CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The purpose of this chapter is to determine the potential for significant impacts of the "federal action" on the "human environment." CEQ regulations for implementing NEPA state that the "human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR Section 1508.14). The "federal action" is BLM's selection of a RMP on which future land use actions will be based.

This chapter objectively evaluates the environmental impacts of implementing each alternative described in Chapter 2. It forms the analytic basis for the comparative summary of impacts presented in Chapter 2 (Table 2-2, Descriptions of Alternatives A, B, C, and D). Chapter 3 describes the existing conditions of the resources and resource uses that would be affected by the alternatives. The organization of this chapter parallels that of Chapter 3, in that the resource programs are presented in the same order. Because resources and resource uses are often interrelated, one section may refer to another.

Chapter 4 presents the likely direct, indirect, and cumulative impacts on the human and natural environment in terms of environmental, social, and economic consequences that are projected to occur from implementing the alternatives presented in Chapter 2. Each topic area includes a methods of analysis section that identifies methods and assumptions; a summary of effects common to all alternatives; and an analysis of impacts from each of the four alternatives for each resource. Separate sections describing cumulative impacts, unavoidable adverse impacts, and the irretrievable or irreversible commitment of resources are presented at the end of Chapter 4.

Some types of impacts for resources or resource uses could be confined to the BLM lands (such as soil disturbance from recreation and OHV use), whereas some actions may have offsite/indirect impacts to resources on federal mineral estate (such as energy and minerals, and requirements to protect such resources as special status species and cultural resources), or to other land jurisdictions (e.g., private, state, or USFS). Federal mineral estate includes subsurface mineral estate administered by the BLM.

Some BLM management actions might affect only certain resources and alternatives. This impact analysis identifies both enhancing and improving effects on a resource from a management action, as well as those that potentially diminish resource values. If an activity or action is not addressed in a given section, either no impacts are expected or the impact is expected to be negligible. Only management programs with anticipated adverse impacts are discussed.

The BLM manages lands for multiple uses in accordance with 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 conflicts among resource uses arise, or when a land use activity could result in unacceptable or irreversible impacts on the environment, the BLM may restrict or prohibit some land uses in specific areas. To ensure that the 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, on reviews of existing literature, and on information provided by experts in the BLM, other agencies, and interest groups, and by concerned citizens. The baseline used for the impact analysis is the current condition, as described in Chapter 3. Impacts on resources and resource uses are analyzed and discussed in detail, commensurate with resources issues and concerns identified throughout the process. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.1.1 General Methodology for Analyzing Impacts

Potential impacts are described in terms of type, context, duration, and intensity, which are generally defined below.

Type of Impact

When applicable, beneficial and adverse impacts are differentiated in this chapter. A beneficial impact would be a positive change in the condition or appearance of a resource or resource use, or a change that would move toward a desired condition. An adverse impact would be a change that would move the resource or resource use away from a desired condition, or would detract from its appearance or condition. The presentation of both beneficial and adverse impacts for key planning issues is intended to provide the BLM decisionmaker and the reader with an understanding of the multiple use tradeoffs associated with each alternative.

Context

Context describes the area or location (site-specific, local, planning area-wide, or regional) in which the impact would occur. Site-specific impacts would occur at the location of the action; local impacts would occur within the general vicinity of the action area; planning area-wide impacts would affect a greater portion of the CRVFO; and regional impacts would extend beyond the planning area boundaries.

Duration

Duration describes the length of time an impact would occur, either short term or long term. Short term is defined as anticipated to begin and end within the first 2 years after the action is implemented. Long term is defined as lasting beyond 2 years to the end of, or beyond, the planning timeframe addressed in the RMP.

Type

The type of impact describes a relative measure of beneficial or adverse effects on biological or physical systems, cultural resources, or the social environment. For example, adverse impacts on ecosystems might be those that would degrade the size, integrity, or connectivity of a specific habitat. Conversely, beneficial impacts would enhance ecosystem processes, native species richness, or native habitat quantity or quality.

Intensity

Intensity describes the degree, level, or strength of an impact. For this analysis, the only intensity qualifier being used is negligible and this qualifier will be used to describe impacts at the beginning of Chapter 4 that would occur, but it will not be discussed further in the chapter.

Direct Impacts

Direct impacts are caused by an action or implementation of an alternative and typically occur at the same time and place as the action. For example, removal of vegetation cover caused by facility construction would be considered a direct impact on vegetation resources.

Indirect Impacts

Indirect impacts are temporally and spatially removed from the action responsible for the impact but related to the action through a process of cause and effect. For example, removal of vegetation cover caused by facility construction that results in increased surface runoff and sedimentation of nearby streams would be considered an indirect impact on water resources and fisheries. Indirect impacts may reach beyond the natural and physical environment (that is, environmental impacts) to include growth-inducing effects and other effects related to induced changes to resource uses (that is, non-environmental impacts).

Cumulative Impacts

Cumulative impacts are described at the end of each resource or resource use section. Cumulative impacts are the direct and indirect impacts to resources and resource uses from actions proposed in the alternatives, when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action. The list of actions used for all cumulative impact analysis is in Table 4.4.1 Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario. Direct, indirect, and cumulative effects of climate change will be analyzed in this document. Some greenhouse gases (GHGs) associated with each alternative and their associated activities will be naturally sequestered, while the balance of those emissions will accumulate with other GHG concentrations in the atmosphere, increasing the potential rate and magnitude of climate change that may be associated with these compounds.

Unavoidable adverse impacts and irretrievable or irreversible commitments of resources are discussed in Sections 4.7 and 4.8. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures and include impacts for which there are no mitigation measures. Irreversible commitments of resources result from actions in which resources are considered permanently changed; irretrievable commitments of resources result from actions in which resources are considered permanently lost. The relationship of short-term uses of the environment to long-term productivity is discussed in Section 4.9.

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. Table 4.1.1-1 identifies the issues that were considered during cumulative impact analysis.

Because of the programmatic nature of an RMP and cumulative assessment, the analysis tends to be broad and generalized to address potential impacts 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, other governmental, and private actions
- Potential for synergistic impacts or synergistic interaction among or between impacts
- Potential for impacts across 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 based on resources of concern and actions that might contribute to an impact. The baseline date for the cumulative impacts analysis is 2010. The temporal scope of this analysis is the life of the RMP. 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 planning area boundaries or include areas within and outside the planning area boundaries.

Additionally, cumulative impact assessments may vary depending on the current analytical tools available. Climate change analyses consider several factors, including GHG concentrations in the atmosphere, the reflectivity (albedo) of cloud layers, and land use management practices. The tools necessary to quantify climatic impacts are presently unavailable. As a consequence, impact assessment of specific effects of human-caused activities cannot be determined. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document is limited to accounting for and disclosing factors believed to contribute to climate change. Qualitative and/or quantitative evaluation of potential contributing factors within the planning area is included where appropriate and practicable.

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 based on proximity, connection to the same environmental systems, potential for subsequent impacts or activities, 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 cooperators and BLM employees with knowledge of the area. Each was asked to provide information on the most influential past, present, or reasonably foreseeable future actions or activities. Additional information was obtained through discussions with agency officials and review of publicly available materials and Web sites.

Reasonably foreseeable future action 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 from those projected for this analysis. Other potential future actions have been considered and eliminated from further analysis because there is small likelihood these actions would be pursued and implemented within the life of the RMP, or because so little is known about the potential action that formulating an analysis of impacts is premature.

Data on the precise locations and overall extent of resources within the planning area 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 RMPs for CRVFO.

