscape.

If released by Congress from wilderness consideration, the Diamond Breaks and Cross Mountain WSAs would be managed as VRM Class II, the same as under Alternative C, which would retain the existing character of the landscape. If released, the West Cold Springs and Ant Hills WSAs would be managed as VRM Class I, which would continue to preserve the existing character of the landscape as if they had not been released. If released, the remaining WSAs would have the same impact as that identified for Alternative A, wherein there is a potential for projects that could attract the attention of the casual observer and dominate the landscape.

This alternative would have nine SRMAs totaling 245,460 acres; however, VRM designations would be mostly the same as under Alternative C, except for the Cold Springs Mountain SRMA, which would be designated as VRM Class II instead of VRM Class III, which would retain the existing visual characteristics of that landscape.

Designating no open OHV areas would eliminate the visual impacts of cross-country OHV travel. About 1,079,440 acres would now be limited to designated routes, none of which would be in VRM Class I areas. About 289,650 acres would be closed, which would be nearly three

times the closed acreage of Alternative A. With more closed and limited areas, and fewer open areas, this alternative would have the least impacts on visual resources from travel designations than any other alternative.

Range improvement projects would have the same impact as under that identified for Alternative C.

4.4 IMPACTS TO RESOURCE USES

4.4.1 Impacts on Energy and Minerals

This section presents potential impacts on energy minerals, non-energy minerals, and renewable resources from management actions for other resource and resource use programs. Energy minerals include oil and gas, coal, and uranium. Non-energy minerals include locatable and salable minerals such as limestone and zeolite. Wind and solar are considered renewable energy resources. Existing conditions for energy and minerals are described in Section 3.2.1.

Impacts on energy and minerals would be significant if any of the following were to occur:

- ❑ A substantial reduction in federal leasing and development of oil and gas in high potential areas
- ❑ A substantial reduction in federal leasing and development of coal, locatable minerals, or salable minerals.
- ❑ A substantial reduction in access to high wind areas or development of other renewable energy resources.

The analysis is based on the following assumptions:

- ❑ Oil and gas operations on existing leases would be subject to COAs by the authorizing officer.
- ❑ Valid existing leases would be managed under the stipulations in effect when the leases were issued, and new stipulations proposed under this RMP would apply if leases are renewed.
- ❑ Leasing and drilling would occur throughout the entire RMPPA, except where restricted by management actions described in Chapter 2.
- ❑ Under Alternatives A, B, and C, a total of 3,031 wells could be drilled during the next 20 years, which could result in a future gross surface disturbance of 49,216 acres and future long-term surface disturbance of 23,030 acres (BLM 2005).
- ❑ Under Alternative D, there would be a 25 percent reduction in number of wells and associated ground disturbance that could be drilled during the next 20 years because of an increase in closed and NSO areas, resulting in a total of 2,273 total wells.
- ❑ If an area is leased, it could be developed; however, not all leases would be developed within the life of this plan.
- ❑ Disturbance associated with future nonproductive wells would typically regain adequate vegetative ground cover and species composition for site stabilization within 5 to 10 years in sagebrush/grass communities, and 15 to 20 years in cold desert communities after the well would be plugged and abandoned.

- Seismic surveys would result in a temporary surface disturbance of 8,000 acres before reclamation, and 100 percent of the disturbance would typically regain adequate vegetative ground cover and species composition for site stabilization within 5 to 10 years in sagebrush/grass communities, and 15 to 20 years in cold desert communities (BLM 2005).
- As population growth and the demand for energy increases, so will the demand for locatable and mineral materials and other energy sources.
- Increased mitigation would generally increase short-term financial cost and risk.
- The majority (96 percent) of oil and gas wells would be concentrated in high potential areas, 3 percent in moderate potential areas, and 1 percent in low potential areas (BLM 2005).

Impacts on energy and minerals from management actions associated with required surveys and areas managed as VRM Class I would be the same under all alternatives. Requiring surveys for Special Status Plant Species or cultural or paleontological resources before any ground disturbance could delay mineral exploration and development activities, including geophysical exploration and renewable energy operations, which could increase the cost of mineral resource extraction or renewable energy development. The seven existing WSAs would be managed as VRM Class I areas (78,250 acres), precluding energy and mineral development, including renewable energy operations, which could increase the cost of mineral resource extraction and renewable energy development.

Impacts on energy and minerals would not be anticipated as a result of implementing management actions for air quality, vegetation, wild horses, fire, paleontological resources, livestock grazing, forest and woodland products, transportation and access and travel management, and social and economic values.

4.4.1.1 Alternative A

Approximately 78,190 acres (4 percent of the RMPPA mineral estate) would be closed to oil and gas leasing within WSAs, precluding oil and gas exploration and development, and rendering energy resources unreachable, which could potentially contribute to energy shortages and result in price increases; however, the areas closed to leasing do not occur within high occurrence potential areas. Continuing to apply NSO stipulations on oil and gas leasing on 192,190 acres (10 percent of the RMPPA mineral estate) could require directional drilling or other extraction methods to access resources. NSO stipulations could result in the relocation of facilities, increased energy costs, and the possible loss of energy resources that cannot be extracted by current or future drilling technology. Applying CSU stipulations on oil and gas leasing on 116,210 acres (6 percent of the RMPPA mineral estate) could influence the placement of oil and gas facilities and, as a result, increase the cost of developing the resources. When operating costs increase, some price increases could be passed onto the user. Timing limitation stipulations on oil and gas leasing could restrict the time available to complete exploration and development activities. About 1,162,040 acres (61 percent of the RMPPA mineral estate) would have timing limitation stipulations for oil and gas leasing. Timing and seasonal restrictions could limit oil and gas activities during specific time periods (Table 4-41), increase costs to the operator, and possibly delay resource development. Where timing limitation stipulations severely limit the time available to complete activities, developing the energy resource could be infeasible or uneconomical, which could contribute to energy shortages and a potential increase in energy

prices; however, allowing exceptions to timing limitation stipulations on a case-by-case basis would, in some cases, allow development activities to occur.

An analysis of oil and gas stipulations based on the 2003 Energy Policy and Conservation Act (EPCA) report reveals the effect of cumulative timing stipulations under Alternative A on oil and gas exploration and development, as well as the effect of areas with standard stipulations, CSU, and that are closed to leasing (Table 4-41; Map 4-1). Cumulative timing limitations are divided into periods of less than three months, three to six months, six to nine months, and greater than nine months.

Table 4-41. Oil and Gas Leasing Restrictions and Cumulative Timing Limitations for Alternative A

Oil and Gas Leasing	Acres
Open to leasing, subject to standard terms and conditions	549,800
Less Than 3 months	13,240
3 to 6 months	317,230
6 to 9 months	802,600
Greater Than 9 months	28,970
Controlled Surface Use (CSU)	116,210
No Surface Occupancy (NSO)	192,190
Closed to leasing	78,190

The EPCA report estimated the number of oil and gas reserves in the Western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing, and areas with NSO stipulations. Based on information from the EPCA report, up to 68,000 barrels of oil and up to 273 million cubic feet of gas would be in areas closed to oil and gas leasing, and up to 2,583,000 barrels of oil and up to 62,550 million cubic feet of gas would be in non-recoverable NSO areas. The areas closed to leasing and non-recoverable NSO areas would not be available for development within the RMPPA (Table 4-42).

**Table 4-42. EPCA Analysis For Alternative A
(Proved Reserves and Undiscovered Technically Recoverable Resources)**

Alternative A	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Open to leasing, subject to standard terms and conditions	549,960	61,497	2,021,383
Seasonal Restrictions	1,162,040	216,771	7,560,670
Controlled Surface Use (CSU)	116,210	15,456	544,095
No Surface Occupancy (NSO)	192,190	19,418	470,294
Recoverable NSO*****	163,630	16,835	407,744
Nonrecoverable NSO*****	28,560	2,583	62,550

Alternative A	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Closed to leasing	78,190	68	273

* Comprising oil, natural gas liquids (NGLs), and liquids associated with natural gas reservoirs.

** Comprising associated dissolved and non-associated natural gas.

*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

***** Recoverable NSO is the area within a 0.25-mile internal buffer of an NSO area that could be accessed through directional drilling.

***** Non-recoverable NSO is the area beyond the 0.25-mile internal buffer of an NSO area.

About 79,190 acres (4 percent of the RMPPA mineral estate) would be recommended for withdrawal from locatable mineral entry, which includes WSAs and the Limestone Ridge ACEC. Withdrawing areas would preclude possible locatable mineral development and could contribute to local mineral shortages and price increases. About 97,790 acres (5 percent of the RMPPA mineral estate) would be closed to mineral material sales, which would preclude possible mineral development and possibly affect the local economy.

ROW exclusion areas (8 percent of the RMPPA or 108,470 acres) and avoidance areas (40 percent of the RMPPA or 535,390 acres) could limit future access to mineral exploration and development sites, and could restrict the placement of facilities associated with mineral exploration and development and with renewable energy operations. Associated facilities would include pipelines, transmission lines, communication facilities, and roads.

4.4.1.2 Alternative B

Management actions under Alternative B would place fewer restrictions on minerals activities and fewer stipulations to oil and gas leasing. Areas closed to oil and gas leasing (4 percent of the RMPPA mineral estate or 78,190 acres) and resulting impacts would be the same as those identified for Alternative A.

Areas with NSO stipulations would decrease to 32,770 acres (2 percent of the RMPPA mineral estate), which could require directional drilling or other extraction methods to access resources, but on 83 percent less area than Alternative A. These management actions could result in the relocation of facilities, the increase of energy costs, and the loss of energy resources that cannot be extracted by current or future drilling technology. Applying CSU stipulations on oil and gas leasing on 153,890 acres (8 percent of the RMPPA mineral estate) could directly influence the placement of oil and gas facilities and, as a result, increase the cost of energy and the cost of developing the resources. When compared to other alternatives, Alternative B would apply timing limitation stipulations to the least amount of area. About 149,360 acres (8 percent of the RMPPA mineral estate) would have timing limitation stipulations for oil and gas leasing. Timing limitation stipulations on oil and gas leasing could restrict the time available to complete exploration and development activities, which could defer energy supply. Oil and gas exploration and development would be limited during specific time periods (Table 4-43), would increase costs to the operator, and would possibly delay resource development. About 84 percent of the 149,360 acres occurs within areas of high potential for oil and gas, 13 percent coincides with

areas of moderate potential, 2 percent within low potential areas, and 1 percent in areas of no known potential. Where timing limitation stipulations severely limit the time available to complete activities, developing the energy resource could be infeasible or uneconomical, which could contribute to shortages and therefore a potential increase in energy prices; however, allowing case-by-case exceptions to timing limitation stipulations would, in some cases, allow development activities to occur.

An analysis of oil and gas stipulations based on the 2003 EPCA report reveals the effect of cumulative timing stipulations under Alternative B on oil and gas exploration and development, as well as the effect of areas with standard stipulations, CSU, and that are closed to leasing (Table 4-43; Map 4-2). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and greater than 9 months.

Table 4-43. Oil and Gas Leasing Restrictions and Cumulative Timing Limitations For Alternative B

Oil and Gas Leasing	Acres
Open to leasing, subject to standard terms and conditions	1,509,500
Less Than 3 months	0
3 to 6 months	145,260
6 to 9 months	4,100
Greater Than 9 months	0
Controlled Surface Use (CSU)	153,890
No Surface Occupancy (NSO)	32,770
Closed to leasing	78,190

The EPCA report estimated the number of oil and gas reserves in the Western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing, and areas with NSO stipulations. Analyzing the leasing categories with information from the EPCA report, up to 68,000 barrels of oil and up to 273 million cubic feet of gas would be in areas closed to oil and gas leasing, and up to 295,000 barrels of oil, and up to 3,661 million cubic feet of gas would be in non-recoverable NSO areas. The areas closed to leasing and non-recoverable NSO areas would not be available for development within the RMPPA (Table 4-44).

**Table 4-44. EPCA Analysis For Alternative B
(Proved Reserves and Undiscovered Technically Recoverable Resources)**

Alternative B	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Open to leasing, subject to standard terms and conditions	1,509,500	270,073	9,248,565
Seasonal Restrictions	149,360	5,391	95,540

Alternative B	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Controlled Surface Use (CSU)	153,890	15,250	617,704
No Surface Occupancy (NSO)	32,770	2,706	59,106
Recoverable NSO*****	26,590	2,411	55,445
Nonrecoverable NSO*****	6,180	295	3,661
Closed to leasing	78,190	68	273

* Comprising oil, natural gas liquids (NGLs), and liquids associated with natural gas reservoirs.

** Comprising associated dissolved and non-associated natural gas.

*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

***** Recoverable NSO is the area within 0.25-mile internal buffer of an NSO area that could be accessed through directional drilling.

***** Non-recoverable NSO is the area beyond the 0.25-mile internal buffer of an NSO area.

Approximately 153,310 acres (8 percent of the RMPPA mineral estate) would be recommended for withdrawal from locatable mineral entry, which includes WSAs and lands with wilderness characteristics outside existing WSAs. Withdrawing areas would preclude possible mineral development and possibly contribute to local material shortages and price increases. Areas closed to mineral material sales (97,790 acres, 5 percent of the RMPPA mineral estate) and resulting impacts would be the same as those identified for Alternative A.

Under Alternative B, stipulations established to protect sensitive resources from oil and gas activity would apply to all permitted ground disturbing activities on 89,240 acres (7 percent of the RMPPA) designated as no ground disturbance. These stipulations would preclude minerals activity and development of renewable energy resources from occurring in these areas. In addition, seasonal limitations on 71,220 acres (5 percent of the RMPPA) could limit access and could delay project construction.

ROW exclusion areas (6 percent of the RMPPA or 78,250 acres) and avoidance areas (41 percent of the RMPPA or 555,440 acres) could limit future access to mineral exploration and development sites, and could restrict the placement of facilities associated with mineral exploration and development and with renewable energy operations. Associated facilities would include pipelines, transmission lines, communication facilities, and roads.

Managing areas as VRM Class II on 590 acres (less than 1 percent of the RMPPA) could increase the cost of energy and mineral development proposed in these areas.

4.4.1.3 Alternative C

Approximately 160,870 acres (9 percent of the RMPPA) would be closed to oil and gas leasing, which would preclude oil and gas exploration and development and render energy resources unreachable, which could potentially contribute to energy shortages and could result in price increases. Areas with NSO stipulations would increase to 216,040 acres (11 percent of the RMPPA mineral estate), which could require directional drilling or other extraction methods to access resource, but on 12 percent more area than Alternative A. These management actions

could result in the relocation of facilities, increased energy costs, and the possible loss of energy resources that cannot be extracted by current or future drilling technology. Applying CSU stipulations on 184,840 acres (10 percent of the RMPPA mineral estate) could influence the placement of oil and gas facilities and, as a result, increase the cost of energy and the cost of developing the resources. Approximately 1,216,190 acres (64 percent of the RMPPA mineral estate) would have timing limitation stipulations for oil and gas leasing. Timing limitation stipulations on oil and gas leasing could restrict the time available to complete exploration and development activities. Oil and gas exploration and development would be limited during specific time periods (Table 4-45), increase costs to the operator, and possibly delay resource development. Where timing limitation stipulations severely limit the time available to complete activities, developing the energy resource could be infeasible or uneconomical, which could contribute to energy shortages and potentially increase energy prices; however, allowing exceptions to timing limitation stipulations in accordance with Appendix E would, in some cases, allow development activities to occur.

An analysis of oil and gas stipulations based on the 2003 EPCA report reveals the effect of cumulative timing stipulations under Alternative C on oil and gas exploration and development, as well as the effect of areas with standard stipulations, CSU, and that are closed to leasing (Table 4-45; Map 4-3). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and greater than 9 months.

Table 4-45. Oil and Gas Leasing Restrictions and Cumulative Timing Limitations For Alternative C

Oil and Gas Leasing	Acres
Open to leasing, subject to standard terms and conditions	417,800
Less Than 3 months	13,240
3 to 6 months	371,380
6 to 9 months	802,270
Greater Than 9 months	29,300
Controlled Surface Use (CSU)	184,840
No Surface Occupancy (NSO)	216,040
Closed to leasing	160,870

The EPCA report estimated the number of oil and gas reserves in the Western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing and areas with NSO stipulations. Based on information from the EPCA report, up to 2,127,000 barrels of oil and up to 68,708 million cubic feet of gas would be in areas closed to oil and gas leasing and up to 2,962 barrels of oil, and up to 93,127 million cubic feet of gas would be in non-recoverable NSO areas. The areas closed to leasing and non-recoverable NSO areas would not be available for development within the RMPPA (Table 4-46).

**Table 4-46. EPCA Analysis For Alternative C
(Proved Reserves and Undiscovered Technically Recoverable Resources)**

Alternative C	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Open to leasing, subject to standard terms and conditions	417,800	54,255	1,766,512
Seasonal Restrictions	1,216,190	217,170	7,566,038
Controlled Surface Use (CSU)	184,840	21,764	764,209
No Surface Occupancy (NSO)	216,040	23,288	580,587
Recoverable NSO*****	180,970	20,326	487,460
Nonrecoverable NSO*****	35,070	2,962	93,127
Closed to leasing	160,870	2,127	68,708

* Comprising oil, natural gas liquids (NGLs), and liquids associated with natural gas reservoirs.

** Comprising associated dissolved and non-associated natural gas.

*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

***** Recoverable NSO is the area within a 0.25-mile internal buffer of an NSO area that could be accessed through directional drilling.

***** Non-recoverable NSO is the area beyond the 0.25-mile internal buffer of an NSO area.

If oil and gas operators were to keep surface disturbance to less than 5 percent and provide a POD, BLM would grant an exception to wildlife timing stipulations. Lifting timing limitation stipulations on oil and gas leasing would not restrict the time available to complete exploration and development activities. This would greatly aid the operator in planning, scheduling, financing, and contracting all of the various components of oil and gas development.

Unitization generally favors maximum recovery of the fluid mineral resource, although under the scenario for Vermillion Basin in this alternative, there are other surface disturbance limitations that could curb development. Usually the largest lease holder in the unit files unitization paperwork and is designated unit operator. Unitization could benefit operators because spacing requirements are not applicable to unit wells. The unit is developed on whatever the operator considers to be the optimal spacing pattern to maximize recovery, within the limit described in Section 2.5.11.2. Unitization would force operators to cooperate in pre-planning, drilling, and extraction. This allows operators to share costs and responsibilities, as well as profits. Coordinated development in a unit would promote consolidation of ancillary facilities, roads, pipelines, and staging sites.

Limiting surface disturbance to below 1 percent in Vermillion Basin could make the development of the oil and gas resource difficult. Because of the exploratory nature of the resource in that area and the lack of existing oil and gas infrastructure in Vermillion Basin, the great distance to existing facilities would necessitate new construction of roads, pipelines, and compressor sites. These developments would all factor into the 1 percent limitation, which could make development problematic. However, if operators were running up against the 1 percent limitation, they could lease additional lands in Vermillion Basin, allowing them to disturb more acres in the area under development.

Approximately 194,400 acres (10 percent of the RMPPA mineral estate) would be recommended for withdrawal from locatable mineral entry, which includes WSAs, lands with wilderness characteristics outside existing WSAs, ACECs, suitable WSRs, and SRMAs. Withdrawing areas would preclude possible mineral development, and possibly contribute to shortages and price increases. Approximately 157,910 acres (8 percent of the RMPPA mineral estate) would be closed to mineral material sales, which would preclude possible mineral development, and possibly contribute to local mineral material shortages and price increases.

Under Alternative C, areas designated as no ground disturbance would increase from Alternative B to 273,100 (20 percent of the RMPPA), restricting minerals and renewable energy resource projects from being sited in these areas. Areas with seasonal limitations would increase from Alternative B to 810,680 acres (60 percent of the RMPPA), which could limit access and could delay project construction. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities may be required; however, allowing exceptions in accordance with Appendix E could minimize the potential to affect placement and costs.

ROW exclusion areas (7 percent of the RMPPA or 91,560 acres) and avoidance areas (11 percent of the RMPPA or 141,260 acres) could limit future access to mineral exploration and development sites, and could restrict the placement of facilities associated with mineral exploration and development and with renewable energy operations. Associated facilities would include pipelines, transmission lines, communication facilities, and roads.

Managing areas as VRM Class II on 96,490 acres (7 percent of the RMPPA) could increase the cost of energy, renewable energy, and mineral development proposed in these areas. In areas with high mineral potential and topographical challenges, energy and mineral resources could be infeasible to recover.

4.4.1.4 Alternative D

Under Alternative D, designation and associated management of the Prairie Dog ACEC (271,730 acres) and management of Vermillion Basin SRMA (77,080 acres) would place substantial closures on leasing, which would be a significant effect.

Management actions under Alternative D would place the most restrictions on minerals activities and more stipulations to oil and gas leasing. About 275,630 acres (15 percent of the RMPPA) would be closed to oil and gas leasing, which would preclude oil and gas exploration and development and render energy resources unreachable and, therefore, could potentially contribute to shortages which could result in price increases. Areas with NSO stipulations would increase to 459,940 acres (24 percent of the RMPPA mineral estate), which could require directional drilling or other extraction methods to access resources, but on 139 percent more area than Alternative A. These management actions could result in the relocation of facilities, increase of energy costs, and the possible loss of energy resources that cannot be extracted by current or future drilling technology. Applying CSU stipulations on 94,210 acres (5 percent of the RMPPA mineral estate) could influence the placement of oil and gas facilities and, as a result, increase the cost of energy and the cost of developing the resources. Approximately 1,214,610 acres (64 percent of the RMPPA mineral estate) would have timing limitation

stipulations for oil and gas leasing. Timing limitation stipulations on oil and gas leasing could restrict the time available to complete exploration and development activities. Oil and gas exploration and development would be limited during specific time periods (Table 4-47), increase costs to the operator, and possibly delay resource development. Where timing limitation stipulations severely limit the time available to complete activities, developing the energy resource may be infeasible or uneconomical, which could contribute to energy shortages and therefore lead to a potential increase in energy prices; however, allowing exceptions to timing limitation stipulations in accordance with Appendix E would, in some cases, allow development activities to occur.

An analysis of oil and gas stipulations based on the 2003 EPCA report reveals the effect of cumulative timing stipulations under Alternative A on oil and gas exploration and development, as well as the effect of areas with standard stipulations, CSU, and that are closed to leasing (Table 4-47; Map 4-4). Cumulative timing limitations are divided into periods of less than 3 months, 3 to 6 months, 6 to 9 months, and greater than 9 months.

Table 4-47. Oil and Gas Leasing Restrictions and Cumulative Timing Limitations For Alternative D

Oil and Gas Leasing	Acres
Open to leasing, subject to standard terms and conditions	364,880
Less Than 3 months	13,240
3 to 6 months	389,540
6 to 9 months	800,620
Greater Than 9 months	2,210
Controlled Surface Use (CSU)	94,210
No Surface Occupancy (NSO)	459,940
Closed to leasing	275,630

The EPCA report estimated the number of oil and gas reserves in the Western United States. Data from the report was used to approximate the number of barrels of oil and cubic feet of gas under areas closed to leasing and areas with NSO stipulations. Based on information from the EPCA report, up to 17,393,000 barrels of oil and up to 619,456 million cubic feet of gas would be in areas closed to oil and gas leasing, and up to 139,942,000 barrels of oil and up to 5,124,802 million cubic feet of gas would be in non-recoverable NSO areas. The areas closed to leasing and non-recoverable NSO areas would not be available for development within the RMPPA (Table 4-48).

**Table 4-48. EPCA Analysis For Alternative D
(Proved Reserves and Undiscovered Technically Recoverable Resources)**

Alternative D	Acres	Total Liquids* (Thousands of Barrels)***	Total Natural Gas** (Millions of Cubic Feet)****
Open to leasing, subject to standard terms and conditions	364,880	42,506	1,292,434
Seasonal Restrictions	1,214,610	216,746	7,548,230
Controlled Surface Use (CSU)	94,210	4,967	101,711
No Surface Occupancy (NSO)	259,940	139,942	5,124,802
Recoverable NSO*****	262,600	44,652	2,144,044
Nonrecoverable NSO*****	197,340	80,290	2,980,758
Closed to leasing	275,630	17,393	619,456

* Comprising oil, natural gas liquids (NGLs), and liquids associated with natural gas reservoirs.

** Comprising associated dissolved and non-associated natural gas.

*** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

**** Estimate based on data from the Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003.

***** Recoverable NSO is the area within a 0.25-mile internal buffer of an NSO area that could be accessed through directional drilling.

***** Non-recoverable NSO is the area beyond the 0.25-mile internal buffer of an NSO area.

Alternative D would have the most area closed to extraction of locatable minerals and mineral material sales. About 587,220 acres (31 percent of the RMPPA mineral estate) would be recommended for withdrawal from locatable mineral entry, which includes WSAs, lands with wilderness characteristics outside existing WSAs, ACECs, suitable WSR, and SRMAs. These actions would recommend withdrawal of 508,030 acres more than in Alternative A. Withdrawing areas would preclude possible mineral development and possibly contribute to shortages and price increases. About 540,510 acres (28 percent of the RMPPA mineral estate) would be closed to mineral material sales. These actions would close to mineral leasing 442,720 acres more than in Alternative A. Closing areas to mineral material sales would preclude possible mineral development and contribute to local material shortages and price increases.

Under Alternative D, many of the areas previously designated as seasonal stipulations would be designated NGD. Areas designated as NGD would increase to 632,940 acres (47 percent of the RMPPA), restricting minerals and renewable energy projects from being sited in these areas. Areas with seasonal limitations would increase from Alternative C to 825,690 acres (61 percent of the RMPPA), which could limit access and could delay project construction. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities could be required; however, allowing exceptions in accordance with Appendix E could minimize the potential to affect placement and costs for new ROWs, or amended ROWs, or renewed ROWs at existing sites.

ROW exclusion areas (37 percent of the RMPPA or 499,700 acres) and avoidance areas (1 percent of the RMPPA or 15,190 acres) could limit future access to mineral exploration and development sites, and could restrict the placement of facilities associated with mineral exploration and development and with renewable energy operations. Associated facilities would

include pipelines, transmission lines, communication facilities, and roads. When compared to other alternatives, these ROW management actions would have the most limitations on facilities that support the development of energy and mineral resources.

Alternative D has the most VRM Class II designations. Managing VRM Class II on 184,600 acres (14 percent of the RMPPA) could increase the cost of energy and mineral development proposed in these areas. In areas with high mineral potential and topographical challenges, energy and mineral resources could be infeasible to recover. When compared to other alternatives, energy and mineral resources could be infeasible to recover.

4.4.2 Impacts on Livestock Grazing

This section describes potential impacts on livestock grazing from the implementation of management actions for other resource programs. Impacts on resources and resource uses resulting from implementation of the livestock grazing program are discussed in those particular resource sections of this chapter. Impacts on livestock grazing activities are generally the result of activities that affect forage levels, of the ability to construct range improvements, and of human disturbance/harassment of livestock within grazing allotments.

Impacts on livestock grazing would be considered significant if the following were to occur:

- ❑ A reduction in forage levels that leads to a decrease in permitted AUMs, or cumulative management actions that adversely affect operations to the degree considered vital to an individual operation.
- ❑ A substantial increase in forage levels that leads to an increase in permitted AUMs across the RMPPA.
- ❑ RMP management actions that prohibit the ability to construct range improvements (infrastructure and vegetation).

The analysis is based on the following assumptions:

- ❑ All existing leases and permits would be subject to Terms and Conditions by the authorizing officer.
- ❑ Livestock grazing would occur throughout the vast majority of the RMPPA.
- ❑ Livestock operators would work toward achieving the *Standards for Public Land Health* on all grazing allotments.
- ❑ Although some areas are more suitable for different classes of livestock, the impacts from different classes of livestock would be similar, and would not be discussed separately.
- ❑ Construction of range improvements (e.g., fences, pipeline, water wells, troughs, and reservoirs) would result in a localized loss of vegetation cover throughout their useful life.
- ❑ Vegetation would be reestablished through reclamation practices along pipelines within 5 to 10 years in sagebrush/grass communities, and 15 to 20 years in cold desert communities; whereas areas with fences, water wells, troughs, and reservoirs would remain disturbed during their useful life and would be revegetated upon abandonment.
- ❑ Range improvements would continue to be carried out in the RMPPA, although in the long term they would consist of more vegetation treatments than facilities.

- ❑ Range improvements generally lead to better livestock distribution, and could benefit the forage base.
- ❑ Although livestock grazing is not considered a surface disturbing activity, grazing could affect the surface in areas where livestock concentrate.
- ❑ Livestock grazing on public lands is tied to permittee-owned/controlled private land.
- ❑ Average forage production in the LSFO is 0.33 AUMs per acre.
- ❑ Areas that are treated with interim reclamation efforts would be invaded by weed species, one-half of which would be successfully eradicated.
- ❑ One-half of any increase in AUMs would be available for livestock
- ❑ Livestock operators would increase their stocking rates if more livestock AUMs were made available, increasing actual use by the same amount.

The following discussions represent impacts on livestock grazing that would not vary by alternative. Management of vegetation resources would generally serve to enhance vegetative conditions and indirectly affect livestock grazing by improving forage conditions. Vegetation treatments designed to reduce incursion of non-native annual grasses (primarily cheatgrass), encroachment of shrubby vegetation, and buildup of biomass in forested areas could have short-term effects on livestock grazing through forage removal, but enhanced rangeland conditions would be realized in the long term. Preventing and controlling the spread of noxious weeds would also affect livestock grazing by reducing competition with native plants, and consequently maintaining or improving forage conditions.

Surface disturbing activities associated with mineral development would involve land clearing and grading that would disturb soils, remove vegetation, and increase the potential for the introduction and proliferation of noxious weeds, thereby causing a loss of livestock forage and associated AUMs. As specified in *Reasonable Foreseeable Development: Oil and Gas in the Little Snake Field Office Administrative Boundary Area* (BLM 2005), average surface disturbance per oil and gas well would amount to 16.24 acres (4 acres per drill pad; 12 acres for roads; 0.24 acres for central facilities). Although 53 percent of the initial disturbance would be reclaimed in the short term, 47 percent of the disturbed area would be devoid of vegetation for the life of the well. Mineral development activities would also increase the potential for livestock harassment and livestock loss from vehicle collisions; however, the improvement of roads associated with mineral development could facilitate livestock management operations by improving access to remote locations within allotments.

Requiring implementation of particular livestock grazing management actions to improve rangeland conditions could affect livestock grazing operators by increasing their operating costs. Grazing management actions could include modified turnout dates, construction of range improvements, modified grazing periods, growing season rest, modified grazing systems, riparian pastures, exclosures, implementation of forage utilization levels, livestock conversions, or other approaches. Although these actions would help to enhance rangeland conditions and increase long-term forage production, AUM use could also decrease for some operators. Conducting vegetation land treatments could result in short-term forage loss, but would enhance overall rangeland health and increase forage production in the long term. Construction of range improvements would serve to improve livestock distribution and allow livestock to utilize more of the rangeland, which would consequently enhance rangeland conditions. Specifically,

constructing offsite water sources and fencing riparian and spring sources could keep livestock away from sensitive riparian areas, and result in maintaining or improving riparian conditions.

Management actions to enhance fish and wildlife habitat would generally affect livestock grazing by improving vegetation conditions and indirectly maintaining or increasing forage production. Habitat management actions that serve to support wildlife populations would also affect livestock grazing through direct competition between big game species and livestock for forage. Because of dietary preference, this competition would be more pronounced with elk than with pronghorn or mule deer. Similar to livestock, elk are considered grazers that prefer grasses, whereas mule deer and pronghorn prefer to browse shrub species. Uneven distribution of big game would cause some grazing allotments to receive a disproportionate amount of wildlife use within the RMPPA, thereby increasing competition for forage within those allotments. This is especially true for allotments located either entirely or partially within big game summer range, winter range, or production areas (Maps 3-10 through 3-17). As a result, livestock operators in these areas could be required to implement grazing adjustments to meet resource condition goals. Achieving wildlife population objectives would help reduce these effects.

Fire suppression efforts would reduce the extent of wildland fires, which would help maintain vegetation cover and conserve livestock forage; however, implementing fire suppression across the RMPPA would continue to limit and exclude fire from functioning in its natural role, resulting in a longer fire-return interval, the continued buildup of fuel loads, and the promotion of vegetation communities that are more susceptible to high-intensity fires. This management action would increase the potential for large fires to occur with associated loss of livestock forage.

Management of wild horses would affect livestock grazing through competition for forage in those allotments that overlap with the Sand Wash Basin HMA; however, maintaining the AML for wild horses would limit the number of wild horses in the RMPPA, which would reduce the effects to livestock grazing.

Recreational activities would affect livestock grazing through direct human disturbance and indirect rangeland degradation. These impacts could include animal displacement, harassment, or injury, mainly from the use of vehicles. Specifically, cross-country OHV use would damage and remove forage resources and increase dust levels in high-use areas, which would cause dust coating of forage and subsequently lower forage palatability.

Construction activities related to the development of ROWs would remove a small amount of livestock forage in the short term, and increase the potential for the introduction and proliferation of noxious weeds. Increased vehicle travel on new roads would also increase the potential for the spread of weeds, and harassment of and injury to livestock; however, an increase in improved roads could facilitate livestock management operations by increasing access to remote locations within allotments.

Harvest of forest and woodland products and associated surface disturbances could result in a loss of livestock forage in the short term. Managing on a sustained yield would help to reduce impacts by limiting harvest levels. In the long term, such activities could increase understory

(grass) production, providing increased forage for livestock; however, this effect would be limited to forest and woodland areas, which comprise 309,556 acres of the RMPPA.

Activities associated with management of cultural and paleontological resources would affect relatively small, localized areas and would not have measurable effects on livestock forage. Even under the most intense management (e.g., site excavation), the amount of acreage disturbed would be very small. Fencing cultural sites and excluding grazing from these sites would result in a minimal loss of forage. Restrictions on surface disturbing activities near cultural and paleontological sites could prevent the removal of forage in these areas, but could also result in the modification or relocation of range improvements.

Impacts on livestock grazing are not anticipated as a result of implementing management actions for air quality.

4.4.2.1 Alternative A

About 49,216 acres within the RMPPA would be initially disturbed by oil and gas development activities over the life of the plan. After interim reclamation, the amount of disturbance would be reduced to 23,030 acres, which represents the anticipated amount of long-term surface disturbance (BLM 2005). The 26,186 acres on which interim reclamation would be conducted would be occupied by weeds, half of which would likely be successfully eradicated; therefore, forage would be lost on a total of 36,123 acres (23,030 acres of long-term surface disturbance plus 13,093 acres where weed eradication was unsuccessful). About 70 percent of this disturbance would occur on BLM-administered surface (BLM 2005), meaning that forage would be lost on a total of 25,286 BLM surface acres. Using a forage production figure of 0.33 AUM per acre, a total of 8,344 AUMs would be lost on BLM surface, half of which (4,172 AUMs) would be eliminated from livestock use. Given that current actual livestock use is estimated at 78,963 AUMs, this loss of 4,172 AUMs would be relatively minor. However, this loss of AUMs would not be evenly distributed across RMPPA. Allotments located in areas of high development potential would be impacted to a greater degree due to concentrated activity and could experience significant impacts if mineral development resulted in a reduction of permitted AUMs that adversely affected operations to the degree considered vital to an individual operation.

Continuing to allow construction of range improvements on 69 allotments would serve to increase livestock distribution, and allow livestock to use more of the rangeland, which would increase forage availability and enhance forage conditions. Development of offsite water sources and fencing riparian and spring sources could draw livestock away from sensitive riparian areas and result in maintaining or improving riparian conditions.

Continuing to prohibit surface occupancy by oil and gas facilities on 192,190 acres specifically to protect fish and wildlife habitat and Special Status Species would reduce vegetation removal and the potential for the introduction and proliferation of noxious weeds, which would indirectly help to conserve livestock forage in these areas.

Continuing to use maximum fire suppression in areas with high resource values, structures, commercial forests, oil and gas developments, cultural values, and habitat for sensitive species

would reduce the extent of wildland fires, and help maintain vegetation cover and conserve livestock forage; however, implementing fire suppression across the RMPPA would continue to limit and exclude fire from functioning in its natural role, resulting in a longer fire-return interval, the continued buildup of fuel loads, and the promotion of vegetation communities that are more likely to fuel high-intensity fires. This management action would increase the potential for large fires to occur and associated loss of livestock forage, and would lead to vegetation successional changes that would decrease forage production and rangeland health.

Recreation opportunities under this alternative would continue to affect livestock grazing by encouraging use of the RMPPA, resulting in livestock displacement, harassment or injury, mainly from the use of vehicles. Management of the Little Yampa/Juniper Canyon SRMA (19,290 acres) would emphasize boating, camping, hiking, and sightseeing opportunities in this area, increasing the probability of impacts on livestock. Other developed recreation sites, such as the campgrounds at Irish Canyon and Rocky Reservoir and the picnic sites at Irish Canyon and Cedar Mountain, would also have similar effects. Management of these recreation sites would continue to exclude forage from livestock use because these areas would be fenced. Because of the relatively small size of these sites, the impacts to livestock grazing would be minor. Allowing cross-country OHV use to occur over most of the RMPPA (991,920 acres) would attract OHV users and increase forage loss and degradation through direct damage, removal, and dust coating of forage.

Construction activities related to the development of ROWs would remove livestock forage in the short term and increase the potential for the introduction and proliferation of noxious weeds. Increased vehicle travel on new roads would also increase the potential for harassment of and injury to livestock; however, an increase in improved roads could facilitate livestock management operations by increasing access to remote locations within allotments. Excluding ROWs on 108,470 acres in the RMPPA would prevent these effects from being realized in these areas.

Establishing NSO stipulations within 500 feet to 0.25 mile of perennial water sources would help maintain and enhance riparian vegetation and water quality, which would provide forage and water sources for livestock. Controlling surface occupancy on fragile soils would reduce vegetation removal and help to conserve livestock forage in these areas. Such restrictions would also limit construction of range improvements in these areas.

4.4.2.2 Alternative B

Vegetation and weed treatments would be conducted on a total of 12,050 acres annually and the areas would be managed to achieve DPC objectives to meet the overall goals and objectives for the RMPPA, which would help to promote healthy vegetation communities and increase forage production. Because vegetation treatments under this alternative would be emphasized to increase forage production, the forage base would be expected to increase by 44,087 AUMs over a 20-year period, which would not occur under Alternative A. It is estimated that about half of this increased forage would be available for livestock use, increasing actual use from 78,963 to 101,006 AUMs. To achieve this increase, 94,000 acres of woodland (producing at 50 acres per AUM) would be converted to a more open grassland community (producing at 10 acres per AUM), resulting in a net increase of 7,520 AUMs. About 191,400 acres of sage and other

communities (producing at 30 acres per AUM) would be converted to grass communities (producing at 5 acres per AUM), resulting in a net increase of 31,900 AUMs. About 20,000 acres of mountain shrub communities (producing at 10 acres per AUM) would be converted to more an open shrub/grass community (producing at 3 acres per AUM), resulting in a net increase of 4,667 AUMs.

The effects on livestock grazing resulting from oil and gas development activities would be similar to those identified for Alternative A, except oil and gas leaseholders whose lease or unit is within the critical sagebrush habitat area (Map 2-4) could opt into an agreement to limit wildlife habitat fragmentation in return for easing wildlife timing limitations. Should leaseholders opt for this agreement, a 5 percent surface disturbance threshold would be required which could limit disturbance associated with oil and gas development. Prior to any new surface disturbance, areas of previously disturbance would have to be rehabilitated in accordance with the Reclamation Performance Standard (Appendix O) requirements. If opted into, this agreement could limit livestock forage losses due to oil and gas development, either maintaining existing forage resources from new development or ensuring forage lost to previous disturbance has been reclaimed prior to creating new disturbance. In addition, limiting surface disturbance to 1 percent in Vermillion Basin could provide additional protection of forage resources in this area.

The effects on livestock grazing resulting from the implementation of grazing management actions would be the same as those identified as impacts common to all alternatives; however, in addition, the construction of range improvements would be considered specifically for the purpose of increasing livestock forage availability, which would increase forage use. The acquisition of additional public lands could increase available forage for permitted users.

The effects on livestock grazing resulting from the management of fish and wildlife habitat and Special Status Species would be similar to those identified for Alternative A, except surface occupancy would be prohibited on 32,770 acres (83 percent decrease) specifically to protect fish and wildlife habitat and Special Status Species, which would decrease the level of protection for vegetation resources and forage for livestock; however, under this alternative, these restrictions would also apply to all other surface disturbing activities (NGD restriction), which would provide additional protections to forage from disturbance and removal.

Applying NGD restrictions to 89,240 acres to protect fish and wildlife habitat, Special Status Species, SMAs (WSAs and ACECs), SRMAs, and cultural resources could preclude the construction of some range improvements, potentially preventing some livestock operators from fully utilizing the rangeland contained in their allotment.

Management actions associated with the fire management program would allow for the use of appropriate fire management response in areas where fire was not desired. This management action would provide more flexibility in determining the areas in which fire suppression should be conducted and to what extent it should be conducted. Compared to Alternative A, this management action would likely reduce the use of fire suppression, which would reduce the related effects on vegetation communities and the potential for high-intensity fires that lead to extensive forage loss.

The effects on livestock grazing resulting from recreation management actions would be similar to those identified for Alternative A, except the Little Yampa/Juniper Canyon area would not be managed as a SRMA. This would deemphasize the recreational opportunities in this area, which would possibly result in reduced use of the area and fewer impacts to livestock grazing. Cross-country OHV use would be allowed on an additional 181,030 acres (18 percent increase compared to Alternative A), which could slightly increase forage loss and degradation.

The effects on livestock grazing resulting from the development of ROWs would be similar to those identified for Alternative A, except 78,250 acres would be excluded from ROW development (28 percent decrease), which would decrease the extent of related forage removal, but also decrease opportunities for access to remote locations within allotments.

If Congress released the seven existing WSAs from wilderness consideration, the IMP would no longer apply, and the areas would be managed for multiple use consistent with the goals and objectives of the RMP. As a result, these areas would likely experience increased forage removal and damage from currently precluded surface uses; however, this would also remove restrictions on the development of rangeland improvements, which could allow for increased rangeland use by livestock.

Surface occupancy restrictions on perennial water sources would not be implemented, which would eliminate the related effects on livestock grazing identified for Alternative A. Surface occupancy restrictions in areas with fragile soils would not be implemented, which would eliminate the related effects to livestock grazing identified for Alternative A.

4.4.2.3 Alternative C

The effects on livestock grazing resulting from vegetation management actions would be similar to those identified for Alternative B, except the extent of annual vegetation and weed treatments would be decreased by 2,640 acres (22 percent decrease). Vegetation communities would be managed to prevent the spread of noxious weeds and achieve DPC objectives that emphasize wildlife habitat, livestock grazing, watershed, and biodiversity values. These actions would result in 7,454 AUMs of increased forage production over a 20-year period (83 percent decrease compared to Alternative B). It is estimated that approximately half of this increased forage would be available for livestock use, increasing actual use from 78,963 to 82,690 AUMs. To achieve this increase, 48,000 acres of woodland (producing at 50 acres per AUM) would be converted to a more open woodland community (producing at 15 acres per AUM), resulting in a net increase of 2,240 AUMs. Approximately 71,200 acres of sage and other communities (producing at 30 acres per AUM) would be converted to Artemisia or grass communities (producing at 10 acres per AUM), resulting in a net increase of 4,747 AUMs. Approximately 2,000 acres of mountain shrub communities (producing at 10 acres per AUM) would be converted to a more open shrub/grass community (producing at 3 acres per AUM), resulting in a net increase of 467 AUMs.

The effects on livestock grazing resulting from oil and gas development activities would be the same as those identified for Alternative A.

The effects on livestock grazing resulting from the implementation of grazing management actions would be the same as those identified for impacts common to all alternatives. In this alternative, however, the construction of range improvements would be considered for the purpose of improving rangeland diversity, condition, and sustainability. This could affect the location, type, and number of range improvements, which could decrease livestock distribution and rangeland use. The acquisition of additional public lands could increase available forage for permitted users.

The effects on livestock grazing resulting from the management of fish and wildlife habitat and Special Status Species would be similar to those identified for Alternative B. The exception is that surface occupancy would be prohibited on 216,040 acres (11 percent increase) specifically to protect fish and wildlife habitat and Special Status Species, thereby increasing the level of protection to vegetation resources and forage for livestock.

The effects on livestock grazing resulting from the application of NGD restrictions to protect fish and wildlife habitat, Special Status Species, SMAs (WSAs and ACECs), SRMAs, and cultural resources would be similar to those identified for Alternative B, except 273,100 acres would be subject to such restrictions (206 percent increase). This would considerably increase the extent to which the construction of range improvements could be precluded.

The effects on livestock grazing resulting from fire management actions would be the same as those identified for Alternative B.

The effects on livestock grazing resulting from recreation management actions would be similar to those identified for Alternative A, except the Little Yampa/Juniper Canyon SRMA would be expanded and four additional SRMAs would be designated, increasing the total acreage of SRMAs by 77,870 acres (304 percent increase). Additional recreation sites (e.g., campgrounds, boat launch, and picnic sites) would also be developed in association with these SRMAs, which would further encourage use of the RMPPA; reduce forage availability; and potentially increase livestock displacement, harassment, or injury. Cross-country OHV use would be limited to 21,940 acres (98 percent decrease compared to Alternative A), which would greatly reduce the related effects on livestock grazing.

The effects on livestock grazing resulting from the development of ROWs would be similar to those identified for Alternative A. The difference is that 91,560 acres would be excluded from ROW development (16 percent decrease), slightly increasing the extent of related forage removal, but also increasing opportunities for access to remote locations within allotments.

VRM Class II areas would be expanded under this alternative to include 96,490 acres (more than 95,900 acres greater than both Alternative A or B). These areas would be managed to retain the existing character of the landscape, which would reduce the extent of surface disturbance and thereby reduce related forage removal and damage.

If Congress released the seven existing WSAs from wilderness consideration, the IMP would no longer apply, and the areas would be managed with NGD restriction. As a result, surface uses in the WSAs would be limited or prohibited similarly to the current situation, and impacts on livestock grazing would not change.

The effects on livestock grazing resulting from management of soil and water resources would be the same as those identified for Alternative A.

4.4.2.4 Alternative D

The effects on livestock grazing resulting from vegetation management actions would be similar to those identified for Alternative B, except vegetation communities would be managed to prevent the spread of noxious weeds and achieve DPC objectives that emphasize wildlife habitat, watershed, and biodiversity values. Although the extent of annual vegetation and weed treatments would be increased by 2,000 acres (17 percent increase), the emphasis of the treatments would not be on forage production. These actions would result in 21,814 AUMs of increased forage production over a 20-year period (51 percent decrease compared to Alternative B). It is estimated that approximately half of this increased forage would be available for livestock use, increasing actual use from 78,963 to 89,870 AUMs. To achieve this increase, 94,000 acres of woodland (producing at 50 acres per AUM) would be converted to a more open woodland community (producing at 15 acres per AUM), resulting in a net increase of 4,387 AUMs. Approximately 191,400 acres of sage and other communities (producing at 30 acres per AUM) would be converted to Artemisia or grass communities (producing at 10 acres per AUM), resulting in a net increase of 12,760 AUMs. Approximately 20,000 acres of mountain shrub communities (producing at 10 acres per AUM) would be converted to a more open shrub or grass community (producing at 3 acres per AUM), resulting in a net increase of 4,667 AUMs.

The effects on livestock grazing resulting from oil and gas development activities would be the same as those identified for Alternative A, except an anticipated 25 percent reduction in development activity would reduce the level of forage loss by 25 percent, resulting in a net loss of 3,129 AUMs. Given that current actual livestock use is estimated at 78,963 AUMs, this loss of 3,129 AUMs is relatively minor.

The effects on livestock grazing resulting from the implementation of grazing management actions would be the same as those identified for Alternative A, with one exception: the construction of range improvements would be allowed to maintain sustainable natural diversity of plant communities. This could affect the location, type, and number of range improvements that could decrease livestock distribution and rangeland use. The acquisition of additional public lands could increase available forage for permitted users.

The effects on livestock grazing resulting from the management of fish and wildlife habitat and Special Status Species would be similar to those identified for Alternative B, except surface occupancy would be prohibited on 459,940 acres (139 percent increase compared to Alternative A) specifically to protect fish and wildlife habitat and Special Status Species, which would increase the level of protection to vegetation resources and forage for livestock.

The effects on livestock grazing resulting from the application of NGD restrictions to protect fish and wildlife habitat, Special Status Species, SMAs (WSAs and ACECs), SRMAs, and cultural resources would be similar to those identified for Alternative B, but 632,940 acres would be subject to such restrictions (609 percent increase). This would considerably increase the extent to which the construction of range improvements could be precluded.

The effects on livestock grazing resulting from fire management actions would be the same as those identified for Alternative B.

The effects on livestock grazing resulting from recreation management actions would be similar to those identified for Alternative A. The exception is that the Little Yampa/Juniper Canyon SRMA would be expanded and eight additional SRMAs would be designated, increasing the total acreage of SRMAs by 245,460 acres (1,172 percent increase). Additional recreation sites (e.g., campgrounds, boat launch, and picnic sites) would also be developed in association with these SRMAs, which would further encourage use of the RMPPA; reduce forage availability; and potentially increase livestock displacement, harassment, or injury. There would be no cross-country OHV use under this alternative, thus eliminating the related effects on livestock grazing.

Suitable WSR Segment 2 of the Yampa River (4,350 acres) would be closed to livestock grazing during the months of June and July. This would exclude approximately 1,670 AUMs from livestock use during this period, which could have a considerable effect on forage availability for the allotments located within this area.

The effects on livestock grazing resulting from the development of ROWs would be similar to those identified for Alternative A, except 499,700 acres would be excluded from ROW development (361 percent increase) considerably decreasing the extent of related forage removal, but also decreasing opportunities for access to remote locations within allotments.

The effects on livestock grazing resulting from visual resource management actions would be similar to those identified for Alternative C, except VRM Class II areas would be expanded to include 184,600 acres (157 percent increase compared to Alternative C). This would further reduce the extent of surface disturbance, and thereby reduce related forage removal and damage.

If Congress released the seven existing WSAs from wilderness consideration, the IMP would no longer apply, and the areas would be managed with NGD restriction. As a result, surface uses in the WSAs would still be limited or prohibited, and impacts on livestock grazing would remain the same.

The effects on livestock grazing resulting from management of water resources would be the same as those identified for Alternative A. The effects on livestock grazing resulting from management of soil resources would be the same as those identified for Alternative A.

4.4.3 Impacts on Recreation

This section presents potential impacts on recreation resources, opportunities, and experiences from management actions for other resource programs. Recreational uses within the RMPPA include hunting, fishing, floatboating, camping, hiking, rock climbing, equestrian, OHV use, photography, wildlife viewing, and antler gathering. Existing conditions concerning recreation resources are described in Section 3.2.3. OHV management is discussed in Section 3.2.6.3 of this document; however, based on the level of recreational OHV use in the RMPPA, some references to OHV use have been used in this section. For specific impacts on OHV management, refer to Section 4.4.5.

Impacts on recreation would be considered significant if any of the following were to occur:

- ❑ Management actions result in long-term elimination or reduction of recreation opportunities, activities, or experience, or they compromise public health and safety.
- ❑ Levels of use or development that would be incompatible with the stated objectives of backcountry areas or SRMAs.

The analysis is based on the following assumptions:

- ❑ Substantial increases in recreational activity would create risks to public health and safety.
- ❑ Traditional recreational uses within the RMPPA would continue, and an anticipated increase would occur in motorized recreation, wildlife viewing, floatboating, hiking, camping, and new technology-based recreation activities.
- ❑ The incidence of resource damage and conflicts between OHV users and non-motorized recreationists would increase with increasing OHV use.
- ❑ Current demand for SRPs would be maintained during the life of the plan.

Impacts from management actions associated with facility closures during fire suppression, issuance of SRPs, maintaining the wild horse herd, and continuing to manage WSAs as VRM Class I would not vary by alternative. Short-term closures of recreation facilities and areas could occur during wildland fires and fire suppression activities, conditional fire suppression actions, and during the use of prescribed fire; such closures would reduce recreation opportunities in the short term in these areas. Issuance of commercial SRPs to provide recreational opportunities, enhance recreational experiences, and protect natural resources would expand and enhance recreation opportunities and experiences throughout the RMPPA. Observation of wild horses is a unique recreation opportunity within the LSFO. Maintaining the herd by managing habitat condition in the Sand Wash Basin HMA would protect this unique recreation opportunity. Continuing to manage WSAs as VRM Class I would maintain scenic qualities by restricting landscape change, thus maintaining and enhancing the recreation experience. Conversely, managing these areas as VRM Class I would restrict development of recreational facilities and limit some forms of recreation. WSAs are popular destinations for users seeking solitude and primitive/unconfined recreation opportunities. Impacts from allowing OHV use on existing roads and trails would occur in all WSAs, except Diamond Breaks and Cross Mountain, which would be closed. OHV use in these areas would increase conflicts between users and displace some non-motorized users, thereby affecting the primitive recreation experience in these areas.

Impacts on recreation would not be anticipated as a result of implementing management actions for air quality, paleontological resources, and social and economic values.

4.4.3.1 Alternative A

Managing the Vermillion Basin area as open to oil and gas leasing, locatable and other minerals, open and limited to existing roads and trails for OHV use, and with no visual resource management designations would affect recreationists seeking solitude and primitive/unconfined recreation opportunities. Surface disturbance, noise, and sights and sounds of other people would detract from the natural character of the area. Such management actions would result in significant impacts on users seeking non-motorized recreation.

If Congress were to release any existing WSAs from wilderness study the opportunity for solitude and primitive/unconfined recreation would likely be affected by an increase in recreation opportunities that WSA management currently restricts, such as motorized recreation. An increase in recreation could also increase the potential for conflicts among users and displace some users thereby diminishing the recreation experience in these areas.

Certain areas throughout the RMPPA, such as Cedar Mountain and south Sand Wash, receive heavy recreation use that currently falls under ERMA management, and increasing use in these areas would be expected to continue. Not providing special recreation management for these areas would likely not provide the recreationist desired opportunities, experiences and outcomes, and could result in user and resource conflicts could throughout these areas. This would affect both users and the natural resources that are important to recreationists. A loss of recreation opportunities and degraded recreation experiences could occur in these areas without focused recreation management. Similar impacts would also on other areas of the RMPPA from this increased recreation activity and the impacts to natural features because of conflicts among users, and loss of recreation opportunities and experiences by continuing to manage the majority of the RMPPA as an ERMA, with minimal recreation management. These impacts would likely become significant in localized areas over the life of the plan. Continuing to manage OHV recreation according to the existing Little Snake RMP would provide opportunities for unrestricted cross-country OHV travel and route proliferation in 74 percent of the LSFO; however, conflicts between motorized and non-motorized recreation users would continue, and they would affect the experience of both user groups. Development and implementation of a travel management plan could reduce these conflicts between motorized and non-motorized users, enhancing recreation opportunities and experiences for both.

Limiting OHV use to designated roads and trails on 56,930 acres, and existing roads and trails on 229,925 acres, would maintain opportunities for trail-based OHV recreation while reducing conflicts with users seeking more primitive forms of recreation; however, limiting use to existing roads and trails could increase the potential for user conflicts because of route proliferation.

Managing the entire LSFO, except for Diamond Breaks and Cross Mountain WSAs, as open to over-the-snow vehicles could cause localized and short-term impacts from conflicts between motorized (over-the-snow) users and non-motorized users. Indirect impacts could also occur from degraded wildlife habitat and stress to big game species, reducing wildlife observation and hunting opportunities.

The Serviceberry and Fly Creek areas are popular non-motorized hunting and backcountry areas with temporary OHV closures. The anticipated recreation demand and associated user and resource conflicts would diminish the recreation opportunities and experience in the area; however, a loss of recreation opportunities and degraded recreation experiences could occur for both user groups.

Managing the Dinosaur North areas (areas outside the existing WSAs) as open to OHV use and open to mineral leasing and/or with CSU stipulations would reduce the backcountry qualities of the area and affect recreationists seeking solitude and primitive/unconfined recreation opportunities. Cross-country motorized experiences, however, would be protected in these areas. Impacts would be similar in the Cold Springs area, except it would be managed as limited to

existing roads and trails thereby protecting trail-based motorized recreation experiences and reducing user conflicts.

Managing the Little Yampa/Juniper Canyon area as a SRMA would maintain recreation opportunities and experiences. Focused recreation management would be limited mostly to use along the river corridor, even though other recreation use has become popular in surrounding areas. These areas are not included in the current boundaries of the SRMA nor are they addressed by special recreation management. Impacts could occur on these surrounding areas from increased visitor use.

Without monitoring, sites along the Yampa River corridor could be affected by heavy recreation use to the point that the recreation experience would be diminished, and possible closures could result from these impacts. Continuing cooperative agreements with Colorado State Parks for the management of the Yampa River could help to preserve the recreation experience and opportunities along the river.

Continuing to manage the existing developed recreation sites would meet the current level of recreational demand in the RMPPA. It is unlikely that the existing developed recreational sites would meet the anticipated increase of recreation activity in the area, which could result in user conflicts and degraded recreation experiences in areas that receive heavy use. These areas warrant recreation facilities to harden them (e.g. construction of trails, picnic and camping areas in areas where such developments would have the least impacts), protecting the natural resource important to recreationists.

In areas open to leasing with standard terms and conditions (approximately 549,800 acres), surface disturbance caused by well pads and roads created for mineral exploration and development could reduce the quality of recreational experiences, displace recreation users to other less developed areas, or eliminate some recreation opportunities.

In the 192,190 acres where NSO stipulations would be used for oil and gas leasing, prohibiting surface occupancy would preserve the natural character of the landscape while maintaining existing recreation opportunities. NSO stipulations surrounding perennial water sources would also protect the quality of the recreational experience along waterways.

Areas open to locatable mineral development and mineral material sales would allow surface disturbance that could affect their desirability for recreation use. Not allowing mineral material sales in Cross Mountain Canyon ACEC, Little Yampa/Juniper Canyon SRMA, and the Cedar Mountain Recreation management unit would protect recreation opportunities and experiences in these areas.

If new coal leases were developed, depending on the extent and location of the development, impacts could occur on recreation from closure of areas or surface disturbance that could reduce the quality of recreational experiences, displace recreation users to other, less developed areas, or eliminate some recreation opportunities. In the 13,920 acres where NSO stipulations would be used for coal leasing, prohibiting surface occupancy would preserve the natural character of the landscape while maintaining existing recreation opportunities. These impacts would be the same if new oil shale leases were developed. If both coal leases and oil shale leases were developed,

impacts on recreation opportunities and experiences would be intensified from a greater cumulative reduction of quality recreational experiences from surface disturbance, closure of areas, and possible elimination of recreation opportunities.

Managing 72,480 acres as closed to OHV recreation use would protect opportunities for solitude and primitive/unconfined recreation.

Obtaining additional access to public lands would enhance recreation opportunities, experiences, and management, which would also facilitate greater access to recreation areas and reduce conflicts between recreationists and private landowners within the RMPPA.

Disposal of 6,670 acres of scattered public land parcels in exchange for consolidated private or State land could enhance recreation opportunities, experiences, and management. Land tenure adjustments would facilitate greater access to recreation areas and reduce conflicts between recreationists within the RMPPA. Acquisition of easements across private land to access public land could also improve and increase recreation access and provide recreation opportunities.

Identifying specific areas as unsuitable and/or sensitive for major ROWs would protect recreation opportunities and experiences in these areas, particularly in the Little Yampa/Juniper Canyon SRMA and WSAs. Designating areas where ROWs would be suitable could centralize transmission facilities outside sensitive and high-value recreation areas.

Development of new recreation sites or facilities could be restricted if surveys found any Colorado BLM Sensitive Species in proposed recreation site developments. These impacts would likely be temporary and could be mitigated through protective measures or site-specific engineering or site relocation. Seasonally prohibiting target shooting, plinking, or any type of sport hunting within a 0.25 mile of black-footed ferret release cages or release sites would cause short-term, localized impacts from a loss of these recreation opportunities during the 3 to 4 months of the release period.

Recreational access to waterways could be restricted because of the lack of measures to control tamarisk or Russian olive on critical and other occupied habitat of Colorado River fishes, which could result in indirect impacts on recreation opportunities and experiences in areas used for access to recreation activities and opportunities.