The past, present, and reasonably foreseeable future actions in Table 4.1.1-1 Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario, were identified as having the greatest likelihood to generate potential cumulative impacts when added to the management actions for the CRVFO RMP.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Past Projects, Plans, or Actions	
Human Actions	
Energy and minerals development	Extensive oil and gas development has occurred in CRVFO. Oil and gas development activity in the CRVFO is concentrated on the western 22 percent, in the area west of the Grand Hogback known as the Piceance Basin. Most of these lands are either already leased or are being addressed through the separate planning process for the Roan Plateau. Of the approximately 127,300 acres of BLM mineral estate in this high potential area that is not within the Roan Plateau planning area, 95 percent has been leased. Most of the unleased land outside the Roan Plateau planning area is along the Grand Hogback, with a few small, scattered parcels elsewhere. The 73,600-acre Roan Plateau planning area contains approximately 57,500 unleased acres, addressed in the Roan Plateau RMPA (approved in 2007). Numerous mining claims exist, but the only significant mining activity is associated with gypsum mining claims in the CRVFO.
	Glenwood Springs RMP Oil and Gas Leasing and Development RMP Amendment (1999). The amendment evaluates the impacts of oil and gas leasing and development on BLM lands and federally owned mineral estates under private lands in the Glenwood Springs Planning Area.
	Geographic Area Plans (GAPs) and Master Development Plans (MDPs) for Oil and Gas Development. Pursuant to the 1999 Oil and Gas Leasing and Development RMP Amendment, the CRVFO has required oil and gas operators to prepare GAPs, now called MDPs, as a tool for BLM's use in planning, disclosing, analyzing, and mitigating oil and gas developments anticipated to span multiple years (typically 2 to 5). The comprehensive planning process includes new and existing wells, new and existing well pads, other surface facilities, access roads, and pipelines for the conveyance of fluids (natural gas, condensate, produced water, and freshwater used in hydrofracture stimulation of the gas-producing strata). Although other oil and gas activities may be approved through the use of environmental assessments or statutory categorical exclusions established under Section 390 of the Energy Policy Act of 2005, the majority of wells are permitted pursuant to a GAP or MDP. Specific GAPs/MDPs approved subsequent to the 1999 RMP Amendment include the following: Williams Production RMT Company, Wheeler to Webster GAP (2002)—Up to 213 new wells on 59 well pads between Rifle and Parachute, Colorado. Encana Oil and Gas (USA), Inc., Grass Mesa GAP (2004)— Up to 100 wells on 16 new pads and one existing pad approximately 5 miles south of Rifle, Colorado. Encana Oil and Gas (USA), Inc., Gant Gulch GAP (2005)—Up to 97 wells on 17 surface locations approximately 15 miles south of Rifle, Colorado. Encana Oil and Gas (USA), Inc., Orchard I GAP (2005)—Up to 65 wells on seven new and eight existing surface locations approximately 7 miles east of DeBeque, Colorado.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Windsor Energy Group, LLC, Castle Springs GAP (2005)—Up to 98 wells on 6 well pads approximately 5 miles southeast of Silt, Colorado.
Encana Oil and Gas (USA), Inc., Rulison GAP (2007)—Up to 68 wells on six new and six existing pads, approximately 5 miles southwest of Rifle, Colorado.
Encana Oil and Gas (USA), Inc., South Parachute GAP (2007)—Up to 139 wells on 10 new and 16 existing pads, approximately 3 miles southeast of Parachute, Colorado.
Noble Energy, Inc., Pete and Bill Creek GAP (2007)—Up to 32 wells on four new pads, approximately 8 miles southwest of Rifle, Colorado.
Williams Production RMT Company, Doghead Mountain GAP (2007)—Up to 82 wells on seven new and three existing locations, approximately 3 miles south of Rulison, Colorado.
Williams Production RMT Company, Spruce Creek MDP (2008)—Up to 58 wells on three new pads and one existing pad, approximately 9 miles southeast of Parachute, Colorado.
Laramie Energy II, LLC, Helmer Gulch MDP (2008)—Up to 131 wells on five new and seven existing pads, approximately 2 miles southwest of Rifle, Colorado.
Encana Oil and Gas (USA), Inc., Orchard II MDP (2009)—Up to 93 wells on 24 new and one existing pad, approximately 5 miles east of DeBeque, Colorado (prepared jointly with the Grand Junction Field Office).
Orion Energy Partners, LP, Kokopelli MDP (2009)—Up to 163 new wells on six new and ten existing pads, approximately 4 miles southeast of Silt, Colorado (project now operated by Williams Production RMT Company).
Bill Barrett Corporation, Gibson Gulch MDP (2009)—Up to 131 wells on seven new and one existing pad, approximately 3 miles southeast of Silt, Colorado.
Noble Energy, Inc., Cache Creek MDP (2009)—Up to 79 wells on five new pads approximately 8 miles southeast of Parachute, Colorado.
Williams Production RMT Company, Flatiron Mesa MDP (2009)—Up to 93 wells from three new pads and one existing pad, approximately 6 miles southwest of Rifle, Colorado.
Laramie Energy II, LLC, West Mamm MDP (2010)—Up to 68 wells from three new and two existing pads, approximately 9 miles southeast of Rifle, Colorado.
Antero Resources, North Castle Springs MDP (2010)—Up to 284 wells from 13 new and three existing pads approximately 6 miles southeast of Silt, Colorado.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Forestry	See present actions.
Livestock grazing	Livestock grazing in portions of the planning area has remained stable or declined in the recent past.
Recreation and visitor services	Colorado's population has grown significantly in the past 10 years, and an increasing number of people are living near or seeking local public lands for a diversity of recreational opportunities characterized by the mountain resort or outdoor lifestyle.
Lands and realty	Land tenure actions have resulted in reducing the total area of lands managed by the CRVFO. Residential development in the areas surrounding CRVFO has been increasing.
	Final Environmental Impact Statement for Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands (USFS 1984). This plan sets management, protection, and use goals and guidelines for the Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands.
	Amended Land and Resource Management Plan for Grand Mesa, Uncompahgre, and Gunnison National Forests (USFS 1991). This plan sets management, protection, and use goals and guidelines for the Grand Mesa, Uncompahgre, and Gunnison National Forests.
	Final Environmental Impact Statement for the 1997 Routt National Forest Land and Resources Management Plan (USFS 1997a). This plan sets management, protection, and use goals and guidelines for the Routt National Forest.
	Final Environmental Impact Statement for the 1997 Land and Resource Management Plan for the Arapaho and Roosevelt National Forests and the Pawnee National Grassland (USFS 1997b). This plan sets management, protection, and use goals and guidelines for the Arapaho and Roosevelt National Forests and the Pawnee National Grassland.
	Final Environmental Impact Statement for the 2002 Revised Land and Management Plan for the White River National Forest (USFS 2002). This plan sets management, protection, and use goals and guidelines for the White River National Forest.
	Record of Decision for the Approval of Portions of the Roan Plateau Resource Management Plan Amendment and Environmental Impact Statement (BLM 2007a). This ROD provides BLM's decision to amend the 1988 Glenwood Springs RMP for BLM lands and resources in the Roan Plateau Planning Area.
	Record of Decision for the Designation of Areas of Critical Environmental Concern for the Roan Plateau Resource Management Plan Amendment and Environmental Impact Statement (BLM 2008a). This ROD provides BLM's decision to amend the 1988 Glenwood Springs RMP for BLM lands and resources in the Roan Plateau Planning Area.
Roadway development	Road construction has occurred in association with timber harvesting, energy development, and mining on BLM lands, private lands, State of Colorado lands, and USFS lands.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Water diversions	The CRVFO has been affected by private irrigation diversions and by transmountain diversions from the Colorado River basin. Reservoir operations have affected water supply, aquatic conditions, and timing.
Special status species management	The Final EIS for Northern Rockies Lynx Amendment, which assesses guidelines for management of Canada lynx on certain lands under the authority of the USFS and BLM, was issued in summer 2007.
	Bald eagles were removed from the federal threatened and endangered species list in 2007; however they are protected by both the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.
Natural Processes	
Spread of noxious/invasive weeds	Noxious weeds have invaded many locations in the planning area carried by wind, humans, machinery, and animals. The ROD for Vegetation Treatment on BLM Lands in Thirteen Western States (USDI BLM 1991bsb) identifies vegetation treatment priorities. Partners Against Weeds – An Action Plan for the BLM (USDI 1996bsb) identifies appropriate actions to control weeds on public lands. The CRVFO is a member of the Tamarisk Coalition.
Spread of forest insects and diseases	See present actions.
Drought	See present actions.
Wildland fires and fuels	Fires within the planning area are both naturally occurring and used as a management tool. Naturally occurring fires have been widely distributed in terms of frequency and severity. Large-scale fires have occurred in the area in the last half of the nineteenth century and beginning of the twentieth century. Extensive wildfires have also occurred in the area since the early twentieth century, including the Storm King and Coal Seam fires.
Present Projects, Plans, or Actions	
Human Actions	
Energy and minerals development	**Wind Energy Development on BLM-Administered lands in the Western United States PEIS (2005).** The BLM initiated a PEIS that proposed implementation of a comprehensive program to address issues associated with wind energy development on BLM lands under a maximum potential development scenario. To the extent appropriate, future project-specific analyses would tier from the analyses conducted in the PEIS and decisions in the ROD to allow project-specific analyses to focus just on the critical site-specific issues of concern.
Forestry	Annual allowable harvest is 1.8 thousand board feet (MBF) in the CRVFO. Lodgepole pine is the primary commercial species, with the occasional sale of Engelmann spruce and subalpine fir in the CRVFO. Douglas-fir, aspen, and pinyon-juniper are also under forest management in the CRVFO.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Livestock grazing	Approximately 552,007 acres within the CRVFO are within grazing allotment boundaries.
Recreation and visitor services	The towns of Wolcott, Eagle, Gypsum, Carbondale, Glenwood Springs, New Castle, Silt, Rifle, Parachute, Battlement Mesa, and DeBeque all have public lands bordering them that are used as "backyard" recreation areas by locals. Recreational use in these areas continues to grow exponentially with the rapid growth in the communities themselves. With use levels growing, evidence of visitation is also increasing. Some are associated with traditional uses (for example, hunting), while others are truly new. On a national level and in response to increasing demand for trails-based recreation on BLM lands, the BLM has developed an OHV strategy and a mountain bike strategy for trails and travel management.
	In response to increased recreational use, CRVFO has had to limit motorized use in many areas (i.e., motor vehicle closures), to limit motorized use by season (i.e., winter closures), to increase signage, field staff, and visitor services, to create brochures and maps for visitors, and to apply more rules and regulations. These actions all are intended to maintain natural resource settings, to direct recreation use, and to protect resources. Within some SRMAs and in urban-interface areas, new issues, such as domestic animals, noise, and visual aesthetics, are necessitating the BLM to consider additional administrative remedies for recreational use.
Lands and realty	**Designation of Energy Corridors on Federal Lands in the 11 Western States PEIS (2007).** This multi-federal-agency programmatic environmental impacts statement analyzes the environmental impacts of designating federal energy corridors on federal land in 11 western states, and incorporating those designations into relevant land use and resource management plans.
Roadway development	The rate of road building in the CRVFO area is greater than it was 10 years ago, due to oil and gas development.
Water diversions	See past actions.
Spread of noxious/invasive weeds	The CRVFO is implementing the ROD for the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) (BLM 2007i), which analyzed the impacts of using herbicides (chemical control methods) to treat noxious weeds and other invasive weeds on public lands. In addition, the *Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report* (PER) (BLM 2007i), which evaluated the general effects of non-herbicide treatments (i.e., biological, physical, cultural, and prescribed fire) on public lands, will be incorporated as a reference. The PEIS identifies impacts to the natural and human environment associated with herbicide use and appropriate best management practices (BMPs), and standard operating procedures (SOPs), mitigation measures, and conservation measures for avoiding or minimizing adverse impacts. The PER describes the environmental impacts of using non-chemical vegetation treatments on public lands.
Spread of forest insects and diseases	Several years of drought in western states have resulted in severe stress on conifer trees. This stress has made the trees less able to fend off attacks by insects, such as bark beetles. Although some infestations of mountain pine beetle have occurred in Colorado in the past, a major pine beetle epizootic has been occurring since 1996.
Drought	Over the past 7 to 8 years, most of the western US has experienced drought, which is threatening agricultural users and drinking water supplies and has raised the potential for wildland fires.
Wildland fire and fuels	See reasonably foreseeable future actions.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Reasonably Foreseeable Future Projects, Plans, or Actions	
Human Actions	
Energy and minerals development	Reasonably foreseeable mineral and energy development activity that considers all public and private activities within the CRVFO is detailed in the Reasonable Foreseeable Development: Oil and Gas in the CRVFO Administrative Boundary Area (BLM 2008b). Oil and gas development within the planning area would continue in the areas that are being developed. Infill drilling and step-out drilling (further expansion of development area) would be the major portion of future activity.
	The area within the Roan Plateau that would be leased in the future would be drilled based on constraints addressed in the Roan Plateau RMPA or Supplemental EIS. Industry would continue to drill heavily on fee minerals, and as they drill out the fee mineral estate, a significant increase of drilling on federal mineral estate would occur. Increased drilling would also occur on USFS lands since only half of the available lands for leasing are leased. It is projected that much of the drilling on USFS lands would occur in the latter half of the life of this RMP.
	Based on the presence of hot springs, the Colorado River corridor from Dotsero to Silt has been identified as prospectively valuable for geothermal energy. These resources have the potential to be developed in the future.
	Roan Plateau Resource Management Plan Amendment (2007). This RMPA presents options for management of BLM lands in the Roan Plateau Planning Area. This includes former Naval Oil Shale Reserves Numbers 1 and 3. The Planning Area includes approximately 73,600 acres of federal land in western Garfield County and a small portion of southern Rio Blanco County.
	Geothermal Leasing in the Western United States PEIS (2008). Through a PEIS and in accordance with the Energy Policy Act of 2005, the BLM and the USFS are proposing to make geothermal leasing decisions on pending lease applications submitted before January 1, 2005, and to facilitate geothermal leasing decisions on other existing and future lease applications and nominations in western states, including those in Colorado.
	Oil Shale and Oil Shale Leasing PEIS (2008). The BLM initiated a PEIS for oil shale and tar sand resources leasing on BLM lands in Colorado, Utah, and Wyoming. The PEIS amends existing applicable RMPs to address oil shale and tar sands resources leasing in these three western states. The PEIS directs the Secretary of the Interior to make available for leasing BLM lands in these three western states.
Forestry	Forest activities would be designed to reduce the size and intensity of existing and future disease and insect epizootics and to reduce the hazard of large-scale high intensity wildfires. The lodgepole pine merchantability for sawlog products from trees affected by the current mountain pine beetle epizootic would continue to decline.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Livestock grazing	The number of permits/leases and AUMs may decrease through the sale of isolated tracts of BLM land. Substantial decreases in the number of livestock would probably occur from the sale of working ranches to hobby ranchers, the continued increase in recreational use of BLM lands, and the difficulty of making money raising livestock.
	Urbanization of rural locations in the planning area would probably continue and would contribute to conflict with livestock grazing.
	Gas development and activity in the western portion of CRVFO planning area would probably increase and create conflicts with livestock operations on BLM lands.
Recreation and visitor services	The demand for developed recreation sites would continue to increase in the planning area as more people come to the area. Demand for developed recreation sites may lead to more campgrounds, trails, trailheads, signage, and other associated facilities.
	US Forest Service Colorado Roadless Rule (2008). The proposed Colorado Roadless Rule is a regulation specific to Colorado that provides management direction for approximately four million roadless acres of National Forest System lands.
	OHV use would continue to increase as counties see increased population growth continuing. OHV use is also likely to increase in the western portion of the CRVFO planning area, where new routes are developed for oil and gas production and new residents move to those areas.
	Nonmotorized use close to urbanizing areas would grow as population grows. It is expected that demand for hiking and mountain biking trails would increase adjacent to all of the municipalities in the planning area. Demand for floating and fishing access to the Eagle River and lower Colorado River would also likely increase. Areas along river corridors would be expected to see increases in nonmotorized use as visitors and anglers hike along and to waterways.
Lands and realty	The BLM is moving toward consolidating its lands to benefit the public. To achieve this goal, candidates for land tenure adjustment through disposal, sale, exchange, or acquisition include parcels that are difficult to manage or that do not have public access, relatively small parcels adjacent to other federal- or state-managed lands, parcels that would increase conservation of natural resources, and parcels that increase access and use of BLM lands.
Roadway development	Road construction is expected to continue at the current steady rate on BLM and US Forest Service lands; the future rate is unknown on private and State of Colorado lands.
Water diversions	Expansion of the WUI and sprawled development in the Eagle, Roaring Fork, and Upper Colorado River Valleys are anticipated to have impacts on flow.
	Irrigation rights are expected to continue being bought and sold in the future, with some new property owners informally changing how the right was historically used. Due to population growth and land sales, more agricultural water rights may be converted to municipal and industrial uses.