Protecting big game severe winter habitat and birthing areas from surface disturbing activities to reduce stress would improve the opportunity and experience for both consumptive and non-consumptive recreational enjoyment of wildlife. Indirect impacts on recreation would occur from improving opportunities and experience associated with hunting and wildlife observation as a result of reducing livestock/big game conflicts that would improve vegetative and forage conditions.

Commercial harvest of forest products would decrease available recreational opportunities in the 6,330 acres of prescribed harvest areas. Based on the area involved, these impacts would likely be minimal; however, commercial harvest of woodland products would decrease available recreational opportunities in the 37,600 acres of prescribed harvest areas. Based on the area involved, and depending on the location of the harvest area, impacts on recreation could occur.

Recreationists could be displaced from vegetation treatment areas to other more desirable areas until revegetation occurs; however, the vegetation treatments would benefit recreationists by improving the long-term aesthetics of an area. These treatments would be conducted on a case-by-case basis, so the extent of the impacts would be difficult to determine. Impacts would be similar in areas that have been burned by wildfire; however, managing the RMPPA for maximum suppression in areas with high resource values and recreation facilities would help maintain and protect recreation facilities and opportunities.

Enforcing performance objectives, including requiring a plan of development or using alternative measures or mitigation measures for surface disturbing activities within fragile soil areas, would protect the quality of the recreational experience in areas where surface occupancy would be allowed and would reduce conflicts between recreationists and development activities, thus improving the recreation experience.

River-related recreation opportunities would benefit from management intended to protect the outstanding remarkable values, tentative classification, and the free-flowing nature of the 31 miles of eligible rivers (including Beaver Creek, Vermillion Creek, and three Yampa River segments).

Maintaining the Irish Canyon interpretive site would retain recreation opportunities associated with heritage tourism in the Irish Canyon area.

4.4.3.2 Alternative B

Managing the Vermillion Basin area as open to new oil and gas leasing, using state-of-the-art technology, reducing visual intrusions, leasing larger sections, withdrawing the area from mineral location, limiting OHV use to designated routes, and designating the area as VRM Class III (Class II VRM and ROW avoidance for the Vermillion Bluffs area) would reduce impacts on recreation as compared to Alternative A. Significant impacts would occur on non-motorized recreation and recreationists seeking solitude and primitive/unconfined recreation opportunities because of degradation of the natural character from the development of new mineral leases and because of user conflicts from allowing OHV use on designated routes and trails. Designating the Vermillion Bluffs area as VRM Class II and managing the Vermillion Bluffs and fragile soil areas of Vermillion Basin as ROW avoidance areas would provide minimal protection for recreation experiences in these areas; however, not designating any additional ROW avoidance areas that receive intense recreation use could diminish recreation opportunities or experiences that were degraded as a result of ROW development. Managing OHV recreation according to the area designation (Map 2-46) would expand cross-country OHV travel and route proliferation in the open portions of the LSFO (87 percent of the RMPPA or 1,172,950 acres open, which is 181,030 acres more than Alternative A). Conflicts between motorized and non-motorized recreation users would increase and would affect the experience of both user groups. Degradation to the visual character and features would likely occur from OHV use, which would impact the recreation experience for many users, including motorized and non-motorized users.

Impacts on recreation would be similar to those identified under Alternative A if Congress were to release any of the existing WSAs from wilderness study. However, under this alternative, these areas would be managed as multiple use consistent with the resource goals and objectives

of the surrounding areas. Management of these areas would likely increase recreation opportunities currently restricted by WSA management, such as motorized recreation in these areas. Conversely, it would also increase conflicts among users, cause displacement of some users, and diminish natural character, resulting in greater impacts on the recreation experience in these areas.

In areas open to leasing with standard terms and conditions (79 percent of the RMPPA or 1,509,090 acres), surface disturbance caused by well pads and roads created for mineral exploration and development could reduce the quality of recreational experiences, displace recreation users to other, less developed areas, or eliminate some recreation opportunities. Under this alternative, these impacts would be greater than those identified in Alternative A because of the greater percentage of the LSFO being open to leasing.

Areas open to locatable mineral development (about 1,746,970 acres) and open to mineral material sales (about 1,802,490 acres) would allow closure or surface disturbance that could also affect the desirability of these areas for recreation use. Not allowing mineral material sales in Cross Mountain Canyon ACEC, Little Yampa/Juniper Canyon SRMA, and the Cedar Mountain recreation management unit would protect recreation opportunities and experiences in these areas.

If new coal leases were developed, depending on the extent and location of the development, impacts could occur on recreation from closure of areas or surface disturbance, which could reduce the quality of recreational experiences, displace recreation users to other, less developed areas, or eliminate some recreation opportunities. In the 13,920 acres where NSO stipulations would be used for coal leasing, prohibiting surface occupancy would preserve the natural character of the landscape while maintaining existing recreation opportunities. These impacts would be the same if new oil shale leases were developed. Under this alternative, lands available for leasing would increase as compared to Alternative A, which would increase the impacts on recreation because of the area being managed as open. If both coal and oil shale leases were developed, impacts would be intensified from a greater cumulative reduction of quality recreational experiences from surface disturbance, closure of areas, and possible elimination of recreation opportunities.

Certain areas throughout the RMPPA receive heavy recreation use that currently fall under ERMA management, such as Cedar Mountain and south Sand Wash. Use in these areas is anticipated to continue to increase. Continuing current recreation management for the Cedar Mountain and south Sand Wash areas would likely not meet the recreation demand, or address user and resource conflicts throughout these areas, which would affect both users and the natural resources that are important to recreationists. A loss of recreation opportunities and degraded recreation experiences could occur in these areas with increased use. Impacts would also occur on other areas of the LSFO from an increase in recreation activity, impacts on natural features, and from conflicts between users. A loss of recreation opportunities and experiences would occur from continuing to manage the majority of the RMPPA as an ERMA, with minimal recreation management. Addressing public health and safety, user conflicts, and resource protection to determine if changes in transportation planning or other activity planning would be needed, would reduce these impacts. Based on the anticipated increase of recreational use in these areas, the impacts would likely become significant over the life of the plan.

Management of VRM Class III areas (48,800 acres) would not affect the type or amount of recreation use that would occur in these areas. Facilities to support recreation could be accommodated. Although management of VRM Class IV areas (1,223,610 acres) would allow major modifications to the landscape, which would not limit recreation facilities or activities in these areas, this type of management could nonetheless diminish scenic quality to a degree that would degrade the recreation experience.

Conducting transportation planning only on an as-needed basis would likely cause impacts as a result of increased use and conflicts that would be resolved as planning was implemented. This could degrade recreation opportunities and experiences and increase users conflicts.

Managing 46,370 acres as closed to OHV recreation use would protect opportunities for solitude and primitive/unconfined recreation in the Diamond Breaks and Cross Mountain WSAs, but these opportunities throughout the LSFO would be reduced compared to Alternative A (26,110 fewer acres closed areas than under Alternative A). The Maybell uranium pit would remain closed for public safety concerns under this alternative.

Limiting OHV use to designated roads and trails on 77,080 acres in the Vermillion Basin area, existing roads and trails on 54,850 acres in WSAs (except Diamond Breaks and Cross Mountain), and areas that meet sensitive soil criteria would maintain opportunities for trail-based OHV recreation while reducing conflicts with users seeking more primitive forms of recreation. Managing areas as limited to existing roads and trails until route designation can take place could lead to route proliferation as new user-created routes would be perceived as existing routes by other users. Enforcement in areas designated as limited to existing roads and trails can be problematic because it is legal for users to travel these new routes. Route proliferation could result in diminished recreation experiences.

Managing the entire RMPPA, except for Diamond Breaks and Cross Mountain WSAs, as open to over-the-snow vehicles could cause impacts from conflicts between motorized (over-the-snow) users and non-motorized users. Indirect impacts could also occur from degraded wildlife habitat and stress on big game species, reducing wildlife observation and hunting opportunities.

Temporarily opening OHV use in areas that are closed to enhance big game harvest would increase motorized use in these areas, potentially dispersing wildlife and decreasing harvest over the duration of the hunting season. Because areas that would be closed to OHV use under this alternative include the Diamond Breaks and Cross Mountain WSAs and the Maybell uranium pit, impacts would also occur from a temporary loss of opportunity for solitude and primitive/unconfined recreation in the WSA areas, and user conflicts that could arise between motorized and non-motorized recreationists.

Impacts on recreation in the Serviceberry and Fly Creek areas would be greater than those described in Alternative A because these areas would be managed as open to OHV use, which would decrease non-motorized hunting and backcountry opportunities and experiences.

Impacts on recreation from management of the Dinosaur North and Cold Springs areas (areas outside the existing WSAs) would be the similar to those described in Alternative A, except oil and gas development would be leased with CSU stipulations on all new mineral leases in the

Vermillion Basin, Dinosaur North, and Cold Springs. This management action would provide minimal protection for the opportunity for solitude and primitive/unconfined recreation in these areas. Based on the potential for development in these areas, impacts could occur from degraded backcountry recreation experiences.

Managing the Little Yampa Canyon and Juniper Canyon area as part of the ERMA would not likely meet the recreation demand and associated user and resource conflicts throughout these areas. Increasing recreation use without increased management would affect both users and the natural resources that are important to recreationists. A loss of recreation opportunities and experiences could occur in these areas because of activities such as motorized use and mineral development occurring throughout the areas in which they were not allowed previously.

Without monitoring, sites along the Yampa River corridor could be affected by heavy recreation use to the point that the recreation experience is diminished, and possible closures could result from these impacts. Continuing cooperative agreements with Colorado State Parks for the management of the Yampa River and working proactively with local communities and governments to identify additional recreation opportunities along the river to expand heritage tourism, wildlife observation, and cultural recreation opportunities would mitigate impacts and likely expand recreation opportunities.

Impacts on recreation from continuing to manage the existing developed recreation sites would be the same as those identified for Alternative A.

Prohibiting competitive events in WSAs and managing the areas consistent with OHV area and route designations would provide the minimal protection to maintain opportunities for primitive recreation and protect resources critical for existing types and amounts of non-competitive recreation use. However, based on the low demand for these types of permits, impacts would be minimal. Allowing vending in support of resource protection or appropriate recreation use would increase and enhance types and amounts of recreation vending and associated recreation experiences in the RMPPA.

Pursuing access through acquisition, exchange, and disposal of lands according to criteria outlined in Lands and Realty Alternatives, Section 2.6.5, would enhance recreation opportunities, experiences, and management when land tenure adjustments and access is acquired to accommodate or improve recreation access. Land tenure adjustments and access would facilitate greater access to recreation areas and reduce conflicts between private landowners and recreationists within the RMPPA. Use of easements could also improve and increase recreation access where easements were acquired to support recreation opportunities.

Depending on the location of new ROWs impacts to recreation opportunities could occur, particularly to opportunities for solitude and primitive recreation. Not designating any additional ROW exclusion areas other than WSAs in areas throughout the planning area that receive intense recreation use could cause impacts similar impacts to recreational opportunities.

Impacts such as degraded recreation opportunities or experiences could occur if the development of a communication site was allowed in areas that receive intense recreation use. Prioritizing existing sites for new communication sites would mitigate some impacts.

Not applying protective measures for big game severe winter habitat and birthing areas could cause stress to big game species, degrading the opportunity and experience for both consumptive and non-consumptive recreational enjoyment of wildlife. Indirect impacts would occur on recreation from decreased opportunities and experience associated with hunting and wildlife observation as a result of focusing on decreasing big game populations and reducing livestock/big game conflicts.

Implementing NSO/NGD stipulations and minimizing impacts from erosion and restoring habitat through controlling tamarisk or Russian olive within critical or occupied habitat of the listed Colorado River fishes could improve recreational fishing and floatboating opportunities and experience. This management action could result in indirect impacts by improving recreational access to waterways by controlling tamarisk or Russian olive. Indirect impacts would also occur from maintaining or improving watershed conditions, and lake and stream habitat containing Colorado River cutthroat trout. The maintained or improved water quality and could enhance water-based recreation experiences.

Enforcing performance objectives—including requiring a plan of development, use of alternative measures, or mitigation measures for new oil and gas leases and all surface disturbing activities permitted under the existing Little Snake RMP—would protect the quality of the recreational experience in areas where surface disturbing activities would be allowed by reducing conflicts between recreationists and development activities.

Development of new recreation sites or facilities could be restricted if surveys found any Colorado BLM Sensitive Species in proposed recreation site developments. These impacts would be localized and short term in duration and could be mitigated through protective measures and/or site-specific engineering or site relocation. In the long term, such actions would provide additional recreational opportunities for some users.

Impacts on recreation from commercial harvest of forest and woodland products would be the same as those identified for Alternative A.

Recreationists could be displaced from vegetation treatment areas to other more desirable locations until revegetation occurs. In the long term the vegetation treatments would benefit recreationists by improving aesthetics of an area. These treatments would be conducted to increase forage production when consistent with healthy rangeland ecosystems, so the extent of the impacts would be difficult to determine. Managing upland and riparian vegetation for healthy and diverse vegetation communities could enhance settings used for recreational activities. Managing wildfire using an AMR and avoiding wildland fire use in areas with recreation facilities would maintain and protect recreation facilities and opportunities. Short-term closures of recreation facilities and areas could occur in fire areas.

Seasonal, localized impacts could occur if recreation activities or opportunities are restricted as a result of not allowing human activity within a 0.50-mile radius of occupied bald eagle nests from November 15 through July 31.

Localized impacts could occur if heavy recreation use warrants developed recreation facilities or trails to prevent resource damage or user conflicts within a Mexican spotted owl protected

activity center (PAC), because these developments would be restricted. These impacts would likely be minimal and could be mitigated by relocating the facilities and trails. Seasonal closures would cause short-term localized impacts, based on the predominant use of the areas that would be closed in relation to the season of use. Impacts would be similar and could occur if recreation activities or opportunities are restricted in areas within the Yellow-billed Cuckoo habitat. These impacts would likely be localized and minimal as a result of mitigation from relocating the recreation activity. Seasonal closures to campsites within 300 feet of occupied boreal toad breeding habitat would cause short-term localized impacts from a loss of recreation opportunities. Based on the areas involved, these impacts would be minimal.

Outstanding river-related recreation opportunities as identified in Alternative A would not benefit from protection of Wild and Scenic eligibility or suitability protections under this alternative. Certain areas might still provide for other recreation management from other special designations such as SRMA management.

Development of an interpretive cultural program would improve and expand recreation opportunities and experiences associated with cultural and heritage tourism throughout the RMPPA.

4.4.3.3 Alternative C

Impacts identified from management associated with the Vermillion Basin under Alternative B would be similar under this alternative, except more stringent stipulations on surface disturbance would be instilled, particularly in regard to oil and gas development. For example, any new oil or gas lease development would have to occur within a federal oil and gas unit, be limited to 2,560 acres, include at least four leases per unit, and have surface disturbance limited to 1 percent of the Vermillion Basin at any one time. In large part, such actions would mitigate where and when oil and gas development activities were to occur, providing some mitigation in maintaining natural resources which provide the settings for the variety of recreation opportunities within the area. Significant impact could still occur, particularly to non-motorized recreationists and those seeking opportunities for solitude and primitive/unconfined recreation.

Designating areas as open, limited, or closed to OHV use as identified on Map 2-47 would maintain trail-based OHV use while reducing conflicts between users (21,940 acres of open areas; 1,242,600 of limited; and 86,710 acres closed to OHV use). Only portions of the south Sand Wash area would be open for cross country use, reducing the opportunities for unconfined OHV recreation. Natural resources important to OHV recreation would be protected, and eliminating open OHV use through the majority of the RMPPA would reduce potential resource damage and conflicts with other land uses. Because of incomplete inventory data, 1,039,500 acres would be managed as limited to existing roads and trails until route designation can take place. Allowing OHV use on existing routes throughout most of the RMPPA would accommodate demand for the trail-based type of OHV recreation most suitable for the terrain of the LSFO. This could also lead to route proliferation as new user-created routes would be perceived as existing routes by other users. Route proliferation could result in diminished recreation experiences. However, as a baseline of existing roads and trails is developed, BLM could identify and close or rehabilitate newly created routes. Expanding areas closed to OHV use, including portions of additional ACECs and WSAs, would cause a limited decrease in trail-

based recreation, but conflicts with non-motorized recreation would be reduced and natural resources would receive enhanced protection, as would opportunities for solitude and primitive/unconfined recreations. Managing limited areas through adaptive management would allow for existing routes to remain open to use until indicators show a need for the development and implementation of a transportation plan. At that time further decisions would be made through a collaborative process. This adaptive management could reduce impacts on motorized recreationists while protecting natural resources important to all recreationists.

The opportunity for solitude and primitive/unconfined recreation could be affected if Congress were to release the Diamond Breaks WSA from wilderness study. There could be an increase in recreation opportunities that are currently restricted such as motorized recreation, which could also cause user conflicts between motorized and non-motorized users and degrade the recreation experience. If the Diamond Breaks WSA was released, the area will be managed as limited to designated roads and user conflicts would be reduced. Designating the area VRM Class II would serve to protect the natural, undeveloped character of the area, reducing the impact on users seeking solitude and primitive/unconfined recreation opportunities. If Congress were to release the Cross Mountain WSA from wilderness study, the opportunity for solitude and primitive/unconfined recreation would be protected by closing the area to OHV use and mineral development and exploration, designating the area VRM Class II, and managing it as a ROW exclusion area (subject to valid existing rights). The opportunity for solitude and primitive/unconfined recreation could be affected if Congress were to release the West Cold Springs WSA from wilderness study. There could be an increase in recreation opportunities that are currently restricted such as motorized recreation in this area. This increase could also cause user conflicts between motorized and non-motorized users, which would degrade the recreation experience for both user groups. By applying adaptive OHV management, user conflicts would be reduced and closing the area to mineral development and exploration and managing it as a ROW avoidance area with no wind power development would serve to protect the natural, undeveloped character of the area, thus reducing the impact on users seeking solitude and primitive/unconfined recreation opportunities. Impacts would be similar in the Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears WSAs, except the area would also be designated as VRM Class II, which would further protect the natural character.

Areas within the Dinosaur North and Cold Springs Mountain areas have been determined to possess wilderness characteristics and provide an opportunity for solitude and primitive/unconfined recreation opportunities. Managing 45,620 acres in the Dinosaur North area as closed to mineral development and exploration, limiting OHV use to designated roads and trails, and managing it as VRM Class II and as a ROW avoidance area with no wind power development would serve to protect the natural, undeveloped character of the area, thus reducing the impact to users seeking solitude and primitive/unconfined recreation opportunities and reduce user conflicts. Impacts would be similar on 30,470 acres in the Cold Springs Mountain area, except the area would be managed as VRM Class III, which would provide minimal protection for the natural, undeveloped character of the area, thus some impacts could occur to users seeking solitude and primitive/unconfined recreation opportunities, if development were to occur in the area.

River-related recreation opportunities along the three Yampa River segments would benefit from protection of outstanding remarkable values, tentative classification, and the free-flowing nature

of the rivers that would result from management of these rivers as suitable for wild and scenic designation.

In the 417,790 acres (about 22 percent of the RMPPA) that would be managed as open to leasing with standard terms and conditions, surface disturbance caused by well pads and roads created for mineral exploration and development could reduce the quality of recreational experiences, displace recreation users to other, less developed areas, or eliminate some recreation opportunities. These impacts would be less than those identified in Alternative A or B because of the smaller percentage of the LSFO being open to leasing, and the majority of high-value recreation areas would be managed as closed to leasing or NSO stipulations.

Managing 160,870 acres as closed to oil and gas leasing and managing 216,040 acres as NSO would preserve more of the natural character of the landscape while maintaining existing recreation opportunities, particularly in the Little Yampa Canyon, Juniper Mountain, and Cedar Mountain SRMAs (managed as NSO).

Areas open to locatable mineral development and mineral material sales would allow surface disturbance that could affect the desirability of these areas for recreation use. Recommended withdrawal of 194,400 acres (115,210 acres greater than Alternative A and 41,090 acres greater than Alternative B) from mineral location and closing of 157,910 acres (60,120 acres greater than Alternatives A and B) to mineral material sales would preserve more of the natural character of the landscape while maintaining existing recreation opportunities. It would also reduce conflicts among recreationists.

If new coal leases were developed, depending on the extent and location of the development, impacts could occur on recreation from closure of areas or surface disturbance that could reduce the quality of recreational experiences, displace recreation users to other, less developed areas, or eliminate some recreation opportunities. In the 13,870 acres where NSO stipulations would be used for coal leasing, prohibiting surface occupancy would preserve the natural character of the landscape while maintaining existing recreation opportunities. These impacts would be the same if oil shale leases were developed; however, lands available for leasing would be consistent with lands available for oil and gas leasing, which would increase the impacts on recreation based on the increased area managed as open. If both coal leases and oil shale leases were developed, impacts would be intensified from a greater cumulative reduction of quality recreational experiences from surface disturbance, closure of areas, and possible elimination of recreation opportunities. Impacts on recreation from coal leasing and development would be less than Alternative B because 230 more acres would be closed to coal leasing.

Application of VRM Class II designation on 96,490 acres would retain the existing character of the landscape and would maintain scenic quality, which would enhance the recreation experience throughout these areas. The effect on recreation experiences would exist on 95,900 more acres than under Alternative B, where the Vermillion Bluffs would be managed as VRM Class II. Management of VRM Class III areas (991,460 acres) would not affect the type or amount of recreation use that would occur in these areas. Facilities to support recreation could be accommodated in these areas; however, management of VRM Class IV areas (184,890 acres) would allow major modifications to the landscape, which would not limit recreation facilities or activities in these areas; however, this type of management could diminish scenic quality to a

degree that would detract from the recreation experience. These effects would be greatly reduced as compared to Alternative A, and Alternative B where there would be 1,038,720 fewer acres managed as VRM Class IV.

Developing and implementing a transportation plan that addresses specific planning issues, such as limited points of access to reduce redundant roads and trails, rehabilitation or elimination of routes causing resource damage, seasonal closures, and reduced habitat fragmentation, would reduce conflicts between motorized and non-motorized users, improve resource conditions, and reduce stress to wildlife, which would enhance recreation opportunities and experiences for multiple user groups.

Managing 86,710 acres as closed to OHV recreation use would protect opportunities for solitude and primitive/unconfined recreation in the Diamond Breaks and Cross Mountain WSAs, and in the Limestone Ridge area (14,230 acres more than Alternative A and 40,340 acres more than Alternative B). The Maybell uranium pit would remain closed for public safety concerns under this alternative.

Limiting OHV use to designated roads and trails on 203,100 acres would maintain opportunities for trail-based OHV recreation while reducing conflicts for users seeking more primitive forms of recreation. Impacts would be similar in areas limited to existing roads and trails; however, more of the RMPPA would be open under this classification (1,039,500 acres), and the potential for user conflicts could be greater as a result of route proliferation. However, by using an adaptive OHV process, these impacts would be addressed through the adaptive travel planning process, which could mitigate the impact to all recreationists.

Temporarily opening OHV use in areas closed for the purpose of enhancing big game harvest would increase motorized use in these areas, which would potentially disperse wildlife and decrease harvest over the duration of the hunting season. Because areas closed to OHV use under this alternative would be the Diamond Breaks and Cross Mountain WSAs, the Limestone Ridge area, certain areas within the Sand Wash Basin HMA, and the Maybell uranium pit, impacts would also occur from a temporary loss of solitude and primitive/unconfined recreation in the these areas, as well as user conflicts between motorized and non-motorized recreationists.

Expanding the Little Yampa Canyon SRMA by 8,020 acres (see Map 2-36) to provide camping opportunities and protect resources would meet the anticipated increased demand for recreation through the life of the plan and preserve recreation opportunities and experiences in the area. The expanded management would also diversify recreation opportunities in the SRMA. Managing the SRMA as NSO for oil and gas exploration and development, VRM Class II from the river bottom to the ridgeline, and VRM Class III elsewhere in the SRMA, and limiting OHV use to designated routes would preserve the natural character of the landscape while maintaining existing recreation opportunities. Impacts would be the same in the Juniper Mountain SRMA.

Monitoring of sites along the Yampa River corridor would reduce conflicts, disturbance, and other impacts that would maintain the recreation experience as the popularity of the area grows. If sites are closed for rehabilitation, some short-term displacement of recreation use could occur. Continuing cooperative agreements with Colorado State Parks for the management of the Yampa River and working proactively with local communities and governments to identify additional

recreation opportunities along the river to expand heritage tourism, wildlife observation, and cultural recreation opportunities would diversify and expand recreation opportunities in the area.

Management of the Cedar Mountain area (900 acres) as a SRMA would provide both developed and undeveloped recreation opportunities in close proximity to the town of Craig. SRMA management would address user and resource conflicts that occur in the area, which would protect and improve the recreation experience in both zones of the SRMA. SRMA management of the south Sand Wash area (35,510 acres) would provide intensive recreation management for all forms of motorized recreation (cross-country, trail-based, single-track). Management of the SRMA would address user and resource conflicts while providing a quality motorized experience for all types of users. Designation of these SRMAs would provide for focused recreation management in these areas and would diversify recreation opportunities in the area.

SRMA management of the Serviceberry area (12,380 acres) would provide recreation management for hunting and both motorized and non-motorized recreation. Limiting OHV use to designated trails in Zone 1 and closing Zone 2 would provide opportunities for both user groups and would diversify recreation opportunities and experiences in the area while reducing user and resource conflicts.

Managing the Fly Creek area (12,340 acres) would provide recreation management for non-motorized, hunting, and backcountry recreation. It would eliminate user and resource conflicts, and the area would offer the opportunity for solitude and primitive/unconfined recreation.

Addressing public health, safety, user conflicts, and resource protection in the ERMA through an adaptive management process to determine if changes in transportation planning or other activity planning is needed would provide mitigation that would protect and enhance the recreation experience and diversify opportunities throughout the RMPPA.

Continuing to manage the existing developed recreation sites would meet the current level of recreational demand in the RMPPA. Under this alternative, additional site development work would be implemented in association with SRMAs, which would result in improved resource protection and improved recreation opportunities and experiences. Increasing interpretive sites and viewing pullouts as opportunities arise would improve the heritage tourism program and diversify recreation opportunities in the RMPPA.

Prohibiting competitive events in WSAs consistent with OHV area and route designations, and limiting events to 50 participants in backcountry SRMAs, would maintain opportunities for primitive recreation and protect resources critical for existing types and amounts of non-competitive recreation use. Allowing vending in support of resource protection or appropriate recreation use would increase and enhance types and amounts of recreation vending and associated recreation experiences in the RMPPA.

Pursuing public access through acquisition, exchange, and disposal of lands according to the zones and criteria outlined in Lands And Realty Alternatives Section 2.6.5 would enhance recreation opportunities, experiences, and management when land tenure adjustments and access is acquired to accommodate or improve recreation access, particularly in the areas that receive intense recreation use, such as SRMAs (e.g., the Serviceberry area and the Sand Wash and

Vermillion Basin areas). Land tenure adjustments and access would facilitate greater access to recreation areas and reduce conflicts among recreationists within the RMPPA. Actively pursuing easements to improve access for recreation use would enhance and protect recreation opportunities in these areas while reducing conflicts between recreationists and private landowners.

Encouraging new ROWs in existing corridors, such as major roads, power transmission lines, and oil and gas pipelines, would centralize transmission facilities outside sensitive, high-value recreation areas. Designating portions of Vermillion Basin, Limestone Ridge ACEC, and Irish Canyon ACEC as ROW exclusion areas (91,560 acres) would restrict surface disturbance and protect opportunities for solitude and primitive/unconfined recreation; however, in areas that did not designate any additional ROW exclusion areas, impacts to recreation could occur.

Designating 141,260 acres as ROW avoidance areas would protect recreation experiences in these areas (see Map 2-43); however, in areas that did not designate any additional ROW exclusion areas, impacts to recreation could occur.

Impacts could occur if the development of a communication site were allowed in areas that receive intense recreation use as a result of surface disturbance and associated activity degrading recreation opportunities or experiences. Prioritizing existing sites for new communication sites would mitigate these impacts.

Development of new recreation sites or facilities could be restricted if surveys found any Colorado BLM Sensitive Species or rare plant communities in proposed recreation site developments. These impacts would be localized and short term in duration, and could be mitigated through protective measures or site-specific engineering or site relocation. Seasonally prohibiting target shooting, plinking, or any type of sport hunting within a 0.25 mile of black-footed ferret release sites would cause short-term, localized impacts from a loss of these recreation opportunities during the 3 to 4 months of the release period.

Impacts on recreation from bald eagle nesting habitat restrictions would be the same as those identified for Alternative B. Impacts on recreation from Colorado River fishes and Colorado cutthroat trout restrictions and erosion control would be the same as Alternative B.

NSO stipulations surrounding perennial water sources would be similar to those identified for Alternative A; however, maintaining a 0.25-mile buffer would provide greater protection than under Alternative A. Developed recreation facilities would not be allowed unless exceptions were granted (Appendix E), potentially altering the recreation experience.

Localized impacts could occur if heavy recreation use warrants development of recreation facilities or trails to prevent resource damage or user conflicts that fall within a Mexican spotted owl PAC because these developments would be restricted; however, these impacts would likely be minimal and could be mitigated by relocating the facilities or trails. Based on the predominant recreational use of an area, seasonal closures could cause short-term localized impacts from restrictions placed on a given recreational activity. Special or temporal restrictions could also be applied for recreational activities in protected and restricted Mexican spotted owl habitat other than PACs, which could result in localized impacts if any recreation activity is

restricted. Impacts would be similar and could occur if recreation activities or opportunities are restricted in areas within the Yellow-billed Cuckoo habitat. These impacts would likely be localized and minimal as a result of mitigation from relocating the recreation activity. Impacts on recreation from boreal toad restrictions would be the same as Alternative B.

Impacts on recreation would be the same as identified in Alternative A for protecting big game severe winter habitat and birthing areas from surface disturbing activities and reducing stress to big game species.

Recreationists could be displaced from 4,110 acres per year in vegetation treatment areas to other more desirable areas until revegetation occurs; however, the vegetation treatments would benefit recreationists by improving the long-term aesthetics of an area. Areas that are not meeting *Standards for Public Land Health* because of OHV use could be closed to motorized recreation use, which would reduce opportunities and could cause impacts on the recreation experience in these areas. Recreationists could experience some minimal impacts from requirements of using noxious weed-free hay for feed on BLM-administered lands or from restrictions on motorized and mechanized use in areas where noxious weeds are known to be spread by these activities.

Impacts on recreation opportunities could occur from temporary displacement and reduction during forest and woodland treatments or fire activities, depending on the extent and locations of the treatments and product sale areas. However, managing for forest and woodland health could improve the recreation setting and opportunities in forested areas and woodland communities in the long term.

Enforcing performance objectives, including requiring a plan of development, using alternative measures, or using mitigation measures for surface disturbing activities within fragile soil areas, would protect the quality of the recreational experience in areas where surface occupancy would be allowed and reduce conflicts between recreationists and development activities.

Impacts on recreation from management of upland and riparian vegetation and management of wildfire would be the same as Alternative B.

Impacts on recreation from cultural resource management actions would be the same as those identified in Alternative A.

4.4.3.4 Alternative D

Designating the Vermillion Basin area as a backcountry SRMA and managing the area as closed to OHV use, closing it to all mineral actions, designating the area as VRM Class II, and managing it as a ROW exclusion area would protect primitive recreation values and the opportunity for solitude and primitive/unconfined recreation and reduce user conflicts. These impacts would be the same in the Dinosaur North and Cold Springs Mountain backcountry SRMAs; however, there would be a loss of motorized recreation opportunities through most of the Vermillion Basin area and all of the Dinosaur North and Cold Springs Mountain areas compared to other alternatives.

Designating areas as open, limited, or closed to OHV use as identified on Map 2-48, would maintain trail-based OHV use while reducing impacts on users. None of the large, open areas

identified in Alternative A or B would remain open to cross-country OHV use. Motorized recreation experiences would be maintained and enhanced by route designation. Natural resources important to recreation would be protected, and the elimination of open OHV use through the majority of the LSFO would reduce resource damage and conflicts with other land uses. Allowing OHV use on existing and designated routes throughout most of the RMPPA would accommodate demand for the trail-based type of motorized recreation most suitable for the terrain of the LSFO. Expanding areas closed to OHV use (289,650 acres) to include portions of additional ACECs, SRMAs and WSAs would cause a limited decrease in trail-based recreation. Conflicts with non-motorized recreation would be reduced, and natural resources would receive enhanced protection. The Maybell uranium pit would remain closed because of public safety concerns under this alternative.

The opportunity for solitude and primitive/unconfined recreation would be protected if Congress were to release the Diamond Breaks WSA from wilderness study by continuing to manage the area as closed to OHV use and to all mineral actions, designating the area as VRM Class II, and managing it as a ROW exclusion area. If Congress were to release the Cross Mountain WSA from wilderness study, the impacts would be the same as identified for Alternative C. Managing the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears as backcountry SRMAs and designating these areas as VRM Class I, limiting OHV use to designated routes, and closing the area to all mineral actions would protect recreation values and the opportunity for solitude and primitive/unconfined recreation if Congress were to release these areas from wilderness study.

River-related recreation opportunities along Beaver Creek, Vermillion Creek, and Yampa River segments 1, 2, and 3 would benefit from protection of outstanding remarkable values, tentative classification, and the free-flowing nature of the rivers that would result from managing them as suitable for wild and scenic designation.

Managing 275,630 acres as closed to oil and gas leasing would preserve the natural character of the landscape while maintaining the opportunity for solitude and primitive/unconfined recreation in these areas, particularly in SRMAs, suitable WSR segments, Vermillion Basin, and the backcountry areas. Managing an additional 459,940 acres as NSO would have similar effects on dispersed recreation activities and locations.

Managing areas with CSU stipulations (94,210 acres) and areas as open to leasing under standard terms and conditions (364,880 acres) would have the potential to affect recreation by reducing the quality of recreational experiences and displacing recreation users to other less developed areas or by eliminating some recreation opportunities from surface disturbance caused by well pads and roads created for mineral exploration and development. Impacts would be much less than those identified in Alternative A or B because a smaller percentage of the RMPPA would be open to leasing, and the majority of high-value recreation areas would be managed as closed to leasing.

Recommending the withdrawal of 587,220 acres (508,030 acres greater than Alternative A, and 433,910 acres greater than Alternative B) from mineral location and closing 540,510 acres (442,720 acres greater than Alternatives A and B) to mineral material sales would preserve the

natural character of the landscape while maintaining existing recreation opportunities and reducing conflicts between recreationists.

Impacts on recreation from new coal and oil shale leasing would be similar to Alternative C. If new coal leases were developed, depending on the extent and location of the development, surface disturbance could reduce the quality of recreational experiences, displace recreation users to other less developed areas, or eliminate some recreation opportunities. In the areas managed as closed or where NSO stipulations would be used for coal leasing, prohibiting surface occupancy would preserve the natural character of the landscape while maintaining existing recreation opportunities.

Management of 184,600 acres of VRM Class II areas would retain the existing character of the landscape and would maintain scenic quality, which could enhance the recreation experience throughout these areas. Because Alternative D provides the largest amount of VRM Class II areas, impacts would be greatest under this alternative as compared to the other alternatives. Management of VRM Class III areas (905,130 acres) would not affect the type or amount of recreation use that would occur. Facilities to support recreation could be accommodated in these areas; however, management of VRM Class IV areas (183,280 acres) would allow major modifications to the landscape, could diminish scenic quality, and could detract from recreation experience and opportunities. These effects would be greatly reduced compared to Alternative A, where there would be 1,089,720 fewer acres, and Alternative B where there would be 1,040,330 fewer acres managed as VRM Class IV.

Impacts on recreation from the development and implementation of a transportation plan would be the same as under Alternative C. Limiting OHV use to designated roads and trails on 1,079,440 acres would maintain opportunities for trail-based OHV recreation while reducing conflicts with users seeking more primitive forms of recreation. Under this alternative, there would be no areas designated open areas, eliminating the opportunities for cross-country OHV travel; however, conflicts among user types would also be reduced, and natural resources important to high-value recreation opportunities and experiences would be further protected throughout of the RMPPA.

Seasonal closures for over-the-snow vehicles (approximately 861,030 acres) and other OHV use would cause impacts on recreation from a seasonal loss of recreation opportunities. These closures would benefit wildlife habitat that could enhance consumptive and non-consumptive wildlife recreation opportunities. These closures would also reduce conflicts among user types.

Expanding the Little Yampa Canyon SRMA by 10,090 acres (See Map 2-37) to provide developed camping opportunities and to protect resources would meet the anticipated increased demand for recreation through the life of the plan and preserve recreation opportunities and experiences in the area. The expanded management would also diversify recreation opportunities in the SRMA. Closing the SRMA to all mineral actions, designating the area as VRM Class II from the river bottom to the ridgeline and VRM Class III elsewhere in the SRMA, closing a portion of the SRMA to OHV use, and limiting the remainder of the area to designated routes would preserve the natural character of the landscape while maintaining existing recreation opportunities.

Monitoring the sites along the Yampa River corridor would reduce conflicts, disturbance, and other impacts and would maintain the recreation experience as the popularity of the area continues to grow. If sites are closed for rehabilitation, short-term localized impacts could occur from displacement of recreation use. Continuing cooperative agreements with Colorado State Parks for the management of the Yampa River and working proactively with local communities and governments to identify additional recreation opportunities along the river to expand heritage tourism, wildlife observation, and cultural recreation opportunities would diversify and expand recreation opportunities in the area.

Impacts on recreation from SRMA management of the Cedar Mountain, south Sand Wash, and Serviceberry areas would be the same as identified in Alternative C. SRMA management of the Fly Creek area (about 12,340 acres) would provide recreation management for non-motorized, hunting, and backcountry recreation. User and resource conflicts would be eliminated, and the area would offer the opportunity for solitude and primitive/unconfined recreation. Impacts on recreation from ERMA management would be the same as identified in Alternative C.

Closing the Cross Mountain, Diamond Breaks, and Pinyon Ridge backcountry areas to OHV use, and all mineral actions and designating the areas as VRM Class II would protect primitive recreation values and the opportunity for solitude and primitive/unconfined recreation.

Impacts on recreation from developed recreation sites would be the same as those identified in Alternative C.

Discouraging commercial outfitter camps on BLM land would reduce impacts on site-specific locations that degrade from heavy use the natural quality of areas during the hunting season. However, this action would eliminate opportunities for guided recreational hunting opportunities.

Prohibiting competitive events in WSAs and consistent with OHV area and route designations and limiting events to 25 participants in backcountry SRMAs would provide the greatest protection necessary to maintain opportunities for primitive recreation and protect natural resources that are important to non-competitive recreation users.

Impacts on recreation from pursuing access through acquisition, exchange, and disposal of lands and actively pursuing easements for access would be the same as those identified under Alternative C. Encouraging new ROWs in existing corridors such as major roads, power transmission lines, and oil and gas pipelines would centralize transmission facilities outside sensitive, high-value recreation areas. Designating 499,700 acres as ROW exclusion areas would provide the greatest amount of protection for solitude and primitive/unconfined recreation opportunities. Designating 15,190 acres as ROW avoidance areas would protect dispersed recreation experiences in the Natural Systems ACEC areas and occupied black-footed ferret habitat (see Map 2-44). Requiring all new communication facilities to use existing sites would centralize and reduce impacts to recreation opportunities and experiences associated with surface disturbance and development throughout the RMPPA.

Development of new recreation sites or facilities could be restricted if surveys found in proposed recreation site developments any Colorado BLM Sensitive Species, rare plant communities, or any additional sensitive plant species found in the Colorado Natural Heritage Database not listed

on the BLM Sensitive Species list. These impacts would likely be short term and temporary and could be mitigated through protective measures and/or site-specific engineering or site relocation. Seasonally prohibiting target shooting, plinking, or any type of sport hunting within a 0.25 mile of black-footed ferret release sites would cause short-term, localized impacts from a loss of these recreation opportunities during the 3 to 4 months of the release period.

Impacts on recreation from bald eagle nesting habitat restrictions would be the same as those identified for Alternative B. Impacts on recreation from Colorado River fishes and Colorado cutthroat trout restrictions and erosion control would be the same as those for Alternative B. Impacts on recreation from Mexican spotted owl and Yellow-billed Cuckoo habitat restrictions would be the same as those for Alternative C. Impacts on recreation from boreal toad restrictions would be the same as those for Alternative B.

NSO stipulations surrounding perennial water sources would be similar to those identified for Alternative A; however, compared to Alternative A maintaining a 0.25-mile buffer would provide additional protection. Developed recreation facilities would not be allowed unless exceptions were granted (Appendix E), potentially altering the recreation experience.

Impacts on recreation would be the same as those identified under Alternative A for protecting big game severe winter habitat and birthing areas from surface disturbing activities and reducing stress to big game species.

Recreationists could be displaced from 8,750 acres per year in vegetation treatment areas to other desirable areas until revegetation occurs; however, the vegetation treatments would benefit recreationists in the long term by improving the aesthetics of an area. Areas that are not meeting *Standards for Public Land Health* because of OHV use could be closed to motorized recreation use, which would reduce opportunities and affect the recreation experience in these areas.

Recreationists could experience some minimal impacts from the requirements of using noxious weed-free hay for feed on BLM-administered lands or restrictions on motorized and mechanized use in areas where noxious weeds are known to be spread by these activities.

Impacts on recreation from forest product management would be the same as under Alternative C.

Enforcing performance objectives, including requiring a plan of development, using alternative measures, or using mitigation measures for surface disturbing activities within fragile soil areas would protect the quality of the recreational experience in areas where surface occupancy would be allowed and would reduce conflicts among recreationists and development activities.

Impacts on recreation from management of upland and riparian vegetation and management of wildfire would be the same as those identified for Alternative B. There would be no impacts on recreation from the management of cultural resources under this alternative.

4.4.4 Impacts on Forestry

This analysis addresses potential impacts on forestry that could result from the alternatives. It focuses on those management alternatives or actions having the potential for physical

disturbance that result in changing the quantity or quality of forest and woodland product available for harvest. Particular focus was placed on potential changes in the quantity or quality of forest and woodland products available for harvest. Section 3.2.4 discussed forestry, which includes forest and woodland species, although areas of vegetation not classified as forests or woodlands could also contain forest products that are suitable for harvest. When possible, mitigation measure(s) were incorporated in the analysis to reduce the adverse effects of impacts on vegetation, rangelands, and riparian/wetland areas.

Impacts on forestry would be considered significant if management actions or activities alter the quality or quantity of forest and woodland products available for harvest compared to existing demand.

The analysis is based on the following assumptions:

- Forest and woodland products could originate from other areas that are not dominated by forest and woodland vegetation.
- Several traditional woodland products (e.g., Christmas trees, pinyon nuts, and posts) could be harvested from tree species growing on sites not classified as forest or woodland.

Under all alternatives, vegetation treatments designed to improve non-forestry objectives such as improving the ecological health of rangelands or eliminating noxious weeds and establishment of invasive species can increase the quantity and quality of products available for harvest. Useable forest by-products often result from treatment and restoration projects designed to improve forest health. Products could include timber, firewood, post and poles, or biomass. Implementing vegetation treatments to improve the ecological health of vegetation could cause a short-term increase in the quantity of forest and woodland products available for harvest. In addition, surface disturbing activities for other resources and resource uses can also cause a short-term increase in the quantity of products available for harvest. In the long term, improving the ecological health of vegetation can increase the quality of forest products (Sonne and Briggs 2001; Prestemon et al. 2005).

The location of cultural and paleontological resources and managing lands as a WSA restrict the areas where harvests could occur. In addition, surface disturbing restrictions for wildlife habitat, ROW exclusion areas, and wildlife habitat managed with seasonal restrictions can also reduce the areas available for forest product harvest, which could reduce the quantity of forest product available for harvest.

Under all alternatives, impacts on forestry would not be anticipated as a result of implementing management actions for air quality, wild horses, energy and minerals leasing management actions, actions in Vermillion Basin, recreation management actions for ERMA, developed recreation sites, actions in the Little Yampa Canyon corridor, SRPs, lands and realty, and social and economic values.

4.4.4.1 Alternative A

The majority of impacts on forestry would occur from surface disturbing restrictions that reduce the area where harvest is feasible. Improvements to the ecological health of vegetation, wildlife

habitat improvements, and some rangeland improvement projects could increase the quality of forest products available for harvest.

Managing 43,930 acres of forests and woodlands on a sustained-yield basis would produce various types and amounts of forest products depending on the forest type. Areas within ponderosa pine forests not previously harvested could yield approximately 2 cords per acre of fire wood. Poles are the primary product in lodgepole pine forests. An average stand will have approximately 700 16-foot poles per acre equating to 21,000 board feet per acre. Aspen stands could be expected to yield 4 cords of fire wood per acre of dead and down material. In pinyon-juniper woodlands, firewood sale areas, or designated firewood gathering areas where live trees are harvested will yield approximately 20 cords per acre.

Restrictions on surface disturbance in the RMPPA could alter the location, extent, or method of forest and woodland harvest. Seasonal restrictions associated with wildlife habitat and springs and 20,910 acres associated with an ACEC can alter the location, extent, or method of forest and woodland product harvest. In addition, 4,110 acres of forest and woodland areas with performance measures for fragile soils, 54,600 acres requiring engineering plans for slopes greater than 40 percent, and 86,170 acres of land with wilderness characteristics could also alter the method of forest product harvest.

Using maximum fire suppression in areas of the RMPPA with high resource values could decrease the quantity and quality of forest and woodland products available for harvest. Fire suppression results in denser stands of forest and woodlands and increases the risk of uncharacteristically larger or intense wildfires and mortality from insect pests and disease.

If released by Congress, managing the West Cold Spring area as part of the Cold Spring and Little Snake management units and managing the Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears areas as multiple use, except for oil and gas leasing, could result in an increase in the area available for forest product harvest.

Not providing predictable and sustainable levels of commodity outputs could decrease the amount of forest product available as a result of a loss of post-harvest processing infrastructure.

4.4.4.2 Alternative B

The majority of impacts on forestry are from surface disturbing restrictions that reduce the area where harvest is feasible. Improvements to the ecological health of vegetation, wildlife habitat improvements, and some rangeland improvement project could increase the quality of forest products available for harvest.

Managing 43,930 acres of forests and woodlands on a sustained-yield basis would produce various types and amounts of forest products depending on the forest type. Areas within ponderosa pine forests not previously harvested could yield approximately 2 cords per acre of fire wood. Poles are the primary product in lodgepole pine forests. An average stand will have approximately 700 16-foot poles per acre equating to 21,000 board feet per acre. Aspen stands could be expected to yield 4 cords of fire wood per acre of dead and down material. In pinyon-juniper woodlands, firewood sale areas, or designated firewood gathering areas where live trees

are harvested will yield approximately 20 cords per acre. These management actions would have the same impact as Alternative A.

Reducing the areas where surface disturbing restrictions apply for wildlife and Special Status Species habitat (89,240 acres), and managing WSAs (78,250 acres) and areas with wilderness characteristics (86,170 acres) for multiple use increases the area where forest and woodland product harvests could occur. In addition, not requiring performance objectives in fragile soils (4,110 acres) and engineering plans for slope greater than 40 degrees (39,460 acres) could also increase the area where forest product harvest occurs compared to Alternative A.

Restrictions on surface disturbance in the RMPPA could alter the location, extent, or method of forest and woodland harvest, decreasing the quantity of forest and woodland product available. Management actions to protect Special Status Species habitat (20,910 acres), WSAs, and Vermillion Bluffs (78,840 acres) to meet VRM Class II objectives can alter the location, extent, or method of forest and woodland product harvests. Managing areas with site-specific relocation (158,950 acres) and seasonal limitations for threatened and endangered species habitat (71,220 acres) can also alter forest and woodland product harvest extent, method, or type. In addition, providing for predictable and sustainable levels of commodity outputs could increase the amount of forest and woodland product available for harvest by retaining the infrastructure necessary for harvest. Compared to Alternative A there would be an increase in the areas available for forest and woodland product harvest. Implementing the standard discovery stipulation for cultural and paleontological resources could alter the location where forest and woodland product harvest occurred compared to Alternative A.

If released by Congress from wilderness consideration, managing the Diamond Breaks, Cross Mountain, West Cold Spring, Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears areas as multiple use could result in an increase in the area available for forest product harvest compared to Alternative A.

4.4.4.3 Alternative C

The majority of impacts on forestry would be from surface disturbing restrictions for wildlife habitat, which could restrict forest products harvest on 273,100 acres associated with NGD restrictions and 137,780 acres associated with SSR restrictions throughout the RMPPA. Improvements to the ecological health of vegetation, wildlife habitat improvements, and some rangeland improvement projects could increase the quality of forest products available for harvest.

Allowing the sale of forest products would yield various types and amounts of products depending on the forest type. Areas within ponderosa pine forests not previously harvested could yield approximately 2 cords per acre of fire wood. Poles are the primary product in lodgepole pine forests. An average stand will have approximately 700 16-foot poles per acre equating to 21,000 board feet per acre. Aspen stands could be expected to yield 4 cords of fire wood per acre of dead and down material. In pinyon-juniper woodlands, firewood sale areas, or designated firewood gathering areas where live trees are harvested will yield approximately 20 cords per acre. Managing forests and woodlands for forest health and limiting some areas to harvest would decrease the acreage available for harvesting compared to Alternatives A and B.

Increasing the areas where surface disturbing restrictions apply for wildlife and Special Status Species habitat and managing WSAs (78,250 acres), ACECs (11,910 acres), and WSR segments (6,260 acres) could decrease the area where forest and woodland product harvests could occur. In addition, 4,110 acres of forest and woodland areas in fragile soils requiring performance objectives and engineering plans for slope greater than 35 degrees (54,660 acres of forest and woodland areas) could decrease the area where forest and woodland harvests could occur compared to Alternative A and B.

Restrictions on surface disturbance in the RMPPA could alter the location, extent, or method of forest and woodland harvest, decreasing the quantity of forest and woodland product available. Management actions to protect Special Status Species habitat, WSAs, ACECs, SRMAs, and Vermillion Basin to meet VRM Class I and II objectives could alter the location, extent, or method of forest and woodland product harvests. Managing areas with site-specific relocation (137,780 acres) and seasonal limitations for wildlife habitat (810,680 acres) could also alter the extent, method, or type of forest and woodland product harvests. In addition providing for predictable and sustainable levels of commodity outputs could increase the amount of forest and woodland product available for harvest by retaining the infrastructure necessary for harvest. Compared to Alternative A and B, there could be a decrease in the areas available for forest and woodland product harvest.

Impacts from implementing the standard discovery stipulation on cultural and paleontological resources would be the same as those identified for Alternative B.

Management of the Dinosaur North and Cold Springs Mountain areas would maintain existing vegetation diversity from surface disturbances through closures to oil and gas leasing and locatable and other minerals, as well as limiting OHV use to designated routes. Impacts would be the same as those identified for Alternative A.

4.4.4.4 Alternative D

The majority of impacts on forestry would be from surface disturbing restrictions for wildlife habitat, which could restrict forest products harvest on 632,940 acres associated with NGD restrictions and 297,000 acres associated with SSR restrictions throughout the RMPPA. Improvements to the ecological health of vegetation, wildlife habitat improvements, and some rangeland improvement projects could increase the quality of forest products available for harvest.

Allowing the sale of forest products would yield various types and amounts of products depending on the forest type. Areas within ponderosa pine forests not previously harvested could yield approximately 2 cords per acre of fire wood. Poles are the primary product in lodgepole pine forests. An average stand will have approximately 700 16-foot poles per acre equating to 21,000 board feet per acre. Aspen stands could be expected to yield 4 cords of fire wood per acre of dead and down material. In pinyon-juniper woodlands, firewood sale areas, or designated firewood gathering areas where live trees are harvested will yield approximately 20 cords per acre. Managing forests and woodlands for forest health and limiting some areas to harvest would decrease the acreage available for harvesting compared to Alternatives A and B.

Increasing the areas where surface disturbing restrictions apply for wildlife, managing WSAs (78,250 acres), ACECs (310,390 acres), and WSR segments (8,480 acres) could decrease the area where forest product harvests could occur. Management actions to protect Special Status Species habitat, WSAs, ACEC, SRMAs, and backcountry acres to meet VRM Class I and II objectives could alter the location, extent, or method of forest and woodland product harvests. Managing areas with site-specific relocation (297,000 acres) and seasonal limitations for wildlife species habitat (825,690 acres) could also alter the extent, method, or type of forest and woodland product harvests compared to Alternatives A and B. In addition, impacts from soils resources would be the same as those identified for Alternative C. Compared to Alternatives A, B, and C, there would be a decrease in the areas available for forest product harvests.

Implementing the standard discovery stipulation for cultural and paleontological resources would be the same as Alternatives B and C.

Management of the Vermillion Basin, Dinosaur North, Cold Springs Mountain, Cross Mountain, Diamond Breaks, and Pinyon Ridge areas would maintain vegetation diversity by reducing surface disturbance through closures to oil and gas leasing, locatable and other minerals, and OHV use. Excluding lands and realty actions would maintain a greater amount of existing vegetation diversity compared to Alternative A.

4.4.5 Impacts on Lands and Realty

Lands and realty is a resource use rather than an environmental component. Consequently, impacts on lands and realty are a direct result of the emphasis of other resource programs. The discussion of the effects on lands in each alternative will be limited to the effects on permitted or authorized uses, including restrictions, costs, and issuance or denial of proposals.

Impacts on lands and realty would be considered significant if the following were to occur:

- ❑ Inability to accommodate the demand for ROW corridors, communication sites, and major roads
- ❑ Inability to accommodate land tenure adjustments necessary to meet RMP objectives and be in the public interest.

The analysis is based on the following assumptions:

- ❑ Existing ROWs and communication sites would be managed to protect valid existing rights.
- ❑ Existing ROWs may be modified upon their renewal if it were shown such action meets the objectives of the RMP.
- ❑ ROW holders may maintain their access at their discretion consistent within the terms of their grant.
- ❑ BLM would continue to process land tenure adjustments.
- ❑ The demand for communication sites and ROW corridors would increase within the life of this plan.
- ❑ BLM will use voluntary approaches to increase access to public lands through acquisition land tenure adjustments and other means at their discretion.

Impacts on lands and realty from management actions associated with required surveys, existing WSAs, fire suppression, and access easements would be the same under all alternatives. Requiring surveys for Special Status Plant Species, cultural resources, or paleontological resources before any ground disturbance occurred could, in some cases, result in the relocation of lands and realty facilities, which would potentially increase project costs and result in project delays. The seven existing WSAs would be managed as VRM Class I areas (78,250 acres), which could prohibit the location of new ROWs and impose greater design and siting requirements, and associated costs on amended or renewed ROWs at existing sites. Using fire suppression in areas with structures and where fire is not desired would protect aboveground facilities from fire-related damage, which would reduce the need for associated repair or replacement costs. Pursuing easements for access to public lands would ensure access as needed for lands and realty projects.

Impacts on lands and realty would not be anticipated as a result of implementing management actions for air quality, vegetation, wild horses, livestock grazing, forestry, transportation and access, and social and economic values.

4.4.5.1 Alternative A

ROWs would not be allowed on 108,470 acres (8 percent of the RMPPA), which would be designated as exclusion areas. Designating 535,390 acres (40 percent of the RMPPA) 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. Such requirements may restrict placement and could possibly limit future access, delay availability of energy supply (by restricting pipelines, transmission lines, and wind and solar projects), and could create dead zones or delay availability of communications service. Such requirements could also require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction. There would also be an increased potential for requests for new or amended and renewed ROWs at existing sites to be denied.

Approximately 705,470 acres (52 percent of the RMPPA) would be available for ROW development (including powerlines, pipelines, wind and solar projects, 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. If any of the seven existing WSAs were released from wilderness study by Congress and subsequently made available to ROWs, applicants could also place facilities in these areas. Encouraging ROWs to be located along preferred routes would allow applicants to understand where such uses are desired. Colocating ROWs could ease the process for construction and maintenance, but existence of ROW corridors could limit options on design or more preferable locations.

Allowing land tenure adjustments in the general retention and disposal areas would enable land tenure adjustments to accommodate resource management. Allowing site-specific approval of communication sites would ensure availability of communications service and minimize dead zones.

4.4.5.2 Alternative B

Exclusion area designations where ROWs would not be allowed would decrease to 6 percent of the RMPPA (78,250 acres), encompassing WSAs areas. Impacts from designating 555,440 acres (41 percent of the RMPPA) as avoidance areas for ROWs would be the same as for Alternative A, except within 1 percent more area.

Increasing areas available for ROW development to 53 percent of the RMPPA (715,710 acres) 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. If any of the seven existing WSAs were released from wilderness study by Congress and subsequently made available to ROWs, applicants could also place facilities in these areas, which would further increase the area available to ROW.

Under Alternative B, stipulations established to protect sensitive resources from oil and gas activity would apply to all ground disturbing activities on 89,240 acres (7 percent of the RMPPA) designated as no ground disturbance. These stipulations would restrict ROW facilities and communication sites from being sited in these areas. In addition, seasonal limitations on 71,220 acres (5 percent of the RMPPA) could limit access and could delay project construction of new ROWs and maintenance activity on existing ROWs. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities might be required; however, allowing case-by-case exceptions could minimize the potential to affect placement and costs for new ROWs or amended or renewed ROWs at existing sites.

Implementing the statewide RMP programmatic conservation measures would impose design and siting requirements and associated costs on new ROWs or amended or renewed ROWs at existing sites, which might restrict placement and could possibly limit future access, delay availability of energy supply (by restricting pipelines, transmission lines, and wind and solar projects), and create dead zones or delay availability of communications service. Such restrictions could require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction. There would also be an increased potential for requests for new or amended and renewed ROWs at existing sites to be denied.

Allowing criteria-based land tenure adjustments would enable land tenure adjustments to accommodate community expansion and development and difficult or hard to access parcels, and to foster contiguous parcels for public land management in addition to resource management. Allowing approval of communication sites on 94 percent of the RMPPA (1,271,150 acres) would ensure availability of communications service and minimize dead zones. Design requirements to reduce migratory bird mortality could increase project costs, restrict placement of facilities, and limit future communication site improvements.

4.4.5.3 Alternative C

Exclusion area designations where ROWs would not be allowed would decrease from that in Alternative A to 7 percent of the RMPPA (91,560 acres). Impacts from designating 141,260 acres (11 percent of the RMPPA) as avoidance areas for ROWs would be the same as for

Alternative A, except with a decrease of 74 percent, allowing more areas where ROWs could be developed. If released from wilderness study by Congress, the Diamond Breaks and Cross Mountain areas would remain exclusion areas; however, the West Cold Springs, Ant Hills, Chew Winter Camp, Peterson Draw, and Vale of Tears areas would become avoidance areas, which potentially allows for placement of some ROWs.

Managing 83 percent of the RMPPA (1,116,580 acres) as available for ROW development would be a slight decrease from Alternatives A and B. This would accommodate the desired placement of facilities, access, and efficient energy supply (by allowing pipelines, transmission lines, and wind and solar projects) and minimize additional costs. Encouraging ROWs to be located in existing corridors such as major roads and existing transmission lines and pipelines would allow applicants to understand where such uses are desired. Colocating ROWs could ease the process for construction and maintenance; however, existence of ROW corridors could limit options on design or more preferable locations.

Under Alternative C, areas designated as no ground disturbance would increase by 206 percent from Alternative B to 273,100 acres (20 percent of the RMPPA) and would restrict ROW facilities and communication sites from being sited in these areas. Areas with seasonal limitations would increase by 1,038 percent from Alternative B to 810,680 acres (60 percent of the RMPPA), which could limit access and could delay project construction of new ROWs and maintenance activity on existing ROWs. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities might be required; however, allowing exceptions in accordance with Appendix E could minimize the potential to affect placement and costs for new ROWs or amended or renewed ROWs at existing sites.

Impacts from implementing the statewide RMP programmatic conservation measures would be the same as those identified for Alternative B. In addition, impacts from implementing the conservation recommendations would require existing water diversion structures to be modified, removed, or relocated, potentially increasing operating costs, adding new construction costs, and possibly disrupting ongoing operations. The conservation measures could also require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction.

Pursuing land tenure adjustments in the three retention and disposal zones would enable land tenure adjustments to foster land management for other agencies, improve public access in desirable areas, and enable better management of areas of interest or special designation. This management action would also accommodate community expansion and development, difficult or hard to access parcels, and foster contiguous parcels for public land management, and resource management. Actively pursuing easements for access to develop identified transportation and utility corridors would ensure access is available to accommodate desired ROW locations. Impacts from allowing approval of communication sites on 93 percent of the RMPPA (1,257,840 acres) would be the same as Alternative B, except within 1 percent less area.