Table 4.1.1-1
Projects, Plans, or Actions that Constitute the Cumulative Impact Scenario

Special status species management	New habitat conservation plans could be developed for currently listed species. If additional species are listed as threatened or endangered, habitat conservation plans also would be developed for designated habitat.
Natural Processes	
Spread of noxious/invasive weeds	Noxious and other invasive weeds are expected to continue to spread on all lands. Due to their ability to tolerate certain conditions, some species are expected to remain a serious long-term challenge in the planning area.
Spread of forest insects and diseases	See present actions.
Wildland fire ecology and management	Wildland fires would probably continue to occur over time, and although the number of fire starts on BLM lands is relatively small, fragmented landownership patterns in certain portions of the planning area increase the potential for fire to cross administrative boundaries and affect BLM lands. Increasing recurrence and severity of drought conditions have been predicted for this area as a result of climate change. This could in turn increase the occurrence and severity of wildfires on BLM land. Fuels treatments, including prescribed or planned fires, chemical and mechanical treatments, and seeding, would probably continue and could increase in the future.
Climate change	Increased concern over greenhouse gas emissions and global climate change may lead to future federal and state regulations limiting the emission of associated pollutants. Regulation could include setting significance thresholds for greenhouse gases, such as those currently proposed in the California Environmental Quality Act (CEQA).

4.1.2 Analytical Assumptions

Several assumptions were made to facilitate the analysis of the projected impacts. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur within the CRVFO during the planning period. These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative, as described in Chapter 2. The following general assumptions apply to all resource categories. Any specific resource assumptions are provided in the Methods of Analysis section for that resource.

- Sufficient funding and personnel would be available for implementing the final decision.
- Implementing actions from any of the RMP alternatives would be in compliance with all valid existing rights, federal regulations, bureau policies, and other requirements.
- Implementation-level actions necessary to execute the land use plan-level decisions in this RMP would be subject to further environmental review, including NEPA, as appropriate. The RMP provides the necessary NEPA analysis for the issuance of leases for fluid minerals, such as oil, gas, and geothermal resources in the planning area.
- Most of the hydrocarbon production in the CRVFO is natural gas with little associated oil, natural gas liquids, and water. The Addendum to the GSFO Reasonable Foreseeable Development (RFD) for the period 2008 to 2027 (BLM 2008g) estimates that 4,818 wells, at seven wells per pad, would be drilled on BLM mineral estate within the CRVFO over the next 20 years, involving 688 well pads.
- Direct and indirect impacts of the RMP direction would primarily occur on CRVFO lands.
- In the future, as tools for predicting climate changes in a management area improve and as changes in climate affect resources and necessitate changes in how resources are managed, the BLM may be able to reevaluate decisions made as part of this planning process and adjust management accordingly.
- Appropriate maintenance would be carried out to maintain the functional capability of all developments.
- The discussion of impacts is based on the best available data. Knowledge of the planning area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used to infer environmental impacts where data are limited.

Acreage calculations used in this analysis are approximate values for alternative comparison and analytic purposes only, and do not reflect exact measurements of on-the-ground resources and actions. For analysis purposes, acreage figures were rounded to the nearest 100 or 10 acres as appropriate. These acreage values were calculated using ESRI's ArcGIS Desktop 9.1 software. The projection of GIS data that were analyzed to provide the acreage calculations is Universal Transverse Mercator (UTM) Zone 12N (UTM12N), based on the North American Datum of 1983 (NAD83).

4.1.3 Incomplete or Unavailable Information

The CEQ established implementation regulations for NEPA, requiring that a federal agency identify relevant information that may be incomplete or unavailable for an evaluation of reasonably foreseeable significant adverse impacts in an EIS (40 CFR 1502.22). If the information is essential to a reasoned choice among alternatives, it must be included or addressed in an EIS. Knowledge and information is, and would always be, incomplete, particularly with infinitely complex ecosystems considered at various scales.

The best available information pertinent to the decisions to be made was used in developing the RMP. Considerable effort has been taken to acquire and convert resource data into digital format for use in the RMP—both from the BLM and outside sources.