Managing Yampa River segments 1, 2 and 3 (22 miles) as suitable for inclusion in the NWSRS could impose design and siting requirements and associated costs on new ROWs or amended or renewed ROWs at existing sites. This management action could restrict placement and could possibly limit future access, could delay availability of energy supply (by restricting pipelines,

transmission lines, and wind and solar projects), and could create dead zones or delay availability of communications service. Such restrictions could require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction. There would also be an increased potential for requests for new or amended and renewed ROWs at existing sites to be denied.

4.4.5.4 Alternative D

Many of the areas previously designated as avoidance areas would become exclusion areas under Alternative D. Such restrictions could hinder the ability to meet future demand as existing sites reach capacity, which could become significant. Restricting communication site authorizations to existing sites could impose greater standards for development at existing sites, potentially resulting in requests for new or amended ROWs at existing sites to be denied in the long term. As existing sites reach capacity such restrictions could hinder the ability to meet future demand, which could become significant. Design requirements to reduce migratory bird mortality could increase project costs, restrict placement of facilities, and limit future communication improvements.

Exclusion area designations where ROWs would not be allowed would increase to 499,700 acres or 37 percent of the RMPPA (a 361 percent increase compared to Alternative A). Impacts from designating 15,190 acres (1 percent of the RMPPA) as avoidance areas for ROWs would be the same as for Alternative A, except within 97 percent less area. If released by Congress from wilderness study, the seven existing WSAs would become exclusion areas, which would continue to restrict placements of ROWs and communication sites.

Decreasing areas available for ROW development to 63 percent of the RMPPA (849,700 acres) would accommodate desired placement of facilities, access, and efficient energy supply (by allowing pipelines, transmission lines, and wind and solar projects) and minimize additional costs, but in 32 percent less area than Alternative A. Impacts from encouraging ROWs along existing corridors would be the same as those identified for Alternative C.

Under Alternative D, many of the areas previously designated as seasonal stipulations would become no ground disturbance areas. Areas designated as no ground disturbance would increase to 632,940 acres (47 percent of the RMPPA), restricting placement of ROW facilities and communication sites in these areas. Areas with seasonal limitations would decrease 2 percent from Alternative C to 825,690 acres (61 percent of the RMPPA), which could limit access and could delay project construction of new ROWs and maintenance activity on existing ROWs. Where seasonal restrictions severely limit the time available to complete activities, relocation of surface facilities might be required; however, allowing exceptions in accordance with Appendix E could minimize the potential to affect placement and costs for new ROWs or amended or renewed ROWs at existing sites.

Impacts from implementing the statewide RMP programmatic conservation measures and conservation recommendations would be the same as those identified for Alternative C.

Impacts from pursuing land tenure adjustments in the three retention and disposal zones would be the same as those identified for Alternative C. Actively pursuing easements for access to

develop identified transportation and utility corridors would ensure access is available to accommodate desired ROW locations.

Managing segments of Vermillion Creek, Beaver Creek, and the Yampa River (31 miles) as suitable for inclusion in the NWSRS could impose design and siting requirements and associated costs on new ROWs or amended or renewed ROWs at existing sites, which could restrict placement and possibly limit future access, delay availability of energy supply (by restricting pipelines, transmission lines, and wind and solar projects), and create dead zones or delay availability of communications service. Such restrictions could require utility corridors and communication sites to be installed in less desirable locations or areas with more restrictions on accessibility or construction. There would also be an increased potential for requests for new or amended and renewed ROWs at existing sites to be denied.

4.4.6 Impacts on Transportation and Access Including OHV

This section describes potential impacts on transportation and access from management actions discussed in Chapter 2. The majority of impacts on transportation and access would occur on OHV use. Impacts on OHV use would be caused primarily by the closure of roads or a limitation on the type, amount, or timing of motorized travel (travel management designations of open, closed, and limited). Additionally, impacts on OHV use could also occur if the quality of the OHV experience were diminished, which is discussed in impacts on recreation (Section 4.4.3). Impacts on transportation associated with moving people and goods and access to and through public lands would be caused primarily by travel planning and route construction and limitation management actions. Because travel management designations would be mapped after completion of the RMP, the following analysis is limited to a general, areawide discussion, except where specific areas are mentioned in the alternatives.

The following criteria were used to determine significance of impacts on transportation and access:

- ❑ Substantial limitation to non-motorized or motorized (including OHV) public access to and travel within public lands
- ❑ Substantial reduction in opportunity for access easement acquisition and major road developments
- ❑ Inability to accommodate access to existing utility corridors and communication sites
- ❑ Inability of private and State landowners to reasonably access their lands.

The analysis was based on the following assumptions:

- ❑ BLM would increase the managed transportation system.
- ❑ BLM has the authority to designate and enforce decisions to close BLM-administered roads on public lands as necessary to meet the goals and objectives of all resource programs.
- ❑ RS 2477 ROWs may exist across the RMPPA, although adjudication is beyond the scope of this RMP.
- ❑ BLM would coordinate with local counties and the State of Colorado in development, maintenance, and management of BLM system, State, and county roads on public lands in the RMPPA.

- The demand for OHV opportunities in the RMPPA would grow at a rate equal to or greater than rates for the State of Colorado.

Under all alternatives, travel management designations do not affect BLM ROWs, permitted uses, county or State roads, or other valid existing rights. Restrictions apply only to motorized public access and recreational OHV use.

Under all alternatives, impacts on OHV use would occur from closures or limitations on motorized access, which would typically be associated with special area management. Management actions associated with ACECs, WSAs, lands with wilderness characteristics, and SRMAs often have specific recommendations for OHV use or other forms of motorized travel. Limiting motorized access to existing routes eliminates the potential for cross-country OHV travel, which would diminish the extent of OHV opportunities. In addition to this impact, limiting motorized access to designated routes also eliminates travel on some existing routes. Closed designations eliminate OHV use entirely. Such management would vary by alternative, and comparisons are made in the following sections.

Impacts on transportation and access would not be anticipated as a result of implementing management actions for air quality, soil resources, water resources, fish and wildlife habitat, cultural and heritage resources, paleontological resources, livestock grazing, forestry, and social and economic values.

4.4.6.1 Alternative A

Continued OHV closures (72,480 acres) in the Diamond Breaks WSA, Limestone Ridge ACEC, Cross Mountain WSA, Serviceberry area, and Fly Creek area, as well as closures near black-footed ferret release sites would eliminate any opportunity for public motorized travel on 5 percent of the RMPPA. If the temporary closures currently in place in the Serviceberry and Fly Creek areas (24,720 acres) were removed, impacts in those areas would be eliminated. The Limestone Ridge ACEC (1,400 acres) and 46,080 acres of WSAs do not have many existing routes in those primitive areas, therefore impacts would be minimal. If Congress released WSAs from further wilderness consideration, the Diamond Breaks WSA (31,810 acres) would remain closed, but the remaining WSA areas previously closed could be opened to some OHV travel. Continuing to limit OHV use to existing or designated routes on 286,855 acres (21 percent of the RMPPA) would limit opportunities for cross-country OHV travel. Of that area, 56,930 acres would be limited to designated routes, which would eliminate some routes of travel. Combined closed and limited areas equal 27 percent of the RMPPA. The remaining 74 percent of the RMPPA (991,920 acres) would be open to cross-country OHV travel with no restrictions, creating extensive opportunities for OHV users. Continuing to restrict over-the-snow opportunities in Diamond Breaks and Cross Mountain WSAs would eliminate winter motorized opportunities on 3 percent of the RMPPA; however, winter travel would be allowed on the remaining 97 percent of the RMPPA.

SRMAs are often created to enhance motorized and non-motorized recreation opportunities. The Little Yampa/Juniper Canyon area would enhance river access opportunities by providing access control, development, and management of river access areas. Implementation of a transportation plan would provide better management of transportation systems, which would contribute to

better road maintenance and access and could alleviate access issues and user conflicts. Pursuing acquisitions to consolidate public lands and pursuing easements for access to public lands would ensure access as needed and improve motorized OHV opportunities.

Map 4-5 shows RS 2477 asserted routes that would not be available for vehicle use under this alternative, unless they are found to be valid existing ROWs.

4.4.6.2 Alternative B

Under Alternative B, OHV closures that eliminate motorized travel would decrease to 3 percent of the RMPPA (46,370 acres in the Diamond Breaks and Cross Mountain WSAs), which is 36 percent fewer closed acres than Alternative A. Areas designated as limited would decrease to 10 percent of the RMPPA (131,930 acres), increasing opportunities for cross-country OHV travel. Although the total acreage of limited areas would be reduced, most of the change is a result of a 76 percent decrease in areas limited to existing routes. The acreage of areas limited to designated routes would increase by more than a third that of Alternative A with 77,080 acres, all of which are in the Vermillion Basin where there are many existing routes that could be closed to OHV users. If Congress released WSAs from further wilderness consideration, the Diamond Breaks WSA (31,810 acres) would remain closed, but the remaining WSAs would be managed for multiple use, including motorized travel, which could potentially eliminate previous closures. Increasing area available to cross-county OHV use to 87 percent of the RMPPA (1,172,950 acres) would open areas previously closed or limited to OHV use, creating extensive opportunities for OHV users. Over-the-snow opportunities would be limited to the same areas as Alternative A, and open to winter motorized recreation on 97 percent of the RMPPA. There would be no seasonal closures to OHV use such as those mentioned under Alternative A.

Implementation of transportation planning would only occur on a case-by-case basis, which might not accommodate some long-term transportation and access needs. Transportation planning would address road maintenance, access issues, and user conflicts as needs arise, which might not meet the diverse needs of the transportation and access system in the RMPPA. The removal of the Little Yampa/Juniper Canyon SRMA could decrease opportunities and overall experience by failing to provide the management and access control needed for such a popular river area.

Map 4-6 shows RS 2477 asserted routes that would not be available for vehicle use under this alternative, unless they are found to be valid existing ROWs.

4.4.6.3 Alternative C

OHV closures on 86,710 acres (20 percent more than Alternative A) in the Diamond Breaks and Cross Mountain WSAs, Limestone Ridge area, Serviceberry SRMA Zone 2, Fly Creek area, and a portion of Vermillion Basin would eliminate motorized access and OHV use on 6 percent of the RMPPA. If Congress releases these areas from WSA status, the Diamond Breaks WSA (31,810 acres) and the Cross Mountain WSA (14,270 acres) would continue to be closed, but the approximately 32,170 acres of the remaining WSAs would be limited to designated routes with adaptive criteria applied for route planning, which could allow for some OHV use. Limiting 92 percent of the RMPPA to existing or designated routes would eliminate cross-country OHV

travel on 1,242,600 acres (333 percent increase from Alternative A). Although greater than Alternatives A and B, most of the existing routes in the RMPPA would still be accessible and the popular cross-country areas would still be designated as open. Areas open to OHV use would decrease to 2 percent of the RMPPA (21,940 acres), which would leave these areas open to cross-country opportunities for OHV users. Closing 62 percent of the area to over-the-snow vehicles could limit motorized winter access. Transportation Plan implementation would help solve access issues year-round, which could result in further decreased restrictions to motorized travel and OHV opportunities. Other seasonal closures (such as within a 0.25 mile of black-footed ferret release cages and restrictions on new roads and bridges if they pass within a 0.50 mile of bald eagle critical night roosts) also would temporarily prevent motorized access.

The Little Yampa and Juniper Mountain areas would be managed to enhance river access opportunities. The Cedar Mountain SRMA would enhance access to hiking opportunities near the city of Craig. Improvement of county road access in the south Sand Wash Zone 1 and signing and access improvements in Zones 2 and 3 could improve transportation and access in this area as well. Implementation of a transportation plan that restricts access to meet resource objectives, reduces habitat fragmentation, and limits access points and stream crossings would provide better management of transportation systems, which would contribute to better road maintenance and alleviate access issues and user conflicts; however, some access points and redundant routes could be eliminated, thereby reducing routes available for OHV use. Pursuing acquisitions to consolidate public lands and pursuing easements for access to public lands would ensure access as needed and improve motorized OHV opportunities on the eastern side of the RMPPA.

Map 4-7 shows RS 2477 asserted routes that would not be available for vehicle use under this alternative, unless they are found to be valid existing ROWs.

4.4.6.4 Alternative D

OHV closures (289,650 acres) would eliminate OHV use on 22 percent of the RMPPA, which is three times the amount of closed area under Alternative A. These areas include the seven existing WSAs; Limestone Ridge ACEC; the Dinosaur North, Fly Creek, and Cold Springs Mountain SRMAs; Serviceberry SRMA Zone 2; a portion of Little Yampa Canyon SRMA Zone 1; suitable WSR corridors; the Cross Mountain, Diamond Breaks, and Pinyon Ridge backcountry areas; and Vermillion Basin. Most of the remainder of the RMPPA under Alternative D (80 percent of the RMPPA or 1,079,440 acres) would be limited to designated routes and many routes found to be redundant or serving no purpose could be closed. If Congress releases WSAs from wilderness consideration, the Cross Mountain WSA (14,270 acres) and the Diamond Breaks WSA (31,810 acres) would continue to be closed. If released, the remaining WSAs (32,170 acres) would have adaptive criteria applied, which could allow for some OHV use. No areas would be available to cross-country OHV use, which would eliminate cross-country travel throughout the RMPPA, including the popular south Sand Wash OHV area. Seasonal closures in the Sand Wash HMA would be similar to Alternative A, which would eliminate all motorized access from March 1 to June 30 well into the summer riding season for OHV use. This would be a significant impact during that time. Areas open to over-the-snow vehicles would decrease to 36 percent of the RMPPA, which would eliminate winter motorized opportunities in most of the RMPPA. Other seasonal closures (such as within a 0.25 mile of

black-footed ferret release cages and restrictions on new roads and bridges if they pass within a 0.50 mile of bald eagle critical night roosts) would have the same impact as those identified for Alternative C.

Impacts on river transportation on the Little Yampa and hiking opportunities in the Cedar Mountain SRMAs would be the same as under Alternative C. Implementation of a transportation plan that restricts access to meet resource objectives, reduces habitat fragmentation, and limits access points and stream crossings would be the same as under Alternative C. Pursuing acquisitions to consolidate public lands and pursuing easements for access to public lands would have the same impact as those identified for Alternative C.

Map 4-8 portrays RS 2477 asserted routes that would not be available for vehicle use under this alternative, unless they are found to be valid existing ROWs.

4.5 IMPACTS ON SOCIAL AND ECONOMIC CONDITIONS

This section presents an analysis of socioeconomic impacts for the four management alternatives proposed in the Little Snake Draft RMP/EIS. Section 4.5.1 presents forecasts for the plan period from 2002 to 2025 and a comparison of results for the four alternatives predicted for 2025. Section 4.5.2 reviews the effects on the main affected sectors: agriculture, oil and gas, and recreation. The outcomes include numerous socioeconomic costs related to the management alternatives, as outlined in Section 4.5.3. Finally, Sections 4.5.4 and 4.5.5 review impacts of the management alternatives on environmental justice and tax revenues. (Appendix P lists websites that provide details of the methods and extended results.)

This analysis focuses on changes in industry income, employment, and employment compensation. These are viewed as *benefits* of choices made by BLM. Higher employment, subject to several qualifications, can be seen as a benefit to the local community. Other benefits are also present, although some are not easily quantifiable, and others may not be tied closely to economic changes. Nonetheless, these benefits warrant discussion so that decisionmakers can decide how much weight to give them, despite the lack of quantification. An example of where effects are difficult to quantify would be how the various alternatives affect equity in the economy. Another benefit consists of contributions that the oil and gas industry has made to the county governments. Although generally tied only to the production level in the region, these contributions are significant and clearly a benefit. Costs are treated similarly in that some are not easily quantifiable, but they are still reviewed.

4.5.1 Economic Forecasts

This section presents three separate forecasts for the plan period from 2002 to 2025. The first forecast includes estimates of population, employment, and per capita income taken from the Colorado Department of Local Affairs (DOLA) (see <http://dola.colorado.gov>). The second forecast estimates the likely increases in key sectors based on assumptions from numerous sources at 10 and 20 years into the future. Because any direct increase in economic activity creates *indirect* impacts, the forecast shows the *total* effects of all increases under Alternative A, the No Action alternative. Finally, a comparative analysis of the forecasts for 2025 for the four alternatives is shown in Table 4-49.

Table 4-49. Population, Employment, and Income Forecasts for Moffat County, Colorado, 2005–2025 (Persons)

	2005	2015	2025
Population, total	13,501	15,851	19,697
Population 60 to 90 years old	1,843	2,831	3,828
Population 0 to 59 years old	11,658	13,020	15,869
Per capita personal income (2002 \$)	25,176	38,345	69,037
Total full-time and part-time employment	6,863	8,017	8,578

Source: Center for Business and Economic Forecasting (found at <http://dola.colorado.gov/demog/widepro3.cfm>)

Forecasts of Population, Total Employment and Per Capita Income

According to DOLA, Routt County’s population will grow 2.4 percent annually, or 61 percent during the next 20 years, reaching 35,734 persons in 2025. In Moffat County, population is expected to grow 1.9 percent per year, or a total of 46 percent, to reach 19,697 in 2025. These results are shown in Table 4-49 and Table 4-50. In both counties, the retired population is expected to grow faster than for the State as a whole. In Routt, the retired population will grow five times faster than the average growth rate for Colorado and will triple in number by 2025. In the same time period, the number of retirees in Moffat will more than double. In Routt, retirees will increase from 9 percent of the total population to 17 percent; in Moffat County, retirees will rise to 19.4 percent from 13.7 percent.

During the same 20 years, in Moffat County, per capita personal income is expected to increase more than two and half times at a rate comparable to the State as a whole, whereas total employment will increase by 25 percent. However, the percentage employed, as a proportion of total population, is expected to decrease by 7 percent. Per capita personal income in Routt County is expected to triple, far exceeding the average increase for Colorado. Total employment in Routt will increase by 68 percent, leading to an increase in the employment-to-population ratio of 3 percent in 20 years. (These figures for per capita income growth are far greater than historical experience, and seem quite high. However, the employment figures appear reasonable, so these latter figures are used to calibrate the sector forecasts below.) Positive effects of this rapid development will spread throughout the economy from the increased expenditures, clearly providing economic benefits to many residents of these counties.

Table 4-50. Population, Employment and Income Forecasts for Routt County, Colorado, 2005–2025 (Persons)

	2005	2015	2025
Population, total	22,140	28,400	35,734
Population 60 to 90 years old	2,041	4,347	6,079
Population 0 to 59 years old	20,099	24,053	29,655
Per capita personal income (2002 \$)	39,211	66,277	118,720
Total full-time and part-time employment	18,367	25,342	30,833

	2005	2015	2025
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Source: Center for Business and Economic Forecasting (Found at <http://dola.colorado.gov/demog/widepro3.cfm>)

Forecasted Economic Activity by Sector for Alternative A

Table 4-51 and Table 4-52 show forecasts for industrial and commercial activity to 2015 and 2025 for seven aggregated sectors. BLM sources and documents were used to estimate growth in oil and gas, coal, government expenditures, and recreation (except for hunting and fishing). DOLA provided estimates of agricultural income growth and population increases. Direct increases in economic activity by businesses create indirect effects on related industries and household expenditures, so the forecasts show total direct *and* indirect economic value of increases under Alternative A, the No Action Alternative. Actual data for 2002 also are presented for comparison.

In the following analyses, the relatively high dependence of Moffat County relative to Routt County on decisions made by BLM should be kept in mind. As mentioned in Chapter 3, Moffat County contains more than 3 million acres of land, with more than half owned by the Federal Government. BLM manages 88 percent of federal land, totaling 50 percent of Moffat's land. Routt County has 670,000 acres of federally owned land. However, BLM manages only about 85,000 acres of that land, totaling about 4.5 percent of Routt's total land. The dependence of Moffat County on BLM decisions is apparent in oil and gas output. Chapter 3 explains that 99 percent of the two counties' 2005 natural gas production came from Moffat County and nearly 95 percent from federal mineral estate. For oil production, 60 percent was on federal mineral estate in 2005 and slightly more than 70 percent was in Moffat County. Thus, BLM decisions on land use, including oil and gas drilling, would affect Moffat County to a much greater degree than Routt County.

In Moffat County, total industry income is expected to grow at 1.71 percent annually over the forecasted period, from \$419 million to \$621 million. In Routt County, the expected expansion is 1.43 percent annually. The Routt County economy is 2.7 times as large as Moffat County's, but it would grow slightly slower. However, the rate of employment growth in Routt County is almost double that of Moffat County. Employment is expected to rise 1.89 percent in Routt, and by 1.45 percent per year in Moffat. Employment opportunities would thus rise more quickly in Routt; in the past, these opportunities have often gone to Moffat County residents who commute to Routt County. Employment compensation, or the total wage bill, would grow more in Moffat than in Routt, at 2.22 percent versus 1.44 percent per year.

The explanation for these varying growth rates lies in the types of industries involved. In Moffat County, one industry that grows extensively is the *energy, utilities, and minerals* sector. Oil and gas drilling income increases by more than six times in the 23 years of the plan, from \$6.9 million to \$40.4 million, resulting from the forecasted large number of wells drilled. Total employee compensation increases 16 times in the same period, from about \$2 million to \$30 million. Because the drilling rate is assumed to be at a fixed yearly level of 132 wells in Alternative A, growth stabilizes and predicted income in the oil and gas *drilling* subsector is the same in 2025 as in 2015. In contrast, both industry income and employment for oil and gas

production, or extraction, increase consistently over the two decades because of the accumulation of producing wells. The portion of industry income generated by oil and gas production and drilling almost doubles, growing from 8 percent to 15 percent, which nearly offsets the expected low growth in the coal industry. Income from the energy and utilities sector, as a whole, declines from 47 percent to 42 percent of total county income, and the sector's role in employment drops from employing 18 percent to 15 percent of the labor force. Oil and gas production firms are estimated to employ directly only an additional 36 persons by 2025, so direct employment would not increase substantially in this industry. However, a very significant 16 percent of total employment is predicted to be dependent on the industry.

By contrast, in Routt County, *energy, utilities, and minerals*, at \$156 million, account for 13.8 percent of total income in 2002, but is forecasted to decline to 11.9 percent by 2025. Because only a small part of the increase of oil and gas drilling and production is likely to be in Routt County, that subsector accounts for less than 0.8 percent of total income, with \$12.2 million earned in the year 2025. Thus, the decline in this sector is related to the small share of the growing oil and gas sector found in Routt County and the flat expected growth in coal production.

The three industries related to population growth and increased tourism that would grow considerably are *Food Services/Retailing and Hotels, Services, and Construction*. In Moffat County, these industries would see income nearly double from \$154 million in 2002 to \$275 million in 2025, and go from providing 37 percent of total income in 2002 to 44 percent in 2025. The industries' share of employment would increase as well, accounting for 65 percent of all workers in 2025 versus 55 percent in 2002. *Agriculture* and *recreation* remain small and steady proportions of the economy. Income of the recreation sector would increase by 2.9 times over the period. *Government* employment, which is 17 percent of the county total in 2002, would drop to 13 percent by 2025.

Table 4-51. Forecasted Industry Income, Employment Numbers, and Compensation for Moffat County, 2015 and 2025

Industry	Actual data 2002			Forecasted data for 2015			Forecasted data for 2025		
	Industry Income	Employ. No.	Employee Comp.	Industry Income	Employ. No.	Employee Comp.	Industry Income	Employ. No.	Employee Comp.
Agriculture	9,746	583	1,697	9,855	602	1,757	9,911	548	1,788
Construction and manufacturing	15,423	324	8,562	22,443	480	14,489	24,090	468	15,545
Food services/retailing, hotels	41,980	1,358	24,008	60,565	1,946	35,654	81,778	2,335	48,906
Energy utilities and minerals	195,271	1,087	72,422	248,113	1,318	112,386	261,916	1,254	121,022
Oil gas production	25,021	61	8,685	34,316	85	14,830	42,668	95	20,353
Oil gas drilling	6,905	20	1,980	40,226	118	30,171	40,422	107	30,337
Other	163,345	1,006	61,757	173,571	1,115	67,384	178,826	1,051	70,333
Recreation	118	25	195	329	55	216	453	74	308
Services	96,166	1,714	45,001	133,954	2,418	66,142	168,689	2,753	85,448
Government	60,261	1,052	49,316	69,349	1,195	56,239	74,056	1,144	59,871
Total	418,965	6,144	201,200	544,608	8,017	286,884	620,815	8,578	332,966

*Industry income and employee compensation are in thousands of dollars, and employment is in numbers of workers

1 **Table 4-52. Forecasted Industry Income, Employment Numbers and Compensation for Routt County, 2015 and 2025**

Industry	Actual data 2002*			Forecasted data in 2015*			Forecasted data in 2025*		
	Industry Income	Employ. No.	Employee Comp.	Industry Income	Employ. No.	Employee Comp.	Industry Income	Employ. No.	Employee Comp.
Agriculture	11,097	585	1,704	11,210	571	1,719*	11,241*	651	1,723
Construction and manufacturing	173,675	3,750	139,530	208,889	4,384	168,850	219,998	5,259	177,958
Food services/retailing, hotels	162,414	4,539	63,698	257,951	6,680	106,909	285,309	8,350	119,375
Energy utilities and minerals	155,759	1,224	69,944	179,291	1,446	82,632	185,990	1,729	85,943
Oil gas production	2,438	12	813	6,640	30	2,434	8,550	43	3,262
Oil gas drilling	929	5	310	3,647	12	2,510	3,706	14	2,536
Others	152,391	1,208	68,820	169,004	1,404	77,689	173,734	1,672	80,144
Recreation	2,210	174	1,521	3,908	298	2,691	4,425	383	3,046
Services	541,188	8,228	198,313	711,150	10,276	263,828	758,862	12,445	282,383
Government	81,771	1,478	65,468	97,672	1,687	77,773	102,897	2,015	81,788
Total	1,128,114	19,978	540,178	1,470,072	25,342	704,401	1,568,722	30,833	752,217

*Industry income and employee compensation are in thousands of dollars, and employment is in numbers of workers

2

The three service-oriented industries would also grow in Routt County, with income rising from \$877 million, or 78 percent of total income, in 2002 to \$1.26 billion, which is 81 percent of total income in 2025. These firms would grow from employing 82 percent of the local workers in 2002 to 85 percent in 2025. The relatively slower growth occurs because service businesses are labor intensive, already employ a large proportion of the total labor force in Routt County, and attract even more employees from nearby counties. Again, agriculture and recreation remain small proportions of the economy, but recreation income doubles in size during this period. As a result of the skiing industry, it is already a much larger industry in Routt than in Moffat County in 2002. Government employment, which is 7.4 percent of county totals in 2002, would drop to 6.5 percent by 2025.

Thus, the forecasts show a shift in the relative importance of extractive industries versus those that prosper with new migrants or the local population's increased income (food sectors in Moffat and construction in Routt). The forecasts also show that growth in the oil and gas industry, along with the increases in the recreation sector, would further expand the services and retail sectors. The forecast also suggests numerous conflicts for which conclusive evidence cannot be provided but insights can be offered. For example, a rise in services means that more jobs would have lower average salaries. The average compensation in 2025 is expected to be \$26,259 in the services industries but \$66,635 in the energy and minerals sectors. As a proportion, high-paying jobs would appear to become somewhat scarcer.

Forecasted Industry Income and Employment by Alternative

Industry income and employment for Alternatives B, C, and D are compared with Alternative A in Table 4-53 and Table 4-54. Forecasts for 20 years into the future, reflecting the life of the plan, are presented for the seven industry clusters for each alternative. Total income in Moffat County in 2025, under Alternative A, would be \$621 million, which exceeds that for Alternative C by about \$12 million per year. Alternative B, which is the least environmentally restrictive alternative, would lead to the highest total income relative to all alternatives, higher than Alternative A by about \$5 million per year. Alternative D, which is the most environmentally oriented and therefore most limiting for oil and gas development, shows overall income decreasing by about \$23 million per year in 2025 relative to Alternative A.

From this perspective, in which industry income is seen as a benefit to the local economy, Alternative B would achieve the highest level of benefits. Costs are associated with these benefits, which are considered in Section 4.5.3. For many of these costs, precise quantification is not possible.

Total income in Routt County is nearly three times that of Moffat County under all alternatives. However, variation in Routt County is very small because that jurisdiction is not affected very much by BLM management decisions, especially those regarding the energy sector. The difference in income between the highest alternative (B) and the lowest (D) is only \$2 million per year.

Most of the variation in Moffat County is attributed to differential effects of *oil and gas production* and *drilling*, which create the largest economic variation across BLM management alternatives. For example, of the \$23.0 million difference in income between Alternatives A and D, \$15 million is attributed to the cumulative effect of fewer wells in production in Alternative

D. A remarkable \$8.0 million is attributed to the reduced indirect effects from less spending by employees and companies in the oil and gas industries. For example, industry income in *Services* declines by \$4.3 million under Alternative D relative to A, even though it is an industry not directly affected by changes in management alternatives.

The smaller sectors affected by BLM management alternatives are agriculture and recreation. These show *relatively* little variation across alternatives, but the changes are related to BLM decisions and occasionally are large compared with the size of the industries. In agriculture, varying forage availability would lead to greater industry income in all alternatives relative to A. Industry income for Alternative B is greater by about \$500,000 per year than for Alternative A, which is the largest change. In recreation, the difference between Alternatives A and B is slightly less than \$30,000 per year. Moreover, in that sector, the shift from motorized to non-motorized recreation in Alternative D would lead to a loss of about \$11,000 per year relative to Alternative A. These two sectors are discussed in detail in the next section, as is the key sector of oil and gas.

4.5.2 Impacts on Affected Sectors

Throughout the analysis and discussions with stakeholders, three sectors stood out as having differing direct, material impacts based on variations in the alternatives: agriculture, oil and gas development, and recreation. The forecasts shown above demonstrate that other sectors were materially affected, but generally attributed to actions originating in one of these three industries. Other sectors are affected by the alternatives, but inadequate data exist to assess impacts across alternatives, including hunting and fishing, and the decisions by retirees and others to migrate into the region because of differing amenities of the alternatives. Hunting and fishing is examined briefly in Chapter 3, and hypothesized behavior of retirees and other amenity-driven migrants will be evaluated in the cumulative impacts discussion below. (Appendix P lists websites that provide details of the industry-specific results.)