Certain information was unavailable for use in developing this RMP because inventories have either not been conducted or are not complete. Some of the major types of data unavailable are as follows:

- Oil and gas leasing is ongoing in the CRVFO. Figures used in this RMP are current through recent leasing, and dated for clarity. Forecasts of energy and mineral activities were used to evaluate the potential impacts from the proposed alternatives. These forecasts are speculative. Energy and mineral development depends on access to resources, available technology, the economics of mineral development, national and global demand for resources, and the potential discovery of additional energy and mineral resources. These factors are subject to significant changes over time. The best available information was incorporated into the analysis.
- Publicly available information about the health status of individual residents in the planning area is incomplete. No formal medical monitoring system has been available to monitor trends and/or anomalies in medical practices. The changes in and causes of health trends remain largely unknown.
- Cultural resource inventory is incomplete for the planning areas. At the time Class I cultural resource inventory reports were completed, only 11 percent of the CRVFO had been inventoried. The methods section for cultural resources discusses how cultural resource projections were based on previous inventory data (e.g., numbers of sites likely to be impacted by roads) and prehistoric and historic site sensitivity models.
- Land Health Assessments and PFC assessments have not been completed for the entire CRVFO area. As a result, the current condition of the rangeland and riparian vegetation in areas that have not been inventoried is unknown.
- Only a portion of the CRVFO has been inventoried for significant plant communities. Other areas could exist that have not been inventoried.
- Extensive weed inventories and mapping have not been conducted for the CRVFO. The current extent and types of weeds in any given area is unknown.
- Not all special status plant locations in the CRVFO are known or inventoried.
- Adequate visitor use data are not yet available to develop emission estimates for major categories of visitor activity.
- Cave and karst inventory is incomplete for the planning area. Some cave and karst resources may be undocumented or unknown.
- While global and national inventories are established, regional and state specific inventories are in varying levels of development. Quantification techniques are in development. For example, there is a good understating of climate change emissions related to fuel usage; however measuring and understanding the effects of albedo are less comprehensive. Analytical tools necessary to quantify climate impacts are presently unavailable. As a consequence, impact assessment of specific effects of anthropogenic activities cannot be determined.
- The assessment of climate changing pollutant emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact on climate. The lack of

scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. Potential impacts due to climate change are likely to be varied.

- Sampling methodology and numeric criteria against which biological conditions can be evaluated for water quality are incomplete.

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 would 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 the BLM and other agencies in the planning area continue to update and refine information used to implement this RMP.

4.2 IMPACTS ON PHYSICAL, BIOLOGICAL, AND CULTURAL RESOURCES

4.2.1 Air Quality - Air and Atmospheric Values

Methods and Assumptions

Quantitative and qualitative analyses were used to evaluate the impact of management alternatives on air resources. Potential impacts on air resources from management actions for other resource programs are summarized in the following subsections. Existing conditions concerning air quality are described in Chapter 3, Section 3.2.1, and goals, objectives, and management decisions are presented in Chapter 2, Table 2-2. The Comprehensive Air Resources Protection Protocol (CARPP) in Appendix L will be implemented to continuously evaluate the impacts of resource decisions on air quality in the CRVFO. Ongoing air resources management will be composed of ongoing review of assumptions, background air quality, advances in technology, potential impacts evaluated in this Proposed RMP/Final EIS, current air quality modeling, and future air quality modeling efforts.

Currently, the CRVFO planning area is considered in attainment or unclassified for all CAAQS and NAAQS, with one small exception. The Aspen area, in the southern portion of the CRVFO planning area, was previously designated a nonattainment area for inhalable PM_{10} and is now a PM_{10} maintenance area. As discussed in Chapter 3.2.1, air quality monitoring within the planning area indicates stable to improving air quality trends for criteria pollutants, ozone, HAPs, particulates, and visibility conditions. Any BLM action on the land within the Aspen PM_{10} maintenance area (any action taken on that 1.6 acres of land) that results in PM_{10} emissions would require a general conformity analysis and, if warranted, a formal determination before such activity is authorized by the BLM. Since the maintenance area within the CRVFO is 1.6 acres, it is unlikely that a formal conformity determination would be required.

Activities on BLM lands in the CRVFO area that have the potential to emit air pollutants include wildfires, vegetation management activities, vehicle and OHV travel; energy development, mineral extraction, livestock grazing, and recreational activities. Combustion processes in wildfires, prescribed burns, and other vegetation burns produce VOCs, nitrogen oxides (NO_x), carbon monoxide (CO), PM_{10}, $PM_{2.5}$, and GHG emissions. Similarly, fuel combustion in vehicle engines produces reactive organic compounds, NO_x, (CO), PM_{10}, $PM_{2.5}$, and GHG emissions. Vehicle travel on unpaved roads or in off-road areas generates fugitive dust that contains PM_{10} and $PM_{2.5}$. Energy and mineral development activities and associated equipment and vehicles produce VOCs, (NO_x), (CO), PM_{10}, $PM_{2.5}$, and GHG emissions. Camping and other recreational activities produce pollutant emissions through vehicle use, campfires, camp stoves, and use of portable internal combustion engines. Livestock grazing produces dust that contains PM_{10} and $PM_{2.5}$, while livestock themselves produce GHG pollutants through digestive processes and manure generation. Wind erosion from disturbed or sparsely vegetated lands produces PM_{10} and $PM_{2.5}$.

CRVFO evaluated the relative contribution of emissions associated with BLM activities and authorized uses, and it was evident that oil and gas activities have the greatest air emissions. Other uses on BLM, such as OHV use, are transient and temporary and therefore impractical to inventory and model. Therefore, it was determined that only emissions associated with all oil and gas activities (including all construction and production operations) would be quantified in the emissions inventory and included in the modeling analysis.

Multiple air quality models were used to predict pollutant concentrations and impacts on air-quality-related values within the CRVFO and throughout surrounding areas for each of the alternatives. The results of the air quality modeling are detailed in the Air Resources Technical Support Document (ARTSD).

AERMOD, an EPA guideline model, was used to predict localized concentrations (within one square mile of a dense source cluster) of CO), nitrogen dioxide (NO_2), PM_{10}, $PM_{2.5}$, and sulfur dioxide (SO_2) for comparison to NAAQS and CAAQS. In addition, six hazardous air pollutants and diesel particulate matter were modeled and compared with relevant health-based thresholds. Hazardous air pollutants (HAPs) are toxic and/or carcinogenic air pollutants that are regulated by EPA. Because EPA has not set ambient air quality standards for HAPs, impacts from HAP emissions are assessed against risk-based concentrations and in terms of increased cancer risk.

Far-field modeling predicted pollutant concentrations within the CRVFO and at greater distances (up to 300 kilometers) from CRVFO oil and gas facilities. The California Puff (CALPUFF) model was performed to:

- Compare predicted concentrations of CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ with NAAQS and CAAQS, as well as to PSD increments.
- Estimate nitrogen and sulfur deposition rates at Class I and sensitive Class II areas.
- Estimate changes in acid neutralizing capacity at selected lakes.
- Estimate visibility impacts at Class I and sensitive Class II areas.

Ozone concentrations were predicted using the Comprehensive Air Quality Model with Extensions (CAMx) model. Ozone is formed in the atmosphere by chemical reactions involving a variety of pollutants, particularly VOCs and NO_x. Ozone modeling was performed using cumulative emissions, and results were compared with the current ozone standard of 0.075 ppm.

Assumptions used for the air quality modeling analyses are provided below.

- Activity, equipment, and emission control assumptions associated with emission calculations were based on information contained in the *Colorado River Valley Field Office Resource Management Plan Revision Air Resources Technical Support Document* (ARTSD) (URS 2011). Emission control assumptions during the scoping process for the Draft RMP/Draft EIS addressed a range of oil and gas development scenarios (including number of wells and surface disturbance) and currently available air mitigation technologies) for the air quality model. The measures were derived specifically from requirements for technologies currently applied or planned to be applied in the future by the EPA and the CDPHE.
- The level of development assessed in the ARTSD and in this air quality analysis was based on the RFD scenario detailed in Appendix R and a variety of technological and economic assumptions that might alter the level of oil and gas development.
- Assumptions and parameters used in modeling to identify potential future pollutant concentrations were based on information contained in the Glenwood Springs Field Office Resource Management Plan Revision Air Quality Assessment Protocol (URS 2008) and on information included in the ARTSD (URS 2011). This protocol was prepared with input from the BLM, EPA Region VIII, the USFS, the National Park Service Air Resources Division, and the CDPHE Air Pollution Control Division.

- The scope of the air modeling was not intended to provide a comprehensive analysis of impacts to air quality from potential emissions of all air pollutants at all potential air emission sources. An extensive analysis of the current and future state of air quality conditions fell under the purview of the regulatory agency with delegated authority to control air emissions (CDPHE).
- The air quality model and future models would be used as a tool in conjunction with ongoing implementation efforts outlined in the CARPP.

Significant air quality impacts would occur if project activities would cause one or more of the following conditions:

- Exceedance of primary or secondary NAAQS or CAAQS.
- Concentrations of HAPs or other toxic air pollutants above designated thresholds.
- An increase in cancer risk of more than one additional person in 1 to 100 million based on the most likely exposure.
- Changes in nitrogen or sulfur deposition exceeding the Level of Concern.
- Changes in lake acid neutralizing capacity above the Limit of Acceptable Change.
- Visibility impacts exceeding 1.0 deciview (dv) change at Class I area, when impacts are evaluated from more than one source.