Impacts on Agriculture Sector

Cattle and sheep ranching are among the most traditional economic activities in the Little Snake region; 172 ranches sold about 25,000 cattle and calves (146 per operation), and 47 ranches sold roughly 72,000 sheep (1,524 per operation) in Moffat County during 2002 (National Agriculture Statistical Service, 2002). The Census figures also show that the number of farms selling cattle declined by 20 percent from 1997 to 2002, whereas the sales per ranch increased by about 50 percent. In Routt County, 201 ranches sold 37,000 cattle and calves (184 per operation), but 40 ranches sold only 3,000 sheep (68 per operation) during 2002. The number of farms selling cattle declined by 24 percent in that county from 1997 to 2002, whereas the sales per ranch increased by about 84 percent. Sheep and lambs saw the same consolidation of farming operations because the number of ranches selling sheep declined by 31 percent in Moffat County and 23 percent in Routt County. However, the sales per farm doubled from 1997 to 2002 in Moffat County, whereas it fell by more than half in Routt County.

In this region, ranching and public land management are strongly linked through grazing permits on public lands. The current total permitted use on BLM land is 149,503 AUM,¹ where approximately 78,963 AUMs constitute “billed use.” A difference of about 44,100 AUMs between the “best” scenario (Alternative B) and the “worst” scenario (Alternative A) is forecasted, which is more than a 50-percent variation. In 2005, about 70 percent of the AUMs were used for cattle and 30 percent for sheep. Based on these proportions, reduced AUMs related to oil and gas drilling in Alternative A would result in a decrease of 244 cattle and 49 sheep. However, because of vegetation conversions, Alternative B would result in an increase of 2,334 cattle and 469 sheep on BLM land. Alternative C would yield a gain of 192 cattle and 39 sheep, whereas Alternative D would provide an increase of 1,093 cattle and 219 sheep. In other words, all management alternatives, except Alternative A, would lead to increased availability of forage and more opportunities for livestock grazing.

¹ According to the *Natural Resources Conservation Service (NRCS) Range and Pasture Handbook*, 1 AUM is equivalent to 790 pounds of dried forage per month, 1 cow-calf pair, or 5 sheep. One dry cow is equivalent to 727 pounds of dried forage, or 0.92 AUM. The total permitted and actual AUMs are derived from the mean of “Billed AUMs” from 1994 to 2003.

Table 4-53. Moffat County Forecasted Industry Income and Employment by Alternative, 2025

Industry	Alternative A		Alternative B		Alternative C		Alternative D	
	Industry Income*	Employment	Industry Income*	Employment	Industry Income*	Employment	Industry Income*	Employment
Agriculture	9,911	548	10,400	580	9,991	553	10,142	563
Construction and manufacturing	24,090	468	21,972	423	22,333	429	21,023	404
Food services/retailing, hotels	81,778	2,335	82,195	2,347	81,265	2,320	80,257	2,293
Energy utilities and minerals	261,916	1,254	266,222	1,265	254,360	1,235	248,352	1,210
Oil gas production	42,668	95	44,834	100	35,184	79	38,356	86
Oil gas drilling	40,422	107	42,503	113	40,800	108	32,909	87
Others	178,826	1,051	178,884	1,052	178,376	1,048	177,085	1,037
Recreation	453	74	485	80	455	74	444	72
Services	168,689	2,753	169,212	2,765	166,690	2,720	164,226	2,680
Government	74,056	1,144	75,154	1,185	74,188	1,150	73,310	1,148
Total	620,815	8,578	625,640	8,648	609,283	8,488	597,754	8,381

*Thousands of dollars

Table 4-54. Routt County Forecasted Industry Income and Employment by Alternative, 2025

Industry	Alternative A		Alternative B		Alternative C		Alternative D	
	Industry Income*	Employment	Industry Income*	Employment	Industry Income*	Employment	Industry Income*	Employment
Agriculture	11,241	651	11,268	653	11,245	651	11,253	652
Construction and manufacturing	219,998	5,259	219,973	5,258	220,000	5,259	219,901	5,256
Food services/retailing, hotels	285,309	8,350	285,340	8,351	285,271	8,349	285,199	8,346
Energy utilities and minerals	185,990	1,729	186,315	1,730	185,418	1,728	184,965	1,725
Oil gas production	8,550	43	8,714	43	7,984	41	8,226	42
Oil gas drilling	3,706	14	3,864	15	3,735	15	3,137	13
Others	173,734	1,672	173,737	1,672	173,699	1,672	173,602	1,671
Recreation	4,425	383	4,427	384	4,425	383	4,424	383
Services	758,862	12,445	758,899	12,446	758,710	12,442	758,524	12,439
Government	102,897	2,015	102,965	2,018	102,903	2,016	102,831	2,015
Total	1,568,722	30,833	1,569,187	30,841	1,567,973	30,828	1,567,097	30,818

* Thousands of Dollars

In terms of an average-size farm, Alternative B, with the largest gain to agriculture, would permit an increase of nearly 13 cattle ranches, but less than one new sheep ranch. Thus, the BLM management alternative chosen could create opportunities for up to 7 percent more cattle ranching operations.

The estimated direct and indirect impacts of Alternatives A–D on employment and industry income show the same moderate but not insignificant effects. (These impacts cannot be seen easily in the earlier tables presenting the forecasts because direct and indirect effects are not separated there.) Alternative A results in industry income of \$1.62 million attributable to grazing on Little Snake lands, whereas Alternative B yields \$2.5 million in *direct* and *indirect* impacts. The other alternatives would create a total income of about \$2.1 million each. The choice of management alternative could affect the local economy up to about \$1.0 million in industry income. The *direct* effect alone on ranch income varies by about \$432,000, or about 10 percent of ranching's total income. The employment results are similar. There would be a net gain of 48 direct jobs between the best (Alternative B) and worst (Alternative A) scenarios, which is about 9.0 percent of direct employment in sheep and cattle operations. There would be a gain of as many as 60 total jobs because for every three direct jobs gained or lost, one indirect job (e.g., veterinarian or legal services) serving the ranching industry is gained or lost.

Impacts on Oil and Gas Sector

A major economic activity on LSFO lands is drilling and extracting natural gas and oil. The LSFO, in its RFD scenario, predicts significantly more activity in the future than in the past (Conrath and Eng, 2005). There are 2,221 wells on BLM land, but only 881 are actively producing. By comparison, 3,031 wells could be drilled during the next 20 years. The oil and gas industry consists of two primary sectors: drilling wells to produce natural gas, oil, or both, and extraction activity, which occurs after the well has been drilled and its economic value determined. The alternatives place land under different designations, so the costs of drilling would vary according to whether acreage is under standard lease terms or the land is subject to other restrictions.

Table 4-55 shows how the number of wells drilled could be distributed under each alternative and designation. This exercise is based on the EPCA evaluation, but takes cost differentials across designations into account. Because each alternative differs regarding the acreage under various designations, the amount of natural gas resource available for development also varies. It is assumed as a starting point that there would be an average of 151 wells drilled per year to meet the RFD target. The analysis assesses where wells would be drilled, how much the differing designations would increase costs, and whether all 151 wells would be drilled each year, given the increases in costs. Firms would be less attracted to areas in which high costs are imposed, and at the margin, fewer firms would drill in the higher cost areas. In addition, there are areas where resources are unrecoverable due to being closed entirely to leasing or under NSO stipulations that cannot be reached by directional drilling. Consequently, for the purposes of this analysis, fewer than 151 wells are forecasted to be drilled in all alternatives except B. The table shows no "penalty" from higher costs or restrictive designations in Alternative B, but shows a "penalty" of 52 wells in Alternative D because of extensive restrictions on drilling. That number amounts to more than one-third of the initial expected wells. Alternatives A and C are nearly

equivalent because they contain oil and gas designations that cause a reduction of 15 and 18 wells, respectively.

**Table 4-55. Estimated Wells Drilled Per Year by Alternative and Designation
(Number of Wells Drilled Per Year)**

	Alternative A	Alternative B	Alternative C	Alternative D
Open lease	44	140	43	21
Open subject surface control	8	9	10	1
3- to 6-month seasonal limits	38	1	36	31
6- to 9-month seasonal limits	40	1	41	34
Recoverable NSO	3	0	5	12
Nonrecoverable NSO	0	0	0	0
No leasing	0	0	0	0
Total	132	151	135	99

The direct, indirect, and induced industry income from drilling up to 151 new wells each year is given in Table 4-56. The income that oil and gas drilling operations earn is large, varying by more than 50 percent, because direct impacts range from \$23.6 million in Alternative D to \$35.8 million in Alternative B. These variations are related to the number of wells drilled annually. (The income values shown earlier in Table 4-53 of \$32.9 million for Alternative D and \$42.5 million in Alternative B, include direct income and income from purchases of oil and gas products or drilling services by other industries). One point about these results that should be noted is that much of the land that would be put under new designations is already leased and therefore, with some exceptions, would not be subject to the new restrictions. Therefore, because this analysis assumes that new restrictions would apply immediately after plan implementation, the results reported here represent the outer extremes of high and low impacts of changes in land use across the various alternatives.

**Table 4-56. Oil and Gas Impact Results on Local Industry Income, 2025
(Thousands of Dollars)**

Industry	Alternative A	Alternative B	Alternative C	Alternative D
Oil and Gas Drilling				
Direct impact	29,307	33,401	29,822	22,249
Indirect impact	28,140	25,251	28,742	22,659
Induced impact	15,167	15,592	15,453	11,845
Total Impact	72,614	74,244	74,018	56,754
Oil and Gas Extraction				
Direct impact	15,124	17,301	15,468	11,343
Indirect impact	4,060	4,646	4,154	3,045
Induced impact	4,341	4,964	4,438	3,255
Total Impact	23,525	26,911	24,060	17,644

Most indirect impacts from oil and gas drilling come from purchases of inputs and services within the local economy. The induced effects, in the third line of the table, arise because laborers in drilling firms and businesses supplying inputs to drilling operations use a proportion of their increased income to purchase goods and services locally. The implied multipliers range from 2.2 in Alternative B to 2.6 in Alternative D. Higher costs in the more restrictive alternatives lead to higher total income for the community. Thus, the overall multipliers for all other alternatives exceed those in Alternative B. The economic activity resulting from oil and gas production is based on the number of producing wells, which varies considerably across alternatives. Industry income in this activity follows the number of installed wells more closely than in the drilling phase because costs of extraction are the same across all alternatives. Thus, the largest number of wells drilled, and consequently largest income, is found in Alternative B. As a result, the multipliers for all alternatives are small and similar, at about 1.55.

The increase in total employment derived from direct and indirect economic activity is quite high, but comes mainly from indirect and induced effects. For instance, the direct employment growth from the alternatives accounts for only 77 employees in Alternative A, while the indirect and induced effects add an incredible 740 persons, implying a very high multiplier of 9.61. Estimated total employment growth in Alternative B is 750; for C, it is 754; and in Alternative D, 582 employees are added. Following the logic that higher costs create a greater demand for inputs, total employment across alternatives in oil and gas drilling is affected not only by the number of wells drilled, but also by the pattern of expenditures that occur as a result of restrictions and cause higher incurred costs.

Although these multipliers are higher than others found for oil and gas (see the Roan Plateau Draft EIS [BLM, 2004]), they appear to be reasonable. First, they are associated with other multipliers such as industry income, which are plausible. Second, these two sectors have the highest output-labor ratios of any industries covered in the analysis. For example, the output to labor ratio is \$2.77 million per laborer in oil drilling and \$1.33 million per laborer in oil extraction. By comparison, in coal, it is \$231,000 per laborer; in construction, it is \$96,000. The implication is that fewer laborers are used per dollar of sales in gas firms than in any other sector. Gas firms are expected to grow considerably under all management alternatives, create much industry income, and purchase many inputs locally. Thus, even with a very low proportion of local purchases, the monetary values would be large, and so would the indirect and induced employment, especially compared with the small direct employment value. Finally, many laborers associated with drilling firms reside outside the counties, so the total labor requirement is not reflected in the direct gain, while indirect effects reflect total local purchases. Thus, large multipliers make sense.

For oil and gas extraction, direct employment adds only 15 employees in Alternative D versus 23 in Alternative B. The indirect and induced effects add another 60 persons in Alternative D or 80 in Alternative B, implying a still high multiplier of 5.0. Again, employment in the extraction phase, while still having high multipliers, seems to follow the pattern of installed wells in the various alternatives; therefore, all multipliers are similar. In contrast to drilling, more employment in extraction comes from the increased business activity in retailing and services,

which are sectors that benefit from increased expenditures by laborers who receive added income.

Additional Benefits Associated With Management Alternatives

Industrial and commercial firms often provide additional benefits to those modeled in the above analyses, including contributions to colleges and municipalities and support to various nonprofit organizations. Moreover, potential benefits might include increased opportunities for employees to receive higher-than-average salaries, an improved distribution of income, or additional opportunities for training and experience for local workers from a more diverse economy. Many of these added benefits are not quantifiable, or, as in the case of contributions, are not necessarily tied closely to the economic growth of a particular sector.

As examples, within the past 10 years, energy industries have contributed, through grants, \$18.5 million for community improvements in the City of Craig and Moffat County. Some of these improvements are infrastructural such as contributions to waterline, road, and transit facilities and broadband connectivity development. Other contributions have addressed hospital and other health facilities. Still others have been used to enhance museum collections, public safety centers, and the Moffat County wildfire plan.

On the Western Slope, the oil and gas industries have contributed toward education—for example, Colorado Mountain College received \$4 million in 2006 from Encana and Williams. The oil and gas industry has also been major contributors to the 4-H and math and science programs and projects. The Western Slope Colorado Oil and Gas Association awards six \$1,000 scholarships to graduating seniors majoring in engineering or petroleum industry. (Appendix P provides the location of more details for these contributions). These added benefits are largely independent of BLM actions and therefore would likely not vary significantly by alternative.

Impacts on Recreation Sector

Land within the LSFO provides much attraction for recreationists from local areas and tourists from outside the region. This analysis splits recreation into *hunting and fishing*, especially big game hunting, and *other recreation*, which was, in turn, separated into motorized and non-motored activities. It was not possible to evaluate the impact of the management alternatives on hunting and fishing; therefore, impacts associated with the alternatives on these activities are not assessed here. Northwest Colorado Stewardship (NWCOS) participants also expressed concern about the impact of energy development on migration patterns of large game, but this concern also could not be determined. However, this can be a very significant effect under certain circumstances. For example, in the Pinedale Anticline, a 46-percent decrease in mule deer might be tied to drilling activity (Sawyer et al. 2005). Another significant factor, which is not analyzed here either, is the importance of recreational opportunities in attracting amenity migrants to the area. This factor is potentially of much greater significance than the direct effects examined in this analysis.

The estimates of recreational use and their socioeconomic impact are made by surveying visitor use, expenditures, and the ripple effects of these visitor expenditures (e.g., via purchases of gasoline, lodging, supplies) on other sectors. Estimates from the BLM and the State of Colorado

were also used to determine current use. Then, BLM recreation staff estimated how total recreation use and type (motorized versus non-motorized) would change across the four alternatives, as shown in Table 4-57. In Alternatives A and B, visitor use is expected to increase by 10 percent each decade. In Alternative C, recreation use is expected to increase by 12 percent. In Alternative D, decreased motorized use would occur as a result of seasonal OHV restrictions in the Sand Wash Basin, but non-motorized recreation would increase by a factor of four based on an increased emphasis on non-motorized opportunities. Motorized recreation use in Alternative A would result in about \$614,735 in direct sales within the RMPPA. Total sales resulting from non-motorized users would be nearly \$300,000, which is much less than the motorized contribution because of fewer non-motorized users and lower spending per user. Industry income would be the same in Alternatives A and B, with spending by motorized recreationists generating about \$475,000 in direct income and \$650,000 in total income. Non-motorized visitors provide about \$72,000 in locally generated income and \$101,000 in direct and indirect income. Alternative C, with the most total visitor days, would create about \$690,000 in total income, whereas Alternative D, which reduces recreation use for motorized recreation, would lead to \$413,000 in total income. The impacts of management alternatives on local income thus vary by up to \$338,000 per year.

Table 4-57. Motorized, Non-Motorized and Total Recreation Use (Visitor Days) by Alternative

	Annual Use in 2015				Annual Use in 2025			
	Alternative				Alternative			
	A	B	C	D	A	B	C	D
Motorized	28,897	28,897	21,673	5,575	31,787	31,787	24,273	5,699
Non-motorized	7,224	7,224	14,448	22,300	7,947	7,947	16,182	22,794
Total	36,121	36,121	36,121	27,875	39,733	39,733	40,456	28,493

Although the overall impacts on the LSFO region are quite modest, they represent effects that can reach nearly 45 percent of current income in the recreation industry. Also, the impacts of the availability of these recreation activities on migration into the region are excluded in this analysis, something we examine in the section below on cumulative impacts.

The employment effects associated with each alternative indicate that, in Alternatives A and B, about 7 direct jobs out of 11 total jobs would be supported by spending of motorized recreationists. Non-motorized visitors would support about two direct jobs out of three total jobs created. Thus, a total of 14 jobs can be attributed to recreation in these two alternatives. Alternative C would lead to 13 total jobs as a result of 6 direct jobs related to motorized recreation spending and 4 direct jobs related to non-motorized spending. However, in Alternative D, employment related to motorized recreation would decrease, but jobs associated with non-motorized recreation would grow. The total jobs created in Alternative D would be 10. Because the distribution of acreage of BLM land in the two counties, 94.7 percent of this effect would be in Moffat County and only 5.3 percent in Routt County.

As noted in Chapter 3, many uses on BLM land in the RMPPA are not traded in markets, and some do not have measurable associated onsite expenditures. Because nearly all visitors indicated their trips to the BLM site were the primary or sole purposes of their trips, it is appropriate to treat their travel costs from home as the price of their trips. The key variable cost of a trip that would not have been incurred if the trip had not been taken is gasoline cost. Our analysis finds that a typical ATV user would pay \$28.70 more than current travel cost to ride in the Sand Wash area. This value is slightly higher than the average net benefits for OHV driving in the intermountain west found in the Loomis (2005) review of the recreation valuation literature. However, this fee could not be charged to all current users because the \$28.70 is an average net benefit per day; half would pay more than this, but half would pay less and would not come as frequently if they were charged \$28.70 per visitor day. Using the same analytical approach, we determined that a typical visitor to areas outside Sand Wash would pay \$8.33 more than current travel cost.

To provide an estimate of total visitor benefits in the LSFO area, the net benefit per visitor day is multiplied by the total visitor days, yielding annual benefits to motorized recreation users of Sand Wash of \$737,963. The annual benefit to non-motorized recreation users in other areas in the LSFO is \$139,103 annually. In Sand Wash Basin, visitors spend about \$30 a day and receive a surplus benefit of an additional \$29 per day. However, because the surplus benefit is not directly associated with expenditures, it is excluded from the regional analysis.

4.5.3 Costs of the Management Alternatives

In developing this analysis, stakeholders identified numerous potential socioeconomic and environmental costs that might arise from the choice of management alternatives. Although quantification of these impacts is usually not possible here, it is important to address these concerns so that decisionmakers may take them into account. Many sources of concern are related to oil and gas development, primarily the socioeconomic effects related to industry seasonality and unaccounted-for tradeoffs with natural amenity-based economic activities. Numerous ecological impacts to wildlife habitat from oil and gas development are well documented in other parts of the Draft EIS (Section 4.3.5). Those conflicts without material economic impacts are not presented here.

This analysis suggests that the *drilling* phase of *oil and gas* development would take about 10 crews operating throughout the year to drill 151 wells per year. These crews are assumed to use about 10 to 20 workers at any given time (Julander, 2006).² Moreover, Jaquet (2006) notes that during the past 5 years, a 50-percent decline in drilling activity has been observed in Sublette County, Wyoming, during winter months. If Moffat County demonstrates a similar pattern, and wells must be drilled predominately during the summer, then 15 crews and 150–300 workers might be required during months without seasonal restrictions, but only five crews and 50–100 workers would be active during the winter. Therefore, only one-third of the work force in oil and gas drilling is likely to be employed full time over the year, and many workers would live in man camps and other temporary quarters when they had employment during the summer. If, as

² This figure may well be on the low side. Analyses in Sublette County, Wyoming, indicate that perhaps 20 workers are on a rig at a given point (Jaquet 2006). Part of the difference is that many support workers are in the region, but they work throughout the entire region, so our data might not reflect the full employment force. However, our values were considered reasonable by two knowledgeable observers of the oil and gas industry in LSFO.

in Alternative B, there were no stipulations that impose seasonal restrictions, there would be less seasonality, although some seasonal effects may remain resulting from weather. This could also be the case in Alternative C, where BLM would grant exceptions to seasonal restrictions if operators limit surface disturbance to less than 5 percent of a lease or unit.

Although few new jobs would be created directly within the energy industry, nearly 900 local jobs might be dependent on oil and gas through indirect and induced impacts of the industry, which are created as the industry purchases inputs and as its employees buy goods and services in locally. This number could increase if the jobs per rig are closer to the Sublette County values. Thus, the effect of seasonality in the oil and gas industry is exacerbated at the community level because of the industry's relatively high employment multiplier. Also, with or without seasonal limits and given the boom-bust cycles seen often in the energy industry, even greater uncertainty exists in the job outlook for those dependent on the energy industry for their income. Consequently, the indirectly affected industries may not react to seasonal increases in the same way as they would to permanent year-round changes, resulting in relative scarcity of services for seasonal employees during a boom or the high season.

For example, if housing is not built because there is only a temporary, or seasonal, stimulus created by oil and gas drilling employment, then housing shortages and upward pressure on rental rates can be expected. Both counties have seen affordability indices drop before the expected oil and gas development (from 198 in 1990 to 154 in 2000 for Moffat County, and from 114 to 82 in Routt County over the same time period). Analyses done by the Colorado Division of Housing show that vacancy rates have dropped steadily in Moffat County, from 20.2 percent in 1990 to 12.3 percent in 2002, and, while the number of households grew by 866, the housing stock only increased by 514 homes. If employment related to oil and gas development reaches the 16 percent mentioned above, the demand for housing could easily be twice the size of the increase in housing stock seen from 1990–2002. In a study of affordable housing in Moffat County during 2002, DOLA determined that only 45 homes were available for families earning 80 percent of the median income, whereas only 29 homes were available for those with 60 percent of the median income (Colorado Division of Housing, 2003). If the demand for temporary quarters grows as indicated earlier, the pressure on the small existing housing stock could be significant. The strong demand for services employment in Routt County demonstrated in the forecasts, combined with its high cost of housing, would mean that many workers would choose to live in Moffat County, thereby putting even more pressure on the existing housing stock.

Temporary and/or seasonal workers cannot be expected to make similar investments in a local community as permanent residents. In addition, an increased likelihood exists that negative social behavior associated with these temporary workers might occur, including drug use and other antisocial behavior (Jaquet, 2005). Although Moffat County has not yet seen an increase in temporary workers, other areas enjoying a surge in oil and gas industry activity have seen dramatic increases in crime rates and arrests. Sublette County, Wyoming, during the years 2000 to 2004, saw an increase in the number of drilling rigs, the population required to man them, and the crime rate. Jaquet (2005) shows comparable trends in gas-field activity and the number of serious felony crimes, arrests (that almost tripled), and services provided by the Sheriff's Department (a 46 percent increase). The greatest increases in arrests during the period were for such actions as DUIs, sex offenses, drug possession, and simple assault. The proportional

increases might be larger and the effects more exaggerated because of the small population in Sublette County (and huge growth in drilling), but the correspondence among the trends seems too high to dismiss as mere correlation. Although the need for police, fire, and emergency services could grow as a result of a temporary increase in oil and gas activity, as strongly Jaquet (2005) has strongly suggested, the community may not hire additional law enforcement personnel. Rather, response times for other police and emergency calls can be expected to increase, along with the cost per capita of these services.

The second broad area of stakeholder concern that cannot currently be defined quantitatively involves the interaction between the oil and gas industry and other natural resource and amenity-based industries. For example, oil and natural gas production and drilling may have an influence on the migration of large game and the presence of wildlife, which would influence the quality of recreational visits for local residents and tourism for visitors, important economic drivers for the region. Sawyer et al. (2005) tracked the migration patterns of radio-marked pronghorn for three years in the Green River Basin of Wyoming, near the Pinedale Anticline. The study concluded that increased human disturbance associated with energy and housing development can influence the migration routes of mule deer and pronghorns.

In addition, the visual quality of BLM lands could be affected by the presence of oil and gas wells. Some of those who recreate on BLM land, particularly those engaged in OHV activities, have argued that the presence of some wells has had little impact on the quality of their experience. On the other hand, the recreation literature reports that machinery and industrial facilities are detrimental to a recreation visitor's experience (see, for example, Brookshire, et al., 1979). Brookshire et al. (1979) focused on the effects of power plants on how others viewed recreation areas and found, in a survey of tourists and residents in the area around Page, Arizona, that all user groups (residents, campers in developed campgrounds and in remote areas, and motel guests) would pay to avoid seeing power plant towers. This same research also determined that the user groups would pay additional amounts if air pollution associated with the existence of the towers were eliminated. These study results are corroborated by a later study by Boyle and Bishop (1984) of visitors in Wisconsin. River visitors indicated that buildings, powerline corridors, and trash detracted the most from scenic beauty. Visitors indicated they would pay to prevent buildings and powerlines from being built so that they could not be seen from any point along the river. These types of structures could be significantly more intrusive than the occasional oil or gas wells. However, the infrastructure associated with oil and gas development could be considered similar in how they impact scenery.

Moreover, the presence of oil and gas wells and well pads has been shown to cause a decline in nearby property values, something that can especially be an issue on split-estate lands. It is a well-established principle, backed by empirical findings, that incompatible land uses, particularly ones that reduce aesthetic values through noise, dust, and visual effects, reduce property values (Anderson and Crocker, 1971; Greenberg and Hughes, 1993; Palmquist, et al. 1997). This finding also holds for coalbed methane wells in La Plata County, Colorado. A recent study (BBC Research and Consulting, 2001) found a 22 percent reduction in the sale price of properties near a coalbed methane well. A more recent study on the effects of oil and gas wells found a 16-percent loss in nearby residential property values during drilling and an 8-percent loss 3 years after drilling ceased (BBC Research and Consulting, 2006). The study author indicated that these results provide a lower bound on actual costs because they were based on older data

taken when well spacing was less dense (e.g., one well per 140 acres). He expects the effects to increase considerably if the spacing were to decrease to one well per 5 acres.

Local stakeholders also expressed concerns about some interactions between local agriculture and wildlife populations. For example, if an increase in the permitted AUMs on public lands for livestock were to decrease available forage for wildlife, the livestock industry and local recreational opportunities, as well as regional tourist visits, may be at cross-purposes. Because new residents to the region are more often attracted by recreational opportunities than by traditional agricultural uses of private and public lands (Sonoran Institute, 2004; McGranahan, 1999), the potential for cultural conflict is increased. Moreover, the increasing role of (particularly motorized) recreation in the region may create conflict with traditional agricultural practices and important sources of supplementary income in guide services. Increases in OHV use on private and public lands could affect traditional wildlife herd movement, if not health, and create opportunities or challenges to individual landowners not evident before the growth of that industry.

Finally, local experiences of the natural environment in the RMPPA are amplified by broader social values (sometimes called passive or nonmarket benefits) for the protection of federal lands from irreversible industrial development. *Residents* are affected by the decision to develop and the decision not to develop federal and private lands. *Nonresidents* are not directly affected by local industrial development but may be influenced by the recreational qualities of a region, should they choose to visit. The fact that the BLM is the publicly designated steward of these lands indicates that some of these broader social values are not well reflected in the private market place. This and the other nonquantifiable costs discussed in this section are associated with all alternatives to some degree. However, because many of these costs are associated with oil and gas development, it is more likely these costs would be greater in Alternatives A, B, and C than in Alternative D, where development is more restrained.

4.5.4 Impacts on Environmental Justice

An Environmental Justice assessment requires determining whether any alternative has disproportionate effects on minority or low-income populations (families with incomes of below \$12,674 for a four-person household). Based on U.S. Population Census data, Moffat County contains approximately 13 percent of households considered low income, whereas in Routt County, roughly 9 percent of the population is low income. Minorities constitute about 4 percent of the population in Routt County and 13 percent in Moffat County. These groups are disproportionately poor: 23 percent of minority Moffat County families and 16 percent of Routt County families earn less than \$15,000.

The forecasts in Section 4.5.1 show several trends affecting minority or low-income populations. The first trend indicated that the greatest growth in *Services* jobs is under Alternative A; aside from oil and gas opportunities, fewer higher income jobs in government and natural resource positions. As Chapter 3 notes, the annual average salary in *Energy, Utilities, and Minerals* is roughly \$60,000, whereas it is \$45,000 in *Government*, as opposed to \$25,000 in *Services* and \$30,000 in *Construction and Manufacturing*. Thus, more opportunities arise for low income and/or less educated persons, but higher income opportunities appear to decrease proportionally.

These trends could put pressure on affordable housing, which would hurt low-income families the most. Nonetheless, these trends are arising regardless of the decisions made by BLM.

In this analysis, the impacts on environmental justice that are explicitly affected by the management alternative are of the most interest. The main variation in employment opportunities derives from the varying degrees of oil and gas development, and in all alternatives except D, the difference in total employment would be at most about 20 jobs. Therefore, in Alternatives A, B, and C, there is little reason to believe that the choices would materially harm those with low income or minorities. Furthermore, the wage rates shown earlier in Table 4-60 and Table 4-61 do not differ by more than several hundred dollars in Alternatives A, B, and C. However, if Alternative D were chosen, foregone jobs in oil drilling could be nearly 200, of which only about 20 would be in the drilling industry itself. The remaining decreases in employment come from smaller indirect and induced effects. About half of the indirect job loss appears in high-wage sectors such as natural resources, government, and finance. The lower induced effects from reduced purchases by households could negatively affect the job market in services and retailing, areas that typically employ lower income households.

The pattern of job reduction seen in Alternative D still would not disproportionately penalize the well-being of low-income groups. Moreover, all alternatives would create some new higher income jobs that might be captured by these groups if adequate policies and educational programs were used. The lower wage rate associated with this alternative reflects the greater proportion of lower wage jobs rather than negative pressure on current wages. Overall, the choice of management alternative in the Draft EIS does not appear to negatively affect minority or low-income families.

One problem in making these assessments is that existing data have been gathered by studying patterns of ethnicity and household income, but not sector employment and ethnicity, or sector employment and household income. For example, all alternatives appear to improve, at least moderately, the chances of those who work in agriculture because room for improvement exists in forage availability, and concurrently potential livestock production, in all alternatives beyond Alternative A. Anecdotal evidence suggests that the workers in this occupation are often minorities or foreign born, and therefore are indeed helped somewhat through BLM's actions. However, this cannot be assessed with certainty because Census data do not yet link job descriptions and ethnicity.

4.5.5 Impacts on Taxes

The models used in this analysis provide estimates of the entire range of taxes, thereby providing federal, State, and local revenue variations across the four alternatives. The growth of the main sectors affected by BLM decisions would lead to gains in federal receipts, including personal income, corporate, and employee taxes, of about \$26 million annually for Alternatives A, B, and C, when accounting for all direct and indirect effects. There is no more than a \$1 million difference between in tax revenue between them over the plan period, and most of these tax receipts leave the region. Of these receipts, \$22 million per year comes from federal taxes on oil and gas drilling activities. Alternative D would lead to a decrease of about \$6.5 million per year in generated revenues. A similar pattern is observed for State and local taxes, which include property, sales, income, and other indirect business taxes. Together, they lead to about

\$6 million from all direct and indirect growth in the affected sectors, and vary by less than \$150,000 across alternatives other than D. Alternative D would lead to foregone tax revenues of about \$1.4 million at the State and local levels per year as a result of decreased oil and gas development.

The above analysis does not isolate the explicit contribution of oil and gas drilling to the differing types of taxes, which can be estimated based on results from Chapter 3. Total tax receipts from levies on oil and gas on federal minerals amounted to 4.5 percent of total revenues in Moffat County. (Had these revenues come from a sector based on sales taxes, this would be consistent with an industry maintaining about \$20 million in sales.) Four types of taxes are levied on the oil and gas industry. The largest, most consistent source of revenue is the Federal Mineral Lease tax revenues, collected by the Minerals Management Service in the U.S. Department of Interior. Colorado receives \$30–60 million of these taxes from the U.S. Government, which is distributed to Colorado counties based on the number of employees of oil and gas industry who reside in a particular county.

The fact that these monies remain so consistent suggests stability of the employees in the area. Moffat County records only 26 employees working and living in the county (which are more likely workers in oil and gas production rather than drilling), on which an average annual amount of about \$620,000 is added to the county coffers. If tax revenues grow proportionally with the number of wells, this total would nearly triple (or grow 2.75 times as reported in the RFD), so by 2025, \$2,520,000 per year in revenues would come from Federal Mineral Lease tax revenues.

The second largest category of taxes is Payment in Lieu of Taxes (PILT), which are federal payments to local governments to offset losses in property taxes from federal ownership of land in a county. These sources, although high, would be unlikely to change during the life of the plan because the amount of federal land is fixed. This source of revenue should remain the same unless tax rates change.

The two other categories of taxes are property taxes, which can change based on the assessed value of the oil and gas improvements on federal land, and severance taxes, which are related to the number of employees within a county as a proxy for production. Property taxes for oil and gas property have been variable, fluctuating between \$55,000 and \$133,000 from 2002 to 2005. These taxes are received on land and equipment when land is private and mineral rights are federal; therefore, they could also triple if future wells are placed on BLM surface and split-estate land in the same proportions as in the past. Thus, these taxes might rise to about \$300,000 per year with higher numbers related to production rather than drilling. Severance taxes have been calculated at under \$7,000 annually, but because they are related to oil and gas production, they could also nearly triple to about \$26,523 per year. Thus, in total, taxes for Moffat County could rise by about \$2.1 million annually if oil and gas production reaches levels expected under various plan outcomes.

4.5.6 Conclusions: Benefits and Costs of the Management Alternatives

As a conclusion to this analysis, the benefits and costs of the four management alternatives are compared in this section. The main benefits are related to industry income, employment, and employment compensation, which are the key variables analyzed in the modeling exercises. The

analysis, moreover, identified several extended benefits that were not tied closely to the modeling efforts. In addition, costs were identified as potential limitations to the implementation of the various alternatives. Most of the costs and extended benefits were not included in the models because of limitations in data availability. Nonetheless, these are important to include so that decisionmakers can decide how to weight them in as they make their choices among alternatives.

In regard to the primary benefits, Alternatives A, B, and C would not lead to significantly different outcomes. Looking at the cumulative effects over the plan's life, the variation in industry income between Alternatives A and B was shown to be \$64 million, only a 2.3 percent variation. Alternative C was in the middle, being \$45.6 million less than Alternative B, but greater than Alternative A. Moreover, there would be only 90 workers less (0.8 percent) in the lowest employment outcome (C) compared with the highest (B) among the first three alternatives. In all cases, the highest values are found in Alternative B, which has the most drilling activity among the alternatives. Total tax revenues across local, State, and federal sources vary by at most \$16 million among the first three alternatives over 20 years, again only a 1.45-percent variation. Finally, average wage rates do not vary across these outcomes by more than several hundred dollars. (These small variations in outcomes do not follow the number of wells drilled precisely because costs of drilling vary across designations and thus create somewhat varying patterns of economic development.)

Costs must be considered with regard to these alternatives as well. These were identified in Section 4.5.3 and are excluded from the economic modeling exercises. Most costs identified were related to the level of oil and gas development. Given that, Alternative B is most likely to create the highest costs. With more than 300 additional wells drilled over the life of the plan, it is more likely that the visual resource objectives of the plan would come into conflict with oil and gas development objectives; recreation would more likely be affected; and some of the negative outcomes associated with large numbers of temporary workers, as has been demonstrated in Sublette County, Wyoming, could most likely arise under Alternative B.

The forecasting exercise done here contains considerable uncertainty, which arises from the fact that Moffat and Routt counties are very small producers of oil and gas in the region. Consequently, numerous variations might occur that would affect the costs and benefits of these alternatives. For example, a high level of oil and gas development might be possible with relatively low growth in the local population if the large regional industry accommodates the development without moving large numbers of people into the planning area. On the other hand, the RMPPA could experience a large growth in population if oil and gas development occurs in other counties in the region; however, if oil and gas workers show a preference to live in a county such as Moffat, that might be out of the main production areas. Thus, scenarios exist in which most of the benefits occur with few of the costs and vice versa.

The above outcomes suggest that choices among Alternatives A, B, and C by BLM could be made based on other criteria than the economic outcomes found in the modeling exercises performed here. These criteria might include minimizing ecological or negative socioeconomic effects or paying attention to added benefits that might arise with different sectors' growth. To this end, the Little Snake RMP cooperating agencies worked with the BLM to develop a sagebrush habitat protection proposal, which is included in Alternative C. This approach (see

Section 2.5.5.2) is designed to reduce the seasonality of oil and gas drilling in the RMPPA and fragmentation of sagebrush habitat. The objectives of this approach are to reduce some of the costs, socioeconomic and ecological, of the higher levels of oil and gas development that are expected during the plan. Because opting into this approach is voluntary, the extent to which oil and gas operators would use it is unknown, making it difficult to identify specific quantifiable economic impacts associated with this action. However, to the extent that this approach is successfully employed, it would help maintain benefits while reducing costs.

Alternative D was estimated to have the greatest divergence from others over the 20-year planning horizon, again mainly attributed to significantly fewer wells drilled (1,980 wells drilled in Alternative D versus 3,020 in Alternative B). Total income was estimated to fall by 16.1 percent and employment to decrease by 792 workers, or 8.6 percent. The average wage would also decline by nearly \$2,000 in Alternative D relative to B. As a result of this decline, Alternative D would lead to a loss in tax revenue of about \$140 million relative to Alternative B over the 20 years of the plan. However, because there are more than 1,000 wells more to be drilled in Alternative B, there is some merit to Alternative D. If the negative socioeconomic consequences of the high oil and gas activity lead to a reduction in expected migrants into the region, much of the advantage in Alternative B disappears. The estimated breakeven industry income between these alternatives would be one-third if all potential migrants chose not to relocate to Moffat or Routt County.

4.6 CUMULATIVE IMPACTS

Cumulative impacts are effects on the environment that result from the impact of implementing any one of the RMP alternatives in combination with other actions outside the scope of this plan, either within the RMPPA or adjacent to it. Cumulative impact analysis is required by CEQ regulations because environmental conditions result from many different factors that act together. The total effect of any single action cannot be determined by considering it in isolation, but must be determined by considering the likely result of that action in conjunction with many others. Evaluation of potential impacts considers incremental impacts that could occur from the proposed project, as well as impacts from past, present, and reasonably foreseeable future actions (RFFA). Management actions could be influenced by activities and conditions on adjacent public and nonpublic lands beyond the RMPPA boundary; therefore, assessment data and information could span multiple scales, land ownerships, and jurisdictions. These assessments involve determinations that often are complex and, to some degree, are subjective.

4.6.1 Cumulative Analysis Methodology

The cumulative impacts discussion that follows considers the alternatives in the context of the broader human environment—specifically, actions that occur outside the scope and geographic area covered by the RMP. Cumulative impact analysis is limited to important issues of national, regional, or local significance; therefore, not all resources identified for the direct and indirect impact analysis in this EIS are analyzed for cumulative impacts.

Because of the programmatic nature of an RMP and cumulative assessment, the analysis tends to be broad and generalized to address potential effects that could occur from a reasonably

foreseeable management scenario combined with other reasonably foreseeable activities or projects. Consequently, this assessment is primarily qualitative for most resources because of lack of detailed information that would result from project-level decisions and other activities or projects. Quantitative information is used whenever available and as appropriate to portray the magnitude of an impact. The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same geographic area. The magnitude of an impact is determined through a comparison of anticipated conditions against the naturally occurring baseline as depicted in the affected environment (see Chapter 3) or the long-term sustainability of a resource or social system.

The following factors were considered in this cumulative impact assessment:

- Federal, nonfederal, and private actions
- Potential for synergistic effects or synergistic interaction among or between effects
- Potential for effects to cross political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- Comparative scale of cumulative impacts across alternatives.

Temporal and spatial boundaries used in the cumulative analysis are developed on the basis of resources of concern and actions that might contribute to an impact. The baseline date for the cumulative impacts analysis is 2008, which is when the RMP would be completed. The temporal scope of this analysis is the life of the RMP, which encompasses a 20-year planning period.

Spatial boundaries vary and are larger for resources that are mobile or migrate (e.g., elk populations) compared with stationary resources. Occasionally, spatial boundaries could be contained within the RMPPA or an area of the RMPPA. Spatial boundaries were developed to facilitate the analysis and are included under the appropriate resource section heading in Section 4.6.3, Cumulative Impacts by Resource Category.

4.6.2 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and potential future actions are considered in the analysis to identify whether and to what extent the environment has been degraded or enhanced, whether ongoing activities are causing impacts, and trends for activities in and impacts on the area. Projects and activities are evaluated on the basis of proximity, connection to the same environmental systems, potential for subsequent impacts or activity, similar impacts, the likelihood a project will occur, and whether the project is reasonably foreseeable.

Projects and activities considered in the cumulative analysis were identified through meetings held with NWCOS members, cooperators, and BLM employees with local knowledge of the area. Each was asked to provide information on the most influential past, present, or reasonably foreseeable future actions. Additional information was obtained through discussions with agency officials and review of publicly available materials and websites.

Effects of past actions and activities are manifested in the current condition of the resources, as described in the affected environment (see Chapter 3). RFFAs are future actions that have been

committed to or known proposals that could take place within the 20-year planning period. RFFA scenarios are projections made to predict future impacts—they are not actual planning decisions or resource commitments. Projections, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate. Unforeseen changes in factors such as economics; demand; and federal, State, and local laws and policies could result in different outcomes than those projected for this analysis.

Other potential future actions have been considered and eliminated from further analysis because there is a small likelihood these actions would be pursued and implemented within the life of the plan or because so little is known about the potential action that formulating an analysis of impacts is premature. In addition, potential future actions that are protective of the environment (such as new potential threatened or endangered species listings or regulations related to fugitive dust emissions) have less likelihood of creating major environmental consequences alone, or in combination with this planning effort. Federal actions such as species listing would require BLM to reconsider decisions created from this plan because the consultations and relative impacts might no longer be appropriate. These potential future actions may have greater capacity to affect resource uses within the RMPPA; however, until more information is developed, no reasonable estimation of impacts could be developed.

Data on the precise locations and overall extent of resources within the RMPPA are considerable, although the information varies according to resource type and locale. Furthermore, understanding of the impacts on and the interplay among these resources is evolving. As knowledge improves, management measures (adaptive or otherwise) would be considered to reduce potential cumulative impacts in accordance with law, regulations, and the final RMP for the LSFO.

The following projects and activities were identified as having the greatest likelihood to generate potential cumulative impacts when added to the LSFO RMP alternatives:

- ❑ **Minerals and Energy Activity.** Reasonable foreseeable minerals and energy activity that considers all public and private activities within the RMPPA is detailed in the Little Snake RFD (BLM 2005).
- ❑ **Entrega Gas Pipeline.** Entrega Gas Pipeline LLC plans to construct a 330-mile natural gas pipeline from the Meeker Hub in Rio Blanco County, traverse through the RMPPA in Moffat County into Wyoming, and terminate at the Cheyenne Hub in Weld County, Colorado. The proposed Entrega gas pipeline will follow existing pipeline corridors. The proposed 42-inch gas pipeline is designed to transport an initial capacity of up to 1.3 billion cubic feet per day (Bcf/d) of natural gas. The maximum operating pressure is less than 1,650 pounds per square inch gauge (psig) (<http://www.entregapipeline.com/>).
- ❑ **Wyoming Interstate Company Piceance Basin Expansion Project.** In response to increasing natural gas production in the Piceance Basin, Wyoming Interstate Company, Ltd. (WIC) is constructing the Piceance Basin Expansion Project. The project consists of 142 miles of 24-inch diameter natural gas pipeline; 1,650 horsepower of compression at the Greasewood Hub located in Rio Blanco County, Colorado (a convergence point for various interstate pipelines and numerous pipeline gathering systems located in the Piceance Basin area); and metering facilities at both the Greasewood Hub and the Wamsutter Compressor Station in Sweetwater County, Wyoming. The project was designed to receive and transport

up to 350,000 dekatherms per day of natural gas from the Greasewood Hub to interconnections with WIC and Colorado Interstate Gas Company (CIG) at the Wamsutter Compressor Station. WIC filed an application with the Federal Energy Regulatory Commission (FERC) in early 2005 asking FERC to authorize construction of the project facilities. Construction began in November 2005 with an expected in-service date of November 2006 (<http://www.cigco.com/piceance.asp>).

- **Oil Shale and Tar Sands Leasing PEIS.** BLM initiated a Programmatic Environmental Impact Statement (PEIS) for oil shale and tar sands resources leasing on lands administered by BLM in Colorado, Utah, and Wyoming. The PEIS will amend existing applicable RMPs to address oil shale and tar sands resources leasing in these three states. The planning area for the oil shale resources comprises the Piceance and Washakie Basins in Colorado, the Uintah Basin in Utah, and the Green River and Washakie Basins in Wyoming. For the tar sands resources, the planning area consists of certain sedimentary provinces in the Colorado Plateau in Utah. The Oil Shale and Tar Sands Leasing PEIS is required to comply with the Energy Policy Act of 2005 (the Act). Section 369 of the Act, Public Law 109-58 (H.R. 6), enacted August 8, 2005, directs the Secretary of the Interior to make available for leasing such BLM-administered land in Colorado, Utah, and Wyoming as the Secretary considers to be necessary to conduct research and development activities to facilitate the recovery of liquid fuels from oil shale and tar sands on public lands. Furthermore, Section 369 directs BLM to prepare a PEIS for a commercial leasing program for oil shale and tar sands resources on public lands. The scope of the PEIS will include an assessment of leasing oil shale and tar sands resources, including all foreseeable commercial development activities on BLM-administered lands located in Colorado, Utah, and Wyoming; a discussion of relevant mitigation measures to address these impacts; and the identification of appropriate, programmatic policies and BMPs to be included in BLM land use plans. The PEIS addresses land use plan amendments to designate lands available for oil shale and tar sands leasing and subsequent development activities (<http://ostseis.anl.gov/>).
- **Hiawatha Regional Energy Project.** BLM will prepare an EIS regarding the proposed Hiawatha Regional Energy Project, a natural gas development project consisting of conventional natural gas well development in established, producing fields. Development will take place in the Rock Springs Field Office and the LSFO. Questar Exploration and Production Company, Wexrpo Company, and other natural gas development companies submitted to BLM a proposal to expand natural gas exploration and development in existing fields. The operator's proposal consists of developing up to a maximum of 3,911 wells and associated facilities and roads over a 30-year period in the 145,000 acre project area in Wyoming and Colorado.
- **Coal Mine Leases.** Private companies continue to show interest in operating coal mines within the RMPPA. Peabody Energy filed an application to lease federal coal on 14,000 acres. The project would entail an underground coal-mine-long-wall method and new rail spur and loadout. The Big Elk Project Final Environmental Assessment was completed in March 1998. Kennecott Energy and Colowyo Coal Company L.P. have filed a lease to operate an open pit mine to recover more than 300 million tons during mine life (approximately 130 million tons federal and 170 million tons other). An environmental assessment is being completed for the Collum Gulch Coal Mine.
- **Claim Staking for Minerals.** Private companies have shown interest in staking claims to minerals in the RMPPA under the 1872 mining laws. Western Fuels renewed staking in

2005 for 549 acres of uranium mining claims last mined in the 1950s. Water Remediation Technology staked claims in 2002 for possible zeolite minerals, specifically clinoptilolite, and the claims are still active. Zeolites have a variety of uses, including water softening. If the claims are validated, the land could be patented and taken out of public domain.

- **Emerald Mountain Exchange EIS.** In an effort to consolidate land ownership in Routt County, BLM would acquire the approximately 4,138 acre Emerald Mountain parcel just west of Steamboat Springs from the Colorado State Land Board in exchange for 127 isolated BLM parcels totaling approximately 15,528 acres. The Emerald Mountain Partnership (EMP) includes various community members such as a Steamboat Springs City Council Member, a Routt County Commissioner, and other individuals who support the preservation of Emerald Mountain. The Colorado State Land Board (SLB) is also involved in the EMP. BLM initially identified 41,523 acres of BLM land (269 parcels) in Routt County for exchange. These consisted of scattered parcels, small parcels, irregularly shaped parcels, parcels with difficult access, and parcels without public access. The EMP narrowed down the initial selection for this exchange to 15,621 acres (129 parcels), of which 11,771 acres (95 parcels, 75 percent) have no public access; 1,988 acres (18 parcels) have limited access by foot or horseback across long distances through BLM or the Routt National Forest; and 1,861 acres (16 parcels) are accessible by a public road. Eleven of the 16 public road access parcels are less than 41 acres in size with an average size of 30 acres. BLM is mandated to trade value for value, not acre for acre; thus, a larger number of BLM lands are needed to exchange for the Emerald Mountain parcel. More information is available on the internet at http://www.co.blm.gov/lra/emerald_mtn/em.htm.
- **Elkhead Reservoir Enlargement.** The Elkhead Reservoir, located in the Yampa Valley west of Steamboat Springs, was opened in 1974 to provide lake fishing opportunities for northwestern Colorado and to provide water for the steam-powered turbines in Craig's coal-fired power plants. In 1990, the City of Craig purchased Elkhead Reservoir to secure its municipal water supply and provide recreation. Additional water supply is necessary to recover in the Yampa River. To comply with federal ESA guidelines and Recovery Program objectives, additional water releases are required to maintain adequate streamflows from late July through September for endangered fish species in the Yampa River. Construction is underway to raise the dam height by 25 feet thereby increasing water storage from 13,800 acre-feet to 24,888 acre-feet. The enlargement of Elkhead Reservoir is a cooperative effort among the River District, the Upper Colorado River Endangered Species Recovery Program, the City of Craig, the Colorado Department of Natural Resources and the Craig Station power plant. Project completion is anticipated in 2007 (<http://www.crwcd.gov/elkhead/>).
- **Ranching For Wildlife State Subsidized Program.** Ranching for Wildlife is a public-private wildlife management partnership under supervision of CDOW that began as a pilot effort with the 1986 hunting seasons. Under the program, participating ranches are given flexibility in season timing, length, and manner of take restrictions and access to licenses for their clients in exchange for permitting public access to high-quality hunting opportunities and managing their habitat to enhance wildlife. Ranches must have 12,000 or more contiguous acres, and partnerships or associations can be formed to combine enough contiguous private land to meet minimum acreage requirements. Eligible species include deer, elk, pronghorn, black bear, turkey, moose, and bighorn sheep. The public allocation of licenses has been generally 100 percent of cow and doe licenses; 10 percent of bull and buck licenses; 40 percent of bear licenses; and 50 percent of turkey, bull moose, and bighorn sheep

licenses. The current requirement is for 30 total public licenses (20 east of I-25), and overall 40 percent of licenses by species must be public licenses. Seasons and license levels are negotiated between CDOW and the ranch. Ranches have a 90-day period to schedule their seasons, which can begin and end each year between approximately August 23 and January 31. Public seasons can also be scheduled within this timeframe and must be a minimum of 10 days total. There are 26 ranches enrolled in the program, encompassing approximately 1.26 million acres. Of these, 23 offer public hunting opportunities (by limited draw) for deer, 22 for elk, 15 for pronghorn, 3 for bear, 3 for turkey, 2 for bighorn sheep, and 1 for moose. Twelve ranches totaling 430,030 acres (34 percent of the acreage enrolled in the program) are situated either entirely or partially within Moffat or Routt Counties. These ranches offer public hunting opportunities for deer, elk, or pronghorn (<http://wildlife.state.co.us/ranching/review.asp>).

- **CDOW Herd Management in the LSFO.** Elk populations within the LSFO are above CDOW objectives. CDOW has increased the number of hunting licenses offered in the LSFO in an effort to reduce herd numbers. Once herds reach those objectives levels, CDOW will reduce the number of hunting licenses offered to sustain population numbers.
- **Moffat County Integrated Weed Management Program.** Through the Integrated Weed Management Program, Moffat County partners with public land managers (including BLM, USFWS, and the National Park Service [NPS]) as well as private landowners and oil and gas operators to control weeds. Moffat County partners with BLM on research projects to study weed treatments such as testing treatments for reclaiming areas infested with Halogeton on test plots concentrated around gas fields on BLM lands in Hiawatha and Powder Wash. Moffat County also handles weed spraying on public as well as private lands in priority areas.

4.6.3 Cumulative Impacts By Resource Category

Cumulative impacts are discussed only for resources or uses that might experience impacts. The discussion below addresses the potential for cumulative impacts to the following resource and resources uses: air quality, soil resources, water resources, vegetation, fish and wildlife habitat, Special Status Species, wild horses, fire, cultural resources, paleontological resources, SMAs, visual resources, energy and minerals, recreation, forest and woodland products, lands and realty, and social and economic conditions. Negligible cumulative impacts would be anticipated to transportation and access and are not discussed.

Air Quality

Dispersed recreation, prescribed burning activities, and mineral and energy development cause emissions of particulate matter, carbon monoxide, nitrogen oxide, sulfur dioxide, and VOC emissions currently below regulatory thresholds. In the future, these emissions could affect ambient air quality, visibility, and atmospheric deposition. The cumulative impact analysis of air quality within and near the LSFO includes major sources such as coal-fired power plants and cogeneration facilities. No other RFDs would increase regulated pollutants in the area.

Ambient Air Quality

Data contained in the Draft Roan Plateau RMP (BLM 2004) were used to determine the baseline conditions after the development of proposed energy resources was complete. The modeled criteria air quality impacts potentially associated with the Roan Plateau RMP demonstrated that there are no exceedances of NAAQS. Estimated concentration concentrations were also compared to Class I and Class I PSD increments. No modeled concentrations exceeded any PSD increment for any criteria pollutant. In addition, emission data were gathered for the area. Using State of Colorado data (CDPHE 2002), emissions for both Routt and Moffat counties are shown in Table 4-3. Other sources are air emissions other than those attributed to BLM activities in the RMPPA that are currently contributing less than 7 percent of the emissions in the vicinity of the LSFO. For example, the NO_x emissions from future BLM activities for all alternatives range from 7,122 to almost 8,643 tons per year (Table 4-58). Current emissions from the sources in the two-county area are more than 23,000 tons per year. Considering that the permitted sources do not calculate emissions from some of the oil and gas sources and that the permitted emissions come from single point sources, the emissions from the BLM activities would be minimal compared with existing sources.

Table 4-58. Air Emissions in Routt and Moffat Counties (Tons Per Year)

County	Sources	PM10	NO _x	SO ₂	CO	VOC
Routt	Stationary	1,023	8,516	2,869	456	87
Total		7,666	10,832	3,104	39,124	27,576
Moffat	Stationary	2,011	20,156	10,398	1,793	1,384
Total		15,041	23,146	10,767	69,203	33,188

Source: Colorado Department of Public Health and the Environment 2002

Hazardous Air Pollutants

The results of the far-field HAPs modeling show that the annual HAPs emissions produced calculated cancer risks, which are within the range of presumptively acceptable risks. Risk calculations are based on the maximum modeled concentration found anywhere in the vicinity of the hypothetical arrangement of sources; therefore, the calculated risk levels should be viewed as an upper bound on the range of possible risks associated with far-field impacts, with risks to actual residents likely being lower.

Visibility

Results of the visibility analysis performed by Trinity (2004) for BLM sources and all sources are presented in Table 4-59.

Table 4-59. Results of Screening-Level and Refined Modeling of Cumulative Visibility Impacts (All Sources; Vernal, UT; and Glenwood Springs, CO Resource Areas¹)

Days >1.0 Deciview Change				
PSD		Screening-	Refined Modeling	
Class	Name of Class I or Class II Area	Level	Minimum	Maximum
I	Black Canyon of the Gunnison National Park	2 (0)	0	1(0)
I	Eagle's Nest Wilderness	0	--	--
I	Flat Tops Wilderness	1 (0)	0	0
I	La Garita Wilderness	0	--	--
I	Maroon Bells-Snowmass Wilderness	0	--	--
I	Mt. Zirkel Wilderness	1 (0)	0	1(0)
I	Rawah Wilderness	0	--	--
I	Weminuche Wilderness	0	--	--
I	West Elk Wilderness	1 (0)	0	0
II	Colorado National Monument	3 (0)	--	--
II	Dinosaur National Monument	3 (0)	--	--
II	Holy Cross Wilderness	0	--	--
II	Hunter-Frying Pan Wilderness	0	--	--
II	Raggeds Wilderness	0	--	--

The results shown in Table 4-59 indicate that potential BLM sources, along with existing inventory sources could result in a perceptible or “just noticeable” impact (1.0-dv reduction) on visibility at several of the PSD Class I areas in the study domain. Results of an analysis using the United States Forest Service (USFS) threshold of 0.5-dv change may be found in the Technical Support Document (TSD) (Trinity 2004). The Class II areas have no visibility protection under existing State or federal laws, but are included to provide decisionmakers with a more complete picture of potential impacts throughout the region.

Because the screening visibility showed potential impacts on one or more Class I areas, a more refined analysis was conducted based on hourly optical monitoring data measured at Canyonlands National Park for the years 1986–2002. Again, the FLAG 1.0-dv (10 percent change in extinction) “just noticeable change” cumulative source threshold was used to assess the significance of potential impacts.

Table 4-59 also shows results of the refined modeling analysis. Note that the refined visibility results show that operations of proposed BLM and inventory sources could result in a “just noticeable” (1.0 dv reduction) impact on visibility at only one Class I area (the Black Canyon of the Gunnison; maximum potential impact is 1 day). No BLM sources (Vernal and Glenwood Springs) would be anticipated to cause significant impacts on this or any Class I area.

Soil Resources

The Cumulative Impact Assessment Area (CIAA) for soil resources includes the RMPPA boundary. Surface disturbance and vegetation loss would be the primary contributors to

decreased soil productivity by increasing soil erosion and loss. Continued population growth and the resulting growth in vehicle and OHV use and visitation in the region would contribute to soil disturbance. Alternatives A and B potentially have the most impact (because 38,530 acres of fragile soils would be designated as limited to OHV use). With historic OHV use adjacent to this area, opening it to OHV use, combined with livestock, wild horse, and wildlife consumption of forage, would reduce soil stabilizing vegetation, which could result in significant increases in soil erosion. Whereas the other alternatives continue to allow open OHV use, fragile soil areas would be limited or closed to OHV use. Cumulative impacts from continued mineral leasing, pipeline construction, and elk overpopulation could be mitigated through actions currently within the alternatives, Standards and Guides, and BMPs to reduce soil erosion resulting from permitted activity.

Water Resources

The CIAA for water resources includes the RMPPA and Level 5 watershed boundaries that intersect the RMPPA. BLM management actions combined with the proposed construction and development of additional natural gas pipelines, coal development activities, and the increased interest in oil shale and tar sand development activities could increase localized erosion and sediment loading, which could degrade downstream water quality; however, permitted activities would have to comply with BMPs that would minimize soil erosion and discharge to water resources. The enlargement of the Elkhead Reservoir could modify the flow regimes in the Yampa River, which could affect water quality. Cumulative impacts would be more evident under Alternative B than other alternatives because there would be fewer restrictions on surface disturbing activities.

Vegetation

The CIAA for vegetation includes the RMPPA and Level 5 watershed boundaries that intersect the RMPPA. RMP alternative impacts to vegetation vary by alternative, but the majority of impacts would result from management actions such as minerals development, open OHV use, and vegetation treatments that could result in surface disturbance and decrease vegetation diversity. Surface disturbance under all alternatives could decrease riparian/wetland functioning conditions. Alternative B would result in the greatest impacts on vegetation because of the greatest amount of development with the least amount of restrictions. Alternative D would result in the least impacts on vegetation because of the least amount of development and the greatest level of protection. BLM management actions combined with the proposed construction and development of additional natural gas pipelines, coal development activities, and the increased interest in oil shale and tar sand development activities could increase surface disturbance, which could reduce vegetation diversity by increasing the areas dominated by early seral vegetation and by establishing noxious weeds and invasive species. Under Alternative A, past fire suppression and livestock grazing have contributed to increasing shrub density within the RMPPA. The Emerald Mountain land exchange would transfer large contiguous blocks of land to BLM management, which could increase vegetation diversity resulting from consistent management for resources goals and objectives. CDOW herd management objectives would reduce wildlife populations in the RMPPA. Reducing wildlife populations and Moffat County's activities under the integrated weed management program would reduce the spread of and opportunities for the

establishment of noxious weeds and invasive species by increasing vegetation diversity and the ecological health of rangelands and forest and woodlands.