The possible impacts on air resources from management actions for other resource programs are discussed in the following subsections. Appendix L outlines the adaptive management approach to implementing air resources management in the CARPP. The above referenced air quality model (ARTSD) is a tool to make air resources management decisions in the CARPP. A range of oil and gas development and mitigation scenarios were evaluated in the ARTSD. These scenarios created a range of emissions levels and air quality impacts to make implementation-level decisions. Efforts to analyze resource impacts in the Draft RMP began alongside the ARTSD; therefore, the range of alternatives in the Draft RMP was the same as the four development scenarios in the ARTSD. In arriving at a Proposed RMP and preparing a Final EIS, the BLM considered the results of the air model, all substantive comments, and issues regarding technical feasibility of air mitigation measures. The Proposed RMP in the Final EIS includes a level of development and mitigations scenarios within the range of alternatives in the Draft RMP/Draft EIS implemented with an adaptive management plan (CARPP). With continuing advancements in technology such as increased number of wells per pad, the BLM decided to analyze the greatest number of wells combined with restrictive protections for other resources. To analyze the full range of possible impacts on other resources and the most oil and gas development, the Proposed RMP considered the full level of the development assumed in the RFD, which is the same number of wells and acres of disturbance as Alternative D. The Proposed RMP includes stipulations and protective measures for other resources similar to the preferred alternative in the Draft RMP/Draft EIS. The stipulations in the Alternative B – Proposed RMP for this Final EIS are more protective than in Alternatives D or A.

Alternative A considered a moderate level of oil and gas development with the least stringent stipulations and the most acres open to leasing. The number of wells and acres of disturbance would be less in Alternative A than in Alternative B – Proposed RMP or in Alternative D, but more than in Alternative C. Alternative C considered the least amount of development, in terms of wells and surface disturbance, the most restrictive

stipulations, and the least acres open to leasing. Alternative C would have the least amount of oil and gas activity. Alternative B – Proposed RMP and Alternative D assumed the same number of wells and surface disturbance, but Alternative B – Proposed RMP would include more restrictions to protect other resources. Alternative D would include more acres open to leasing than Alternative B – Proposed RMP and Alternative C but less than Alternative A.

Environmental Consequences

Impacts on air quality would result from some of the actions included under other resources and uses. Programs that were deemed to have no impacts or only negligible impact on air quality under any of the four alternatives completed a qualitative air quality assessment, as noted under the activities outlined in each alternative below. Only emissions associated with oil and gas activities (including construction and production operations) were quantified in the emissions inventory and put into the modeling analysis. The impacts are analyzed under each alternative discussed below. See the *Air Resources Technical Support Document* (URS 2011) for comprehensive results comparing air quality impacts for each of the alternatives.

Alternative A

Impacts from Air Quality Management. The air quality management objective under Alternative A would be to limit air quality degradation in the resource area by ensuring that BLM land use activities are in compliance with federal, state, and local laws and regulations. Air quality management objectives and actions under Alternative A would emphasize coordination with local, state, and federal air quality management agencies to ensure compliance with regulatory programs.

Air quality management actions under Alternative A would be the least restrictive with regard to emission controls mandated under the other alternatives. Air quality management actions under Alternative A would include the following strategies to reduce emissions from oil and gas activities:

- Require engines at compressor stations, drill rig engines, and frac pump engines to meet EPA and CDPHE emission standards.
- Require twice-daily watering at construction sites and associated roads.
- Continue ongoing fugitive dust management practices for unpaved roads to achieve 50 percent fugitive dust reduction from uncontrolled levels.
- Require facility consolidation so that 60 percent of well pads pipe natural gas and natural gas liquids to consolidated facilities.
- Require at least 40 percent of produced water to be piped from production sites to its final destination.
- Require glycol dehydrators, condensate tanks, and produced water tanks to meet EPA and CDPHE emission standards.

Descriptions of oil and gas activity, air quality management actions, emission control levels, and emission calculations are provided in the ARTSD (URS 2011). Estimated maximum annual emissions from oil and gas development under Alternative A would be expected to have the greatest annual emissions of each pollutant as presented in the ARTSD. In addition to criteria pollutants, emissions of six HAPs were quantified, including benzene, ethylbenzene, formaldehyde, hexane, toluene, and xylene. Hexane, BTEX, and

formaldehyde are emitted from oil and gas operations and from engine exhaust. Comparisons of the expected emissions among each of the four scenarios were modeled and reported in the ARTSD.

Dispersion modeling analyses were conducted to estimate local and regional changes in ambient air quality resulting from oil and gas development. To be conservative, Table 4.2.1-1 summarizes maximum criteria pollutant concentrations expected in the vicinity of oil and gas well fields under the air quality modeling scenario that corresponds with Alternative A. This near-field modeling assumed four well pads with associated access roads surrounding a compressor station within a 1-square-mile area.

Near-field modeling used the AERMOD program to predict ambient concentrations. Initial modeling results for Alternative A resulted in a predicted maximum, 24-hour average PM_{10} concentration above the NAAQS. Consequently, a revised analysis was prepared assuming that fugitive dust controls under Alternative A would be identical to those under Alternative B (Proposed RMP) and Alternatives C and D. The modeling results for PM_{10} shown in Table 4.2.1-2 assumed those more stringent fugitive dust controls. With more stringent fugitive dust controls, maximum criteria pollutant concentrations near oil and gas well fields would be less than the relevant NAAQS. Consequently, fugitive dust controls associated with the Proposed RMP and Alternatives C and D were recommended to replace Alternative A fugitive dust controls if Alternative A were the selected alternative.

Table 4.2.1-1
Estimated Maximum Annual Emissions from Oil and Gas Development, Alternative A*

Pollutant	Maximum Emissions, Tons per Year
CO	805
NO_x	423
PM_{10}	1,950
$PM_{2.5}$	200
SO_2	1
VOC	3,382
Benzene	73
Ethylbenzene	0.3
Formaldehyde	55
Hexane	210
Toluene	52
Xylene	28

* Based on 2028 modeling year, the year with the greatest annual emissions of each pollutant
Source: URS 2011.

Acronyms and Abbreviations:

CO	carbon monoxide
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
SO_2	sulfur dioxide
VOC	volatile organic compound

Table 4.2.1-2
Estimated Maximum Criteria Pollutant Concentrations Near Oil and Gas Well Fields, Alternative A

Pollutant	Averaging Time	Units	Maximum Pollutant Concentration			NAAQS	Percent of Air Quality Standard
			Modeled	Background	Total		
NO_2	1 hour	ppmv	0.074	not included	0.074	0.100	74%
	Annual	ppmv	0.004	0.016	0.021	0.053	39%
CO	1 hour	ppmv	0.31	4.07	4.38	35	13%
	8 hours	ppmv	0.14	2.03	2.18	9	25%
SO_2	1 hour	ppmv	0.001	0.031	0.032	0.075	43%
	3 hours	ppmv	0.001	0.025	0.026	0.267 [CAAQS]	9.8%
	24 hours	ppmv	0.000	0.013	0.014	0.14	10%
	Annual	ppmv	0.000	0.002	0.002	0.03	7%
PM_{10}	24 hours	$\mu g/m^3$	16.80	56.00	72.80	150	49%
	Annual	$\mu g/m^3$	0.83	30.00	30.83	50 [CAAQS]	62%
$PM_{2.5}$	24 hours	$\mu g/m^3$	2.85	24.00	26.85	35	77%
	Annual	$\mu g/m^3$	0.37	9.00	9.37	15	62%

Acronyms and Abbreviations:

CAAQS	Colorado Ambient Air Quality Standard
CO	carbon monoxide
$\mu g/m^3$	micrograms per cubic meter
NAAQS	National Ambient Air Quality Standard
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
ppmv	parts per million by volume
SO_2	sulfur dioxide
VOC	volatile organic compound

Modeling hazardous air pollutants (BTEX, formaldehyde, and n-hexane) showed that maximum concentrations would be less than relevant 1-hour and annual average toxicity criteria. In addition to toxicity concerns, benzene and formaldehyde are carcinogenic. Cancer risk analyses showed a maximum long-term cancer risk from exposure to benzene and formaldehyde (combined) of 0.49 per million for the maximally exposed individual and 0.16 per million for the most likely exposure. This cancer risk is well below the impact significance level of 1 to 100 per million (URS 2011).