Fish and Wildlife Habitat

The CIAAs for effects on fish and wildlife vary by species. The CIAAs for elk, mule deer, and pronghorn are composed of the habitat management units (HMU) for each species that either falls completely within the RMPPA or both within and outside of the RMPPA. CIAAs for raptors and all other wildlife and fish species are all composed of the RMPPA. RMP alternative impacts on fish and wildlife habitat vary by alternative; however, the majority of impacts would be considered moderate as a result of actions such as minerals development, OHV use, and livestock grazing that could result in the loss, alteration, and fragmentation of habitats and displacement of wildlife. Alternative B would result in the greatest impacts on wildlife because it has the greatest amount of development with the least amount of protections. Alternative D would result in the least impacts because of the least amount of development and the greatest level of protection.

The majority of cumulative impacts on wildlife habitat within all the CIAAs would result from surface disturbing and disruptive activities such as mineral development and associated wells, roads, pipelines, facilities, and open pit mines on private, State, and other federal lands within the RMPPA. The two pipeline projects (Wyoming Interstate Company Piceance Basin Expansion Project and Entrega Gas Pipeline) would result in fragmentation of wildlife habitat and migratory corridors; however, because of the temporary nature of pipeline disturbance, no long-term effects to wildlife habitat would be anticipated.

The primary big game migratory corridor goes through some existing oil and gas leases, as well as the area with the majority of existing coal leases and coal development potential. Applications for leasing and development of coal in these areas would temporarily reduce available habitat and would likely disrupt migratory corridors.

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.

Elk

Severe winter range and birthing habitat are important areas for the viability of the elk herds. Persistent disturbance in sensitive elk habitats shifts the areas of use, weakens the tendency of elk to return to the disturbed area, and results in the selection of habitat with equal or more marginal quality and security. If animals return to disturbed habitat, populations might be lower and use of the habitat could be impaired. Potentially significant effects on these habitats from activities would be likely because they would not be afforded the same protections as habitat on

BLM lands. The potential also exists for long-term disruption of migration corridors as a result of proposed pipelines between these key habitats within the CIAA.

Pronghorn

Although few published studies exist on pronghorn antelope reactions to roads and/or disruptive human activities, roads, fences, and pipelines are known to fragment habitat and can impede or block pronghorn movement. The density with which these occur could have a great effect on pronghorn migration and use of habitat. Mineral development would have the greatest impact on pronghorn by habitat fragmentation caused by the proliferation of roads, pipelines, and wells. Road proliferation would continue to occur from oil and gas projects in pronghorn habitat, which would potentially reduce or eliminate migration corridors throughout antelope severe winter range in the CIAA. Depending on the timing of activities and location of surface disturbance within the CIAA, disruption of severe winter range continuity and migration corridors between key habitats could occur, which would likely affect pronghorn populations; however, it is unknown whether effects would be significant given the lack of information on pronghorn reactions to human activity.

Mule Deer

Mineral development would cause the greatest impacts on mule deer habitats on all lands within the CIAA through direct loss of habitat and animal displacement. Depending on the timing of activities and location of surface disturbance within the CIAA, disruption of severe winter range continuity and migration corridors between key habitats could occur, which would likely affect mule deer populations. It is unknown whether effects would be significant.

Yampa River Fisheries

To comply with federal ESA guidelines and recovery program objectives, additional water releases from the Elkhead Reservoir are required to maintain adequate streamflows from late July through September for endangered fish species in the Yampa River. Construction is underway to raise the dam height by 25 feet, which would increase water storage from 13,800 acre-feet to 24,888 acre-feet. Adequate streamflows would also maintain populations of other fish species within the Yampa River.

Special Status Species

The CIAA for Special Status Species includes the RMPPA and all Level 5 watersheds that intersect the RMPPA. Depending on the extent and timing of activity, casual use could cause slight to significant changes to habitats that may be occupied by Special Status Species or provide necessary habitat components over time. Such impacts could include trampling of Special Status Plant Species or damage to Special Status Species habitats, introducing noise or dust that can disturb species during sensitive periods, introducing invasive weeds or disease, degrading Special Status Species habitat, and causing direct or stress-related mortality. Stationary species such as plants would be particularly susceptible to cumulative effects from recreation. With the eventual increases of casual use resulting from increased populations or popularity of the area for recreation activity, cumulative impacts could become significant for some species. Alternatives that apply NGD and SSR to all permitted activity (Alternatives B, C,

and D) and incorporate the statewide programmatic conservation measures (Alternatives B, C, and D) would provide greater protections for Special Status Species from casual use activity.

Permitted activities result in ground disturbance that could accumulate to affect large expanses of habitat. 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. All permitted activities, including reasonably foreseeable well development on federal minerals, proposed pipelines traversing the RMPPA, oil shale and tar sands leasing, coal mine leases, and mineral claims, would require USFWS and BLM consultation to ensure projects would not adversely affect Special Status Species at a cumulative level. Additionally, BLM policy requires other Special Status Species of non-federal status (such as BLM Sensitive and State-listed species) to receive the same protection and consideration as federally protected species. Continued management of OHV use and permitted activity under Alternative A would likely lead to significant cumulative impacts to Special Status Species, particularly sage-grouse populations. Alternatives that incorporate the statewide programmatic conservation measures (Alternatives B, C, and D) would provide a consistent approach to management of Special Status Species across the RMPPA that would further facilitate recovery and maintenance of existing populations.

Changes to habitat conditions that foster habitat diversity and Special Status Species habitat components (Alternatives C and D) would provide greater cumulative protections for existing Special Status Species habitats, and potentially foster areas of habitat suitable for population expansion. Integrated weed management provided by Moffat County on public, as well as private lands would control and prevent noxious weeds that could otherwise deteriorate habitat conditions and key habitat components necessary for Special Status Species. Continuing to consolidate surface ownership, including the Emerald Mountain Exchange project in Routt County, would protect Special Status Species by providing more contiguous habitat that would be consistently managed and subject to federal policy protecting Special Status Species. The Ranching for Wildlife State-subsidized program would provide wildlife habitat on undeveloped private lands that might foster Special Status Species on neighboring lands. Because the Elkhead Reservoir enlargement project is intended to maintain adequate streamflows for endangered fish species in the Yampa River, any efforts undertaken by BLM to minimize stream pollution and degradation would provide additional protections. On the contrary, if BLM activities under some alternatives lead to increased pollution (Alternative A), the additional streamflow would dissipate introduced substances and reduce impacts to endangered fish.

Wild Horses

The CIAA for wild horses includes the Sand Wash Basin HMA. If the CDOW elk herd populations remain above their objective levels, wild horses would have to compete for forage with wildlife. Although there might be sufficient forage if livestock permits are reduced, wildlife herds that are too big could force wild horses out of their preferred grazing areas. Additionally, increases in hunting licenses to bring wildlife populations within objective levels would increase the number of vehicles and hunters in the HMA, which could displace wild horses from their preferred grazing areas.

Wildland Fire Management

The CIAA for fire management includes all areas within 100 kilometers of the RMPPA and all Level 5 watersheds that intersect the RMPPA. Effects on fire frequency, intensity, and suppression activities resulting from actions taken by BLM within the RMPPA would combine with similar effects caused by activities sponsored by other groups and private interests (see Section 4.6.2) to create cumulative impacts to fire management within the analysis boundary. As development, recreational activities, and general use of the area increased, so would the number of potential ignition sources and consequently the probability of wildland fire occurrence, which would increase the need for federal, State, and local agencies to suppress wildland fires to protect life, property, and sensitive resources. Furthermore, development of the area would also increase the amount of WUI areas, which would put additional pressure on fire suppression efforts, because these are high priority areas for fire suppression. Suppression activities within WUI areas can 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 area, potentially increasing the frequency, size, and intensity of wildland fires. Developed areas and associated roads and ROW corridors could also provide increased accessibility to remote areas for fire suppression equipment and provide fuel breaks in the case of wildland fire events.

Additional cumulative effects would occur as a result of all projects and activities within the analysis boundary that create air emissions (e.g., oil and gas development, prescription fire, vehicle use, and all surface disturbing activities that mobilize dust). Such activities could impair visibility within the five federal Class I areas that occur within 100 kilometers of the RMPPA. If this occurred, the use of prescribed fire could be limited or suspended.

Cultural and Heritage Resources

The CIAA for cultural resources includes the RMPPA and neighboring lands with a high potential for connected resources. 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.

Impacts associated with CDOW wildlife population measures, specifically if the population levels continue to exceed objectives, 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.

Activities permitted through BLM (such as the Wyoming Interstate Company Piceance Basin Expansion Project and Entrega Gas Pipeline, oil and tar sands leasing of federal minerals, and mining on federal minerals) would likely disturb cultural resources. Section 106 consultation

would be required for these activities, which would require cultural surveys and avoidance or mitigation of identified sites. This could result in the identification of more cultural resource sites, and an increase in information concerning cultural resources within the RMPPA.

Paleontological Resources

The CIAA for paleontological resources includes the RMPPA and neighboring lands with a high potential for connected resources. Surface disturbing activities within areas containing significant fossils have the potential to damage these fragile, nonrenewable resources; however, existing laws, regulations, and policies provide ample opportunity to mitigate adverse effects of federal activities through avoidance or collections of specimens and data. Although it is expected that some fossils would be destroyed in the course of legitimate uses of public lands, mitigation measures would likely bring paleontologists to areas where fossils have not yet been studied. Fossils that would otherwise have disintegrated over time as a result of weathering and erosion would be collected, placed in repositories, and preserved in perpetuity.

Special Management Areas

The CIAA for SMAs (including WSAs, lands with wilderness characteristics outside existing WSAs, ACECs, and WSR segments) includes the entire RMPPA. If any of the seven existing WSAs were released by Congress from wilderness consideration, cumulative effects could occur. The potential for cumulative impacts would be the greatest under Alternatives A and B because these areas would be available for potential development, surface disturbance, and OHV use. These impacts would be similar on the lands with wilderness characteristics outside existing WSAs, ACECs, and WSR segments.

Visual Resources

The CIAA for visual resources consists of the RMPPA, regardless of land status. Many of the lands in this area are privately-owned, including lands in cities and towns. Public lands in the CIAA are also managed by several federal agencies and the State. Under Alternatives A and B, cumulative impacts on visual resources would occur primarily from resource development, oil and gas leasing, motorized recreation, and urban growth and development. Under Alternatives C and D, mitigation and appropriate VRM categories would reduce these impacts in the long term.

Energy and Minerals

The CIAA for energy and minerals includes the RMPPA and the immediately adjacent northern boundary. An increase in public demand for energy and mineral resources could have a cumulative impact on energy and minerals development within the RMPPA. An increase of oil and gas prices would favor continued exploration and development of these resources. Construction of the Piceance Basin Expansion Project pipeline and the Entrega gas pipeline would increase the infrastructure to transport natural gas resources, which would facilitate gas exploration and development activities. Oil shale and tar sands leasing authorized through the PEIS could allow for the development of these resources on public lands and increase infrastructure in the area that would benefit other minerals activity within the field office. Increasing interest in developing coal, uranium, and other mineral resources could increase the

development of these resources within the RMPPA and potentially foster additional infrastructure and other mineral activity.

Livestock Grazing

The CIAA used to analyze cumulative impacts on livestock grazing includes all grazing allotments that intersect the RMPPA. Potential cumulative impacts on livestock grazing operations would occur from a combination of activities and land uses taking place within the analysis boundary. Vegetation treatment activities designed to enhance rangeland conditions would generally result in increased forage production. Surface disturbing activities, the presence of grazing wildlife, and general human disturbance would result in forage loss and degradation and could result in livestock displacement, harassment, and injury.

Existing and future oil and gas development projects, recreation use, and big game populations located within the analysis boundary would reduce AUMs and forage available for livestock and cause a cumulative increase in soil disturbance, vegetation removal, noxious and invasive weed proliferation, and livestock displacement. Impacts would be greater in areas with large populations of big game and areas with high-density mineral development projects. These impacts could result in substantial rangeland degradation and jeopardize compliance with the *Standards for Public Land Health* on some allotments. If livestock grazing is considered to be a factor in violating the *Standards for Public Land Health*, the responsible livestock operator would be required to make adjustments to grazing practices.

Oil and gas development activities and related construction of roads, pipelines and well pads would be the primary cause of direct forage removal and weed proliferation. The implementation of BLM's mitigation guidelines, restrictions on surface use, *Standards for Public Land Health*, vegetation treatments, and monitoring efforts would provide protections to forage resources on federal lands, which would help to reduce effects on livestock grazing operations. Under Alternatives B, C and D, these actions would actually increase net forage production.

Recreation

The CIAA for recreation includes the RMPPA. Cumulative impacts would likely occur through management proposed under Alternatives A and B because of the increased surface disturbance from development activities based on reduced surface disturbance restrictions, the high percentage of the RMPPA that would be open to cross-country OHV use, and the lack of special management to address the increased use and demand for recreation opportunities and experiences in certain areas of the RMPPA. Development activities could impact certain recreational settings resulting in the degradation of some recreational opportunities and experiences. Impacts would potentially occur as a result of increased recreational demand and use to a point where conflicts would occur to unconfined dispersed recreational opportunities. The cumulative effect of these actions would degrade resources that are important to recreationists and increased user conflicts between mineral development operations, and motorized and non-motorized recreationists. Management actions proposed under Alternatives C and D would reduce the potential for these conflicts.

Cumulative impacts could also occur in the south Sand Wash area because of the potential for conflicts between the wild horse herd, motorized recreation opportunities, livestock grazing, and oil and gas development. These conflicts could degrade the recreation experience in the area to the point that recreationists would be displaced.

The cumulative impacts of oil and gas, locatable minerals, mineral material sales, coal, oil shale, and ROWs for pipelines (such as the Entrega gas pipeline and Wyoming Interstate Company Piceance Basin Expansion) would cause significant impacts on recreation opportunities and experiences throughout the RMPPA if full development of these resources and projects occurred. These impacts would result in a long-term elimination or reduction of recreation opportunities, activities, and experience as a result of surface disturbance and displacement of users. These actions could also result in public health and safety concerns for both motorized and non-motorized recreationists because of increased traffic and activity from oil and gas development.

The Emerald Mountain Exchange, Ranching for Wildlife State-subsidized program, and the Elkhead Reservoir enlargement could expand recreation opportunities and experiences. The Emerald Mountain exchange could increase access to public lands and expand dispersed recreation opportunities in the area, and the Wildlife Ranching program would expand deer, elk, and pronghorn hunting recreation opportunities within the RMPPA. Effects of the Elkhead Reservoir enlargement project to recreation are discussed in Section 3.2.3.1.

Forestry

The CIAA for forestry includes the RMPPA and includes USFS lands in the eastern portion of the LSFO. BLM management actions combined with the proposed construction and development of additional natural gas pipelines, coal development activities, increased interest in oil shale and tar sand development activities, and development of the Elkhead Reservoir could cause a short-term decrease in the quantity of forest and woodland product available. Long-term surface disturbance associated with these projects would convert the amount of forest and woodlands to an early seral stage, reducing the areas where forest and woodland harvest would be considered.

Lands and Realty

The CIAA for lands and realty include the RMPPA and major ROW corridors that intersect its boundaries. Increasing minerals activities in the RMPPA as well as increasing interest in oil shale and tar sands in adjacent areas places a greater demand on lands and realty actions, creating the need for additional ROWs for pipelines, powerlines, and supporting development. Two such projects, the Entrega gas pipeline and Wyoming Interstate Company Piceance Basin expansion project, are already proposed. Restrictions on ROWs in the RMPPA, combined with restrictions from other management plans in the area, would have a minor cumulative effect by reducing routing options and possibly increasing construction costs for utilities.

Social and Economic Conditions

Cumulative impacts over the 20-year life of the plan across the management alternatives are provided in Table 4-60 and Table 4-61. The analysis focuses on overall industry income, employment and employment compensation, but also presents details about the main subsectors

affected by the management alternatives. Each panel contains results for one of the variables, both as totals and also for the main subsectors. For perspective, the impacts of growth created by non-retirees and the retiree population are also provided, even though they do not vary across the alternatives.

The cumulative impacts illustrated in Table 4-60 show few differences between Alternatives A, B, and C in industry income, employment or compensation to employees. The variation on industry income, shown in the top panel, between Alternatives A and B would be \$64 million over the full 20 years, which is just a 2.3 percent variation. Moreover, there would be only 90 workers less (0.8 percent) in the lowest employment outcome compared to the highest among the first three alternatives, as shown in the middle panel. In all cases, the highest values would be found in Alternative B, which has the most drilling activity among the alternatives. The bottom line of Table 4-61 shows total tax revenues across local, State and federal sources, which vary by at most \$16 million among the first three alternatives over 20 years.

It also evident from Table 4-60 that Alternative D has the greatest divergence from others over the 20-year planning horizon, again due mainly to the significantly fewer wells drilled (1,980 wells drilled in Alternative D versus 3,020 in Alternative B). As a result, total income would fall by 16.1 percent and employment would fall by 792 workers or 8.6 percent. The lesser change in employment arises because oil and gas development does not create large employment effects, and therefore the decline is smaller. However, Table 4-60 shows that the average wage would decline by nearly \$2,000 in Alternative D relative to B, reflecting the point that the oil and gas industry is capital and not labor intensive and pays higher wages to those who obtain jobs in that sector. For the same reasons, employment compensation would decline by a relatively large 17.3 percent in Alternative D as opposed to Alternative B. As a result of this decline, Alternative D, with its lower industry income and employee compensation, would lead to a loss in tax revenue of approximately \$140 million relative to Alternative B over the 20 years of the plan.

Table 4-60. Cumulative Impacts of BLM Management Alternatives over the 20-Year Plan, by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
INDUSTRY INCOME (MILLIONS OF \$)				
Total	2,741.3	2,805.1	2,759.5	2,352.8
Oil drilling	1,452.3	1,484.9	1,480.4	1,135.1
Oil production	235.3	269.1	240.6	176.4
Cattle	(1.4)	13.3	1.1	6.2
Sheep	(0)	0.3	0.0	0.1
Motorized recreation	6.9	6.9	5.5	1.4
Non-motorized recreation	1.1	1.1	2.3	3.6
Non-retirees	673.4	673.4	673.4	673.4
Retirees	373.8	373.8	373.8	373.8
EMPLOYMENT (NUMBER OF WORKERS)				
Total	9,097	9,167	9,090	8,375

	Alternative A	Alternative B	Alternative C	Alternative D
Oil drilling	740	750	754	582
Oil production	170	194	174	127
Cattle	(7)	65	5	30
Sheep	(0)	3	0	1
Motorized recreation	12	12	9	2
Non-motorized recreation	3	3	6	9
Non-retirees	1,325	1,325	1,325	1,325
Retirees	710	710	710	710
EMPLOYEE COMPENSATION (MILLIONS OF \$)				
Total	1,849.4	1,897.0	1,864.4	1,570.5
Oil drilling	1,067.6	1,095.6	1,087.8	834.1
Oil production	152.4	174.4	155.9	114.3
Cattle	(0.7)	6.8	0.6	3.2
Sheep	(0.0)	0.2	0.0	0.1
Motorized recreation	4.2	4.2	3.3	0.9
Non-motorized recreation	0.7	0.7	1.5	2.5
Non-retirees	393.9	393.9	393.9	393.9
Retirees	231.3	231.3	231.3	231.3

The same inferences can be made by observing data on oil and gas versus population-driven economic activity, which is represented in the table segments as retiree and non-retiree contributions. Approximately 62.5 percent of the total growth in industry income in Alternative B over 20 years would be related to oil and gas activity, while that amount drops 55.7 percent in Alternative D. However, the economic activity related to growth in these two population groups is non-trivial, accounting for 37.4 percent of the overall activity.

The other affected sectors include agriculture and recreation. Table 4-60 shows that the total effects on these sectors would be much smaller than for oil and gas. Despite the much smaller impacts, the choice of alternative would have implications for these sectors as well. The forecasts for agriculture taken from DOLA show a decrease in the sales for that sector, corresponding with a decline in cattle and sheep in Alternative A. Thus, the other alternatives yield improvements, with Alternatives B and D having the greatest positive impacts. Alternative B has the greatest impact overall, with an addition of 68 workers, followed by D, where increased forage availability would lead to 31 more workers active in the agricultural economy. In the area of recreation, total employment would stay the same for Alternatives A, B and C, but the proportions supported by motorized recreation vary. There would be a slight decline in the contribution of recreation in Alternative D, which shows a significant shift to non-motorized opportunities.

Table 4-61. Cumulative Impacts of BLM Management Alternatives Over the 20-Year Plan, by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Average wage (\$)	20,331	20,694	20,511	18,753
Wells drilled (No.)	2,640	3,020	2,700	1,980
Taxes from affected sectors (Millions of \$)	1,185	1,201	1,200	1,058

Although data on the preferences of potential migrants into the county are not available, a number of potential conflicts between new migrants and development of oil and gas fields are discussed in Section 4.5.3. Some of the factors outlined in that section may affect migrants' decisions to choose to live in Moffat County versus other rural destinations, but their reactions to differences in oil and gas development between Alternative B versus D, for example, cannot be quantified without further survey work. Whereas the difference of 1,000 wells over 20 years appears to be significant, that variation may or may not be visible to those choosing to move to Moffat County. If in fact these conflicts exist, and the relatively greater oil and gas development in Alternative B would lead to a reduction of one-third of the new migrants (for example), then the loss in population-related income could be \$350 million, which would eclipse much of the higher income in Alternative B coming from the extensive oil and gas activity.

Impacts of Variations in Timing of Oil and Gas Development

The cumulative impacts data discussed above assume that oil and gas development grows linearly throughout the 20 years of the plan. However, it may well be that development occurs rapidly over a much shorter period. In this section, analyses from other parts of this document are revisited to show how effects might change within different time periods.

Suppose that growth derived from the estimate of 3,020 wells in Alternative B occurs in 10 rather than 20 years. This would result in an average of 302 wells being drilled during each of the first 10 years, and then none after that time. The drilling impacts, including direct, indirect, and induced impacts, would double on an annual basis, and thus the figures for oil and gas drilling in 2015 would also be doubled on an annual basis. Moreover, oil and gas production, which can be supported as a result of drilling during the first 10 years of the plan, would lead to a doubling of income over the second 10-year period. Thus, instead of an industry income of \$42.7 million in 2015 (for management Alternative A), the total income for oil and gas *drilling* would be \$85.4 million. However, by 2025, these numbers would return to zero because drilling will have stopped after the first 10 years. The numbers of people employed during this period would also double, resulting in a total of 250 rather than 125 workers during each of the first 10 years.

The oil and gas *production* values would also be double in the year 2015, but would then remain the same through 2025 (except for some productivity growth in output per laborer assumed in the forecasts). Thus, maximum yearly industry income of \$43.8 million would be reached in 2015 rather than 2025, and that stream of income would remain for the following 10 years. Likewise, the employment of 98 workers would be reached in 2015 and would also remain level for the

next 10 years. These changes would lead to increased cumulative impacts of 50 percent for oil and gas production as shown in Table 4-60 due to the earlier development of the wells forecasted in the plan.

The effects on job growth are very significant because of the large multipliers in oil and gas development. Table 4-62 illustrates the effects of doubling the growth in jobs and economic activity during the drilling phase for all alternatives. Thus, in Alternative C, 79 jobs are created from drilling during a typical year when the development takes 20 years, but that number would double to 157 jobs when drilling takes place during 10 years. The multiplier effects would lead to a total of 754 jobs in Moffat and Routt counties, or 16 percent of the total jobs when development occurs over 20 years. Accordingly, 1,508 jobs can be expected to result from the 10-year scenario, thus linking oil and gas development to a total of 26 percent of all jobs in the affected region. Of course, if development is performed predominately by oil and gas firms in the surrounding region outside the counties, who make few purchases inside the counties, this impact would be much smaller. The higher forecasted drilling activity would also lead to higher, although temporary, indirect effects. This could result in very high local economic activity for a number of years and potentially steep declines in later years. The indirect effects would exhibit the same great activity followed by a steep decline.

Table 4-62. Comparison of Oil and Gas Extraction Income for Wells Drilled Over 10 and 20 Years, by Alternative (Millions of \$)

	Alternative A	Alternative B	Alternative C	Alternative D
OIL AND GAS DRILLING—CUMULATIVE IMPACTS, WELLS DRILLED OVER 20 YEARS				
Direct Impact	77	89	79	59
Indirect Impact	380	370	387	302
Induced Impact	283	291	288	222
Total Impact	740	750	754	582
OIL AND GAS DRILLING—CUMULATIVE IMPACTS, WELLS DRILLED OVER 10 YEARS				
Direct Impact	155	177	157	118
Indirect Impact	760	741	773	605
Induced Impact	565	582	575	443
Total Impact	1,480	1,500	1,508	1,164

4.7 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Section 102(2)(C) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that are involved in the proposal should it be implemented. An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time (e.g., extraction of any locatable mineral ore or oil and gas). An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species or disturbance to protected cultural resources).

The air quality resource in the RMPPA 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.

Implementation of the RMP management actions would result in surface disturbing activities, including dispersed recreation, OHV use, mineral and energy development, and ROW development that results in loss of irreversible or irretrievable resources. Although new soil can develop, soil development is a slow process in the RMPPA. Surface disturbing activities, therefore, would remove vegetation and accelerate erosion that would contribute to irreversible soil loss; however, management actions and BMPs are intended to reduce the magnitude of these impacts and restore some of the soil and vegetation lost.

Laws protecting cultural and paleontological resources would provide for mitigation of irreversible and irretrievable impacts on cultural resources from permitted activity. OHV use areas open to cross-country use, specifically in areas of high cultural sensitivity or areas containing vertebrate or scientifically significant fossil resources, could have some resources destroyed. Such destruction would be irreversible and irretrievable.

An irreversible commitment of nonrenewable fossil fuels (e.g., oil, gas, and coal), locatable minerals, and mineral materials would occur from development over the next 20 years.

4.8 UNAVOIDABLE ADVERSE IMPACTS

Section 102(C) of NEPA requires disclosure of any adverse environmental effects that cannot be avoided should the proposal 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 occur as a result of implementing the RMP. Others are a result of public use of the BLM-managed lands within the planning area.

Activities planned would produce some level of air emissions even with mitigation; however, none of the activities proposed in this EIS would produce adverse impacts on the air quality resource.

Surface disturbance activities would result in unavoidable adverse impacts under current BLM policy to foster multiple uses. Although these impacts would be mitigated to the extent possible, unavoidable damage would be inevitable. Permanent conversion of areas to other uses such as transportation and mineral and energy development or used for OHV use would increase erosion and the relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities. Because large portions of the crucial big game habitats coincide with areas of high oil and gas potential, unavoidable wildlife habitat loss would also occur. These activities would also introduce intrusions, which could affect the visual landscape.

Unavoidable damage to cultural and paleontological 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. Unavoidable loss or destruction of cultural and paleontological

resources would also occur in areas open to cross-country OHV use, specifically in areas of high cultural sensitivity or areas containing vertebrate or scientifically significant fossil resources. Unavoidable loss of cultural and 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 cultural and paleontological resources would be expected to greatly reduce the probability of unavoidable adverse impacts to the resource.

Wildlife, livestock, and wild horses would contribute to soil erosion, compaction, and vegetation loss, which could be extensive during drought cycles and dormancy periods. Conversely, unavoidable losses or damage to forage from human uses in the RMPPA would affect livestock, wildlife, and wild horses. Some level of competition for forage between these species, although mitigated to the extent possible, would be unavoidable. Instances of displacement, harassment, and injury could also occur.

Recreational activities, development of mineral resources, and general use of the RMPPA would introduce additional ignition sources into the RMPPA, which would increase the probability of wildland fire occurrence and the need for suppression activities. These activities combined with continued fire suppression would also affect the overall composition and structure of vegetation communities, which could increase the potential for high-intensity wildland fires.

As recreation demand increases, recreation use would disperse, creating unavoidable conflicts between recreation user types such as those seeking more primitive types of recreation and motorized users sharing recreation areas. In areas where development activities would be greater, the potential for displaced users would increase.

Numerous land use restrictions imposed throughout the RMPPA to protect sensitive resources and other important values, by their nature, affect the ability of operators, individuals, and groups who use the public lands to do so freely without limitations. These restrictions could also require the closing of roads and trails or the limiting of certain modes or seasons of travel. Although attempts would be made to minimize these impacts by limiting them to the level of protection necessary to accomplish management objectives, and providing alternative use areas for affected activities, unavoidable adverse impacts would occur under all alternatives.

4.9 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of human environment, and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, “short-term” is defined as anticipated to occur within 1 to 5 years of implementation of the activity. “Long-term” is defined as following the first 5 years of implementation, but within the life of the RMP (projected to be 20 years).

Short-term use of the air quality resource would not affect long-term productivity, except that air quality emissions in high enough concentrations could reduce vegetation and plant vigor.

Short-term use of an area to foster energy and minerals, ROWs, and cross-country OHV use would result in long-term loss of soil productivity and vegetation diversity. Impacts would persist as long as surface disturbance and vegetation loss continue.

The short-term use of big game severe winter range, birthing areas, and/or migratory corridors for energy and minerals, ROWs, and cross-country OHV use could impair the long-term productivity of big game populations by displacing animals from primary habitats and removing components of these habitat that might not be restored for more than 20 years. These short-term uses could also affect the long-term sustainability of some Special Status Species. The potential for these effects would vary by alternative, because long-term deterioration of sage-grouse habitat as a result of minerals activity and endangered Colorado pikeminnow habitat and Special Status Plant populations as a result of recreation use would be more evident under Alternative A.

The short-term resource uses associated with OHV use and minerals development (individual short OHV trips, oil and gas seismic exploration, natural gas test well drilling, and the noise associated with these activities) in the HMA would have adverse impacts on the long-term productivity of wild horse herds if they impinge on wild horse foraging areas and water sources. These activities, though short-term individually, could have collective long-term impacts on wild horse productivity and health if they increase in the long term.