Far-field pollutant concentrations were estimated using CALPUFF modeling, which is described in the ARTSD (URS 2011). Thousands of receptors were modeled within and beyond the CRVFO oil and gas development area. Class I receptors were modeled in Arches National Park, Eagles Nest Wilderness, Flat Tops Wilderness, Maroon Bells-Snowmass Wilderness, and Mount Zirkel Wilderness. Class II (gridded) receptors were modeled within and beyond the major oil and gas development areas, as well as within the West Elk Wilderness (a Class I area), Colorado National Monument (sensitive Class II area), and Dinosaur National Monument (sensitive Class II area). Two other Class I areas—Rocky Mountain National Park and the Rawah Wilderness—were not modeled because of their distance from the CRVFO and the presence of three modeled receptors between these two and the CRVFO. In addition to predicting non-ozone criteria pollutant concentrations, modeling was performed to predict nitrogen and sulfur deposition, changes in acid

neutralizing capacity conditions at selected wilderness area lakes, and visibility changes in Class I and sensitive Class II areas. The modeling results in the ARTSD can be summarized as follows:

- Maximum concentrations of NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ would be less than the relevant NAAQS and CAAQS at all modeled receptors. Incremental increases in NO_2 and SO_2 concentrations would be less than PSD increment consumption criteria at all modeled receptors.
- Incremental increases in PM_{10} concentrations would be less than PSD increment consumption criteria for annual average concentrations but would exceed the 24-hour increment consumption criteria at some locations.
- Incremental increases in $PM_{2.5}$ concentrations would be less than PSD increment consumption criteria for both annual and 24-hour average concentrations at all receptors.
- Total nitrogen and sulfur deposition at Class I and sensitive Class II areas would be below the Level of Concern.
- Predicted changes in acid neutralizing capacity at Avalanche Lake, Moon Lake, Ned Wilson Lake, Seven Lakes, Summit Lake, and Trappers Lake would be below the Limit of Acceptable Change (LAC), which is 10 percent of baseline acid neutralizing capacity for these lakes. Predicted changes in acid neutralizing capacity at Upper Ned Wilson Lake would also not exceed the LAC. However, since this lake is extremely sensitive, the LAC is not defined as a percentage of change, but rather as "For surface waters that have a baseline of <25 μeq/l [microequivalents per liter] Acid Neutralizing Capacity, no more than 1 μeq/l cumulative loss in Acid Neutralizing Capacity is acceptable."(USFS 2011). For Upper Ned Wilson Lake, the LAC is less than 21.2 equivalents (eq). Project impacts for Alternative A are 0.8 eq, well below the LAC of 21.2.

Visibility changes are assessed by predicting pollutant concentrations and their effect on visibility. The predicted change in visibility is reported in terms of dv. A 1.0 dv change in visibility is a small but perceptible scenic change that is approximately equal to a 10 percent change in the light extinction coefficient. Data on visibility change are the number of days when a visibility change from estimated natural visibility (or near pristine) conditions is predicted to be 1.0 dv or more. Some non-BLM federal agencies use a threshold of 0.5 dv. The ARTSD describes visibility change analysis methodologies and provides visibility results for both the 0.5 and 1.0 dv thresholds for CRVFO oil and gas impacts (URS 2011). Three visibility impact prediction calculation methods were used in conjunction with 3 years of modeling data. Impacts of Alternative A on air quality are summarized as follows:

- Visibility changes at Class I and sensitive Class II areas would be less than 1.0 dv at all modeled areas, except for 1 day at the Flat Tops Wilderness.
- Visibility changes would be less than 1.0 dv at Holy Cross View, Holy Cross Wilderness View, and Rabbit's Ear View.
- Visibility changes would exceed 1.0 dv at Big Mountain View and the Roan Cliffs View, with up to 1 day per year of visibility change above 1.0 dv at the Big Mountain View and between 20 and 69 days per year of visibility change at the Roan Cliffs View, which is within the CRVFO. Because these scenic views are not Class I areas, they are not afforded special protection under the Clean Air Act. Visibility impacts at these scenic views are provided for disclosure purposes only.

Ozone impacts are modeled cumulatively and are reported in the air quality cumulative impacts section and detailed in the ARTSD.

Impacts from Wildland Fire Management. Depending on the number of acres burned and fire severity and intensity, wildland fires and prescribed burns produce relatively short-term, localized quantities of criteria pollutant emissions and some HAPs. Carbon monoxide, carbon dioxide, suspended particulate matter, and organic compounds are the pollutants emitted in the greatest quantities by wildland fires and prescribed fires. Smoke from wildland fires and prescribed burns can cause visibility and traffic safety problems in addition to air quality issues. Wind erosion from burned areas can cause post-fire air quality, visibility, and traffic safety problems. Vehicles and aircraft used for fire suppression operations and post-fire land stabilization programs contribute minor amounts of vehicle engine exhaust and fugitive dust emissions. Proposed fire management actions would be the same across all alternatives; therefore, impacts on air quality from wildland fire management would be the same across all alternatives. Under all alternatives, long-term beneficial impacts would generally outweigh adverse impacts from wildland fire and fuels management by improving forest health and reducing the risk of high-severity fire. Since wildland fires are not constituted as authorized uses of the public lands, and because the BLM fire management program develops smoke management plans, emissions associated with wildland fires were not calculated. CDPHE has established a separate permitting program for open burning and prescribed fires, where the Air Pollution Control Division (APCD) administers the prescribed fire permit program and the open burning permit program in most counties. The open burning permit program has been delegated to some counties, three of which are Eagle, Mesa, and Routt counties, which make up part of the CRVFO.

Impacts from Forestry Management. Under Alternative A, the most acres of commercial forestland would be intensively managed to improve forest health and vigor and to provide timber products. Wood products, such as posts, poles and firewood, would be produced on these lands. Reduction of pinyon-juniper encroachment into rangeland ecosystems and fuels reduction would be the focus of treatments in woodland stands, primarily through thinning by hand crews and the use of mechanized equipment for clearing and thinning. Reducing the cover of encroaching pinyon-juniper stands would lead to an increase in understory vegetation, such as grasses and forbs, thus providing greater protection against wind erosion and long-term fugitive dust.

Timber harvesting generates criteria air pollutant emissions from equipment used for logging road construction, from logging operations, from traffic on unpaved and paved roads, and from burning logging slash. Pollutants emitted from these activities include CO, CO_2, particulate matter, and VOCs. Burn plans implement fire management techniques to manipulate burn conditions to reduce the severity of the fire and minimize exposure of sensitive populations to smoke. The result would be soil compaction and displacement and soil erosion. The severity of impacts would depend on soil characteristics and implementation of stipulations, BMPs, and mitigation measures. Impacts would be minor to moderate before understory regrowth occurs and would generally have long-term benefits to air quality.

Alternative A would place a moderate emphasis on forest health, which is beneficial for air resources. Alternative B (Proposed RMP) and Alternative D would be the most aggressive alternatives and therefore more protective than Alternative A.

Since forestry management was not identified as an issue of concern during the scoping process for air quality impact analysis, and since the CRVFO determined that the potential magnitude of emissions generated by

these types of activities was considered to be so much less than the magnitude of emissions from oil and gas activities, the increase in modeled impacts would be virtually undetectable. Emissions from these activities were not quantified because of the transient and varying nature and short-term duration of these types of activities, because emissions data are not reliable, and because impacts from these activities could not be well simulated in the model. If and when these activities are proposed for implementation under this RMP, and if air quality is determined to be an issue of concern during the NEPA analysis process, then an appropriate air quality analysis would be conducted at that time.

Impacts from Livestock Grazing Management. Alternative A would allow 39,200 AUMs on 488,300 acres within the CRVFO. GHG from ruminant livestock (e.g., cattle, sheep, and goats) grazing occur primarily from enteric fermentation, with smaller GHG emissions occurring from manure. Open grazing reduces manure-related greenhouse gas emissions compared with concentrated animal feeding operations (CAFOs) because manure handled as a solid (i.e., deposited on pasture or range land) tends to decompose aerobically and produce little or no methane, while manure at CAFOs is often handled as a liquid or slurry in ponds or lagoons from which anaerobic decomposition produces more methane (EPA 2011c). Vehicle traffic to transport livestock between grazing allotments is a minor source of criteria pollutant and carbon dioxide emissions from vehicle exhaust and fugitive dust from unpaved roads. Adverse impacts in areas where livestock congregate could include loss of vegetation cover caused by grazing and becoming a minor source of fugitive dust emissions. Alternative A would involve the most acres and AUMs available for livestock grazing and the least management restrictions; therefore, air quality impacts would likely be greatest under Alternative A.

However, since livestock grazing was not identified as an issue of concern during the scoping process for air quality impact analysis, and since the CRVFO determined that the potential magnitude of emissions generated by these types of activities was considered to be so much less than the magnitude of emissions from oil and gas activities, the increase in modeled impacts would be virtually undetectable. Emissions from these activities were not quantified because of the transient and varying nature and short-term duration of these types of activities, because emissions data are not reliable, and because impacts from these activities could not be well simulated in the model.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, the planning area would leave large tracts of land open to cross-country OHV use. The CRVFO has 295,900 acres open to cross-country travel, 38,000 acres limited to travel on existing routes, and 123,000 acres limited to travel on designated routes. On-road and off-road vehicles generate engine exhaust emissions and fugitive dust. Engine exhaust emissions include emissions of CO, carbon dioxide (CO_2), NO_x, fine particulate matter, SO_2, and organic compounds (including VOCs and HAPs). The impact from increased motorized use (e.g., full-sized vehicles, motorcycles, and ATVs) as well as from horses and foot traffic, increases the potential for soil disturbance and erosion. Road and trail maintenance is a source of vehicle emissions and fugitive dust generation. Since travel management was not identified as an issue of concern during the scoping process for air quality impact analysis, and since the CRVFO determined that the potential magnitude of emissions generated by these types of activities was considered to be so much less than the magnitude of emissions from oil and gas activities, the increase in modeled impacts would be virtually undetectable. Emissions from these activities were not quantified because of the transient and varying nature and short-term duration of these types of activities, emissions data not reliable, and impacts from these activities could not be well simulated in the model. If and when these activities are proposed for implementation under this RMP, and if air quality is determined to be an issue of concern during the NEPA analysis process, then an appropriate air quality analysis would be conducted at that time.

Impacts from Lands and Realty Management. Actions related to lands and realty management programs include acquiring, disposing of, and exchanging land, establishing mineral withdrawal areas and ROW avoidance and exclusion areas, and issuing ROWs. Such actions have the potential for indirectly creating emissions of criteria pollutants from construction of infrastructure projects or from future uses of lands that the BLM acquires or transfers to other entities. Establishment of mineral withdrawal areas may have the minor beneficial effect of avoiding criteria pollutant emissions from mineral development projects that might otherwise occur. Establishment of ROW avoidance and exclusion areas may have indirect effects of avoiding some potential ROW construction projects or altering the routing of other projects. Since land and realty management was not identified as an issue of concern during the scoping process for air quality impact analysis, and since the CRVFO determined that the potential magnitude of emissions generated by these types of activities was considered to be so much less than the magnitude of emissions from oil and gas activities, the increase in modeled impacts would be virtually undetectable. Emissions from these activities were not quantified because of the transient and varying nature and short-term duration of these types of activities, because emissions data are not reliable, and because impacts from these activities could not be well simulated in the model. If and when these activities are proposed for implementation under this RMP, and if air quality is determined to be an issue of concern during the NEPA analysis process, then an appropriate air quality analysis would be conducted at that time.

Impacts from Coal Management. Under Alternative A, approximately 28,500 acres of the federal mineral estate in the planning area would be open to further consideration for coal leasing. Stipulation GS-NSO-1 for surface coal mines would prohibit surface occupancy and surface-disturbing activities within the area of an approved surface coal mine. Additionally, stipulation GS-CSU-1 for underground coal mines would apply CSU restrictions to oil and gas operations within the area of federally leased coal lands.

Construction equipment operations associated with facility, road, and ROW construction for coal development projects would be a source of fugitive dust, engine exhaust emissions, and methane from coal outgassing. Equipment used for extraction, processing, and material transport also would be a source of fugitive dust and engine exhaust emissions. Most coal development projects would be subject to state and federal air quality permits, and developers would be required to comply with state and federal air quality regulations While coal mining would result in surface-disturbing activities, there are no active coal mines in the planning area, and the potential for new coal mine operations in the future is relatively low. Since coal management was not identified as an issue of concern during the scoping process for air quality impact analysis, and since the CRVFO determined that the potential magnitude of emissions generated by these types of activities was considered to be so much less than the magnitude of emissions from oil and gas activities, the increase in modeled impacts would be virtually undetectable. Emissions from these activities were not quantified because of the transient and varying nature and short-term duration of these types of activities, because emissions data are not reliable, and because impacts from these activities could not be well simulated in the model. If and when these activities are proposed for implementation under this RMP, and if air quality is determined to be an issue of concern during the NEPA analysis process, then an appropriate air quality analysis would be conducted at that time.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The primary impact on the planning area in this section would be from oil and gas development. Under Alternative A, approximately 672,500 acres of the federal mineral estate within the planning area would be managed as open to fluid minerals leasing and development and 28,700 acres would be closed to fluid minerals leasing. This alternative accounts for development of approximately 2,662 federal wells with an

estimated 3,347 acres of surface disturbance and includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 2,181 acres on interim reclamation of well pads. The air quality impacts from oil and gas development under Alternative A are presented in the Air Quality Management section. Air quality impacts to public health are discussed in detail in the Chapter 4-6-1.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, approximately 470,700 acres of the planning area would be open to locatable mineral development. However, the CRVFO would recommend to the Secretary of the Interior withdrawal of approximately 34,500 acres from locatable mineral exploration or development. Approximately 470,700 acres of the planning area would be open to salable minerals and non-energy leasable minerals. The CRVFO would close approximately 34,500 acres in the planning area to mineral materials and non-energy solid mineral leasing.

Exploration and development of locatable and salable minerals would result in surface and subsurface disturbing activities through mineral development. Construction equipment operations associated with facility, road, and ROW construction for mineral development projects would be a source of fugitive dust and engine exhaust emissions. Equipment used for extraction, processing, and material transport also would be a source of fugitive dust and engine exhaust emissions. Most mineral development projects would be subject to state and federal air quality permits, and developers would be required to comply with state and federal air quality regulations. Alternative A would withdraw the fewest acres for mineral development and would potentially result in the most impacts to air quality.

Since this issue was not identified as an issue of concern during the scoping process for air quality impact analysis, and since the CRVFO determined that the potential magnitude of emissions generated by these types of activities was considered to be so much less than the magnitude of emissions from oil and gas activities, the increase in modeled impacts would be virtually undetectable. Emissions from these activities were not quantified because of the transient and varying nature and short-term duration of these types of activities, because emissions data are not reliable, and because impacts from these activities could not be well simulated in the model. If and when these activities are proposed for implementation under this RMP, and if air quality is determined to be an issue of concern during the NEPA analysis process, then an appropriate air quality analysis would be conducted at that time.

Alternative B (Proposed RMP)

Impacts on air quality from wildland fire management, forestry management, lands and realty management, and coal management would be the same as or similar to those for Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Air Quality Management. The air quality management goal under the Proposed RMP would be to ensure that air quality and air-quality-related values are adequately protected in conjunction with activities or resource uses authorized by the BLM. The objective would be to control or reduce emissions of air pollutants associated with oil and gas activities to help protect human health, reduce visibility-impairing pollutants in accordance with the reasonable progress goals established within the Colorado Regional Haze State Implementation Plan to improve visibility, reduce atmospheric deposition, and reduce GHG emissions. Air quality management objectives and actions under the Proposed RMP would include more stringent emission controls on oil and gas equipment and activities than those assumed for Alternative A. Air quality management actions under the Proposed RMP would include the following strategies to reduce emissions from oil and gas activities:

- Implement an adaptive air quality management plan to continuously monitor and manage air quality in the CRVFO using the air quality modeling results in the ARTSD, review of the level of oil and gas development and resulting emissions, and institute ambient air quality monitoring and phased implementation of air quality mitigations.
- Cooperate with the CDPHE and local governments in identifying monitoring needs, as well as in facilitating installation and operation of air quality monitoring equipment on BLM land or in conjunction with BLM-authorized activities.
- Based on annual review required in the CARPP in Appendix L and on the rate of development, require phased-in use of improved drilling and completion engines that meet or exceed Tier 4 non-road diesel emission standards (40 CFR 1039). The conversion to engines that meet or exceed Tier 4 non-road diesel emission standards would be completed when the equivalent of 2,664 wells or the emissions modeled in Alternative A of the ARTSD are exceeded.
- During construction, reduce emissions of fugitive dust by requiring operators to implement watering (minimum twice daily during dry conditions) or application of other dust-suppressant agents at construction areas, including access roads used during construction. The authorized officer might direct the operator to change the level and type of dust abatement if the measures being used were insufficient to prevent visible plumes of fugitive dust or deposition of excessive dust on nearby surfaces in conjunction with vehicular traffic, equipment operations, or wind events. Require fugitive dust control plans in conjunction with oil and gas MDPs. In the oil and gas development area, require road design, construction, and surfacing methods that would achieve at least 94 percent fugitive dust emission reduction using asphalt, chip-seal, or gravel in combination with watering or dust suppressants.
- Require at least 80 percent of condensate and produced water to be piped from production sites to consolidated facilities for treatment or transfer to trucks for haulage.
- Reduce emissions of VOCs associated with federal oil and gas wells by requiring that operators install and maintain measures to achieve at least 90 percent control on glycol dehydrators and storage vessel and tank vents or otherwise as needed to comply with CDPHE Regulation Number 7, 5 CCR 1001-9, COGCC Rule 805, the New Source Performance Standards for Crude Oil and Natural Gas Production at 40 CFR Part 63 subpart OOOO and National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Oil and Natural Gas Production at 40 CFR Part 63 subparts HH and HHH.
- Require that oil and gas operators use reduced-emission completion technologies (i.e. "green" completions) as defined in COGCC Rule 805 and the New Source Performance Standards for Crude Oil and Natural Gas Production at 40 CFR Part 63 subpart OOOO for all wells on BLM lands and wells that access federal minerals. An exemption may be granted on a case-by-case basis if installation of necessary infrastructure is impracticable.
- Require flaring of natural gas during well completions that are exempted from green completion technology. Prohibit venting of natural gas except during emergencies
- Require that natural-gas-fired reciprocating internal combustion engines at BLM-authorized field compression facilities comply with CDPHE Air Quality Control Commission Regulation No. 7, 5 CCR 1001-9 Section XVII.E.2, Emission Standards for New and Relocated Engines, and Section XVII.E.3 for existing engines.

- Require compliance with applicable New Source Performance Standards and NESHAPs for all internal combustion engines.
- Consider electrification of engines at compressor stations as a possible mitigation measure in areas where it is feasible.

The Proposed RMP would include an adaptive management approach to implementing the range of development scenarios and mitigation measures modeled in the ARTSD and evaluated in the Draft RMP. The purpose of the CARPP in Appendix L is to address air quality issues identified by BLM in its analysis of potential impacts to air quality resources for the CRVFO RMP/EIS. In addition, the plan further clarifies the air resources goals, objectives, and management actions set forth in Table 2-2 of the Proposed RMP/Final EIS. The CARPP is an adaptive management approach to implementing air resources decisions and outlines BLM's commitments for managing air resources. The CARPP considers a range of emissions levels and air quality impacts from the mitigation and development scenarios in the ARTSD and future modeling efforts to make implementation-level decisions. The Proposed RMP includes a level of development and mitigations scenarios within the range of alternatives in the Draft RMP/Draft EIS implemented with an adaptive management plan (CARPP). With continuing advancements in technology such as increased number of wells per pad, the BLM decided to analyze the greatest number of wells combined with restrictive protections for other resources. To analyze the full range of possible impacts on other resources and the most oil and gas development, the Proposed RMP considered the full level of the development assumed in the RFD, which is the same number of wells and acres of disturbance as in Alternative D. The Proposed RMP includes stipulations and protective measures for other resources similar to the preferred alternative in the Draft RMP/Draft EIS. The stipulations in the Proposed RMP in this Final EIS would be more protective than under Alternatives D or A. Therefore, the Proposed RMP would balance the highest oil and gas extraction volume with protecting other resources and resource uses. Implementation of the CARPP in the Proposed RMP would allow for a flexible approach to oil and gas development by relying on air quality modeling to analyze future impacts, continuously comparing air quality conditions and industry emissions to the analysis, and allowing operators to use technological advancements to mitigate air quality impacts. Alternative A would protect air quality and other resources while assuming the level of development analyzed in Alternative D.

Impacts from Livestock Grazing Management. Livestock grazing impacts under the Proposed RMP would be less than under Alternative A because of a reduction in the number of available AUMs and a reduction in acres open to grazing. Under the Proposed RMP, 35,500 AUMs would be allowed in the planning area, and approximately 441,600 acres of public land would be available for livestock grazing. These restrictions would cause a decrease in methane, vehicle exhaust, and fugitive dust emissions compared with Alternative A that is proportionate to the change in AUMs between Alternative A and the Proposed RMP.

Impacts from Comprehensive Trails and Travel Management. The Proposed RMP impacts would be similar to those described under Alternative A. Under the Proposed RMP, the CRVFO would not designate any areas as open to OHV use, 41,200 acres would be closed to OHV use, and 464,000 acres would limit OHV use to designated routes. This reduction of total acres open to cross-country OHV use would result in a reduction in erosion and less fugitive dust. Compared with Alternative A, the impact from travel management on air quality would be similar across the Proposed RMP and Alternatives C and D, resulting in benefits to air quality.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The primary impact on air resources in the CRVFO planning area would be from oil and gas development. Under

the Proposed RMP, approximately 603,100 BLM surface acres within the planning area would be managed as open to fluid minerals leasing and development. This alternative accounts for the development of approximately 4,200 federal wells on 525 multi-well pads, with an estimated 5,300 acres of surface disturbance, and includes the pads, access roads, pipelines, and a *pro rata* share of off-site facilities. The total area would be reduced to 3,400 acres on interim reclamation of well pads. The Proposed RMP includes ongoing air quality management outlined in Appendix L to make implementation-level decisions for this assumed level of development.

The air quality impacts from oil and gas development under the Proposed RMP are presented in the Air Quality Management section above. Air quality impacts to public health are discussed in detail in the Chapter 4-6-1.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The CRVFO would recommend withdrawal of approximately 181,200 acres for closure to the mining laws for locatable exploration or development. The CRVFO would close approximately 162,500 to mineral materials and non-energy solid mineral leasing. Under this alternative, air quality would benefit in those areas where these activities would be prohibited. Mineral development under the Proposed RMP would be implemented according to the CARPP and would have less impact on air resources than under Alternatives A and D, but more than C.

Alternative C

Impacts on air quality from wildland fire management, forestry management, lands and realty management, and coal management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Air Quality Management. The air quality management goal under Alternative C would be to ensure that air quality and air-quality-related values are adequately protected in conjunction with activities or resource uses authorized by the BLM. The objective would be to control or reduce emissions of air pollutants associated with oil and gas activities to help protect human health, reduce visibility-impairing pollutants in accordance with the reasonable progress goals established within the Colorado Regional Haze State Implementation Plan to improve visibility, reduce atmospheric deposition, and reduce GHG emissions. Air quality management objectives and actions under Alternative C would include more stringent emission controls on oil and gas equipment and activities than are assumed for Alternative A. The ARTSD analyzed four development and mitigation scenarios.

Alternative C air quality management actions include the following strategies to reduce emissions from oil and gas activities:

- Require electrification of all engines used for gas compression at compressor stations.
- Require new drill rig and frac pump engines to use natural gas and existing engines to be converted to natural gas within 2 years of the ROD.
- Require twice-daily watering at construction sites and associated roads, development of fugitive dust control plans, and additional abatement measures if necessary.
- In the oil and gas development area, require road design, construction, and surfacing methods that would achieve at least 94 percent fugitive dust emission reduction using asphalt, chip-seal, or gravel in combination with watering or dust suppressants.

- Require at least 90 percent of condensate and produced water to be piped from production sites to consolidated facilities for treatment or transfer to trucks for haulage.
- Require glycol dehydrators to achieve at least 90 percent VOC emission control (which also reduces methane emissions).
- Require condensate tanks and produced water tanks to achieve at least 90 percent VOC emission control (which also reduces methane emissions).
- Require green completion to capture VOC and methane emissions during well completion (unless an exemption is authorized).
- Prohibit venting of natural gas during well completion, except during emergencies.

Estimated maximum annual emissions from oil and gas development under Alternative C are summarized in Table 4.2.1-3. As a result of the high level of emission control described above, Alternative C emissions are estimated to be less than Alternative A emissions.

With regard to near-field modeling, Alternative A non-particulate emissions were modeled for Alternatives C and D to conservatively estimate impacts from a dense grouping of emission sources. Although emission controls would be more stringent under Alternatives C and D compared with Alternative A, some of the more stringent emission controls would not be required during the first year after the ROD. Consequently, modeling of Alternative A emission control levels provides a reasonable, but conservative, estimate of the highest potential near-field non-particulate pollutant concentrations possible under Alternatives C and D. Most Alternative C CRVFO oil and gas development would require that equipment meet more stringent emission control requirements, and near-field emissions would be lower for Alternative C than for Alternative A.

Table 4.2.1-3
Estimated Maximum Annual Emissions from Oil and Gas Development, Alternative C

Pollutant	Maximum Emissions, Tons per Year
CO	103
NO_x	60
PM_{10}	66
$PM_{2.5}$	10
SO_2	1
VOC	1,268
Benzene	21
Ethylbenzene	0.2
Formaldehyde	0.04
Hexane	122
Toluene	22
Xylene	17

Source: URS 2011.

Acronyms and Abbreviations:

CO	carbon monoxide
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
SO_2	sulfur dioxide
VOC	volatile organic compound

Near-Field Comparisons to Non-Ozone NAAQS and CAAQS. Alternative C predicted concentrations for most non-ozone pollutants would be less than those shown above for Alternative A. PM_{10} and $PM_{2.5}$ concentrations would be similar to those shown above for Alternative A because Alternative C emission controls were modeled for Alternative A.

Near-Field Comparisons to Hazardous Air Pollutant Thresholds. One-hour and annual predicted HAP concentrations and cancer risks would be less in the Proposed RMP than those shown for Alternative A.

Far-Field Comparisons to Non-Ozone NAAQS and CAAQS. The ARTSD predicted far-field concentrations for non-ozone pollutants would be less for Alternative C than predicted concentrations for Alternative A. Modeled concentrations are below the NAAQS for each of the modeled pollutants and averaging times.

Far Field Comparisons to PSD Increments. As shown in the ARTSD, far-field concentrations predicted under Alternative C would be less than predicted concentrations for Alternative A. In addition, Alternative C concentrations of NO_2, PM_{10}, PM_{25}, and SO_2 would be less than PSD increments.

Deposition. The predicted deposition analysis for Alternative C indicates that nitrogen and sulfur deposition rates would be less than under Alternative A and below the Levels of Concern at modeled Class I and sensitive Class II areas.

Lake Chemistry. Predicted Alternative C changes in lake chemistry would be much less than acid neutralizing capacity changes under Alternative A. Alternative C lake chemistry impacts at the most sensitive lake, Upper Ned Wilson Lake, would still be insignificant; the LAC is 21.2 eq, and the predicted change is 0.1 eq, well below the LAC.

Visibility. Predicted Alternative C visibility impacts would be less than those for Alternative A, which showed visibility changes of 1.0 dv or more for up to 1 day at Flat Tops Wilderness, up to 1 day at Big Mountain View, and 20 to 69 days at Roan Cliffs View. The Proposed RMP would have no days of visibility change of 1.0 dv or more at any Class I or sensitive Class II area or view.

Impacts from Livestock Grazing Management. Under Alternative C, a total of 35,500 AUMs would be allowed in the planning area, and approximately 427,800 acres of public land would be available for livestock grazing. These limits would cause a slight decrease in methane, vehicle exhaust, and fugitive dust emissions compared with the Proposed RMP and an approximate doubling of emissions compared with Alternative A.

Impacts from Comprehensive Trails and Travel Management. Under Alternative C, the CRVFO would not designate any areas as open to OHV use, 43,900 acres would be closed to OHV use, and 461,300 acres would limit OHV use to 835 miles of designated routes. On-road and off-road vehicle use generates engine exhaust emissions and fugitive dust. Road and trail maintenance is an additional small source of vehicle emissions and fugitive dust generation. More acres than under the other alternatives would be closed to off-highway vehicle use from December 1 to April 30, which would help protect soils and result in lower fugitive emissions. Alternative C would be most protective of air quality, followed by the Proposed RMP, then Alternatives D and A.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under Alternative C, more acres would be closed to fluid minerals leasing (179,700 acres) and slightly more acres would be protected by NSO or CSU stipulations than under Alternatives A or the Proposed RMP. The air quality impacts from oil and gas development under Alternative A are presented in the Air Quality Management section. Air quality impacts to public health are discussed in detail in the Chapter 4-6-1.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. CRVFO would recommend for withdrawal to the Secretary of the Interior approximately 179,400 acres for locatable mineral exploration or development. The CRVFO would close approximately 182,100 acres in the planning area to mineral material disposal and non-energy solid mineral leasing.

Alternative C impacts would be similar to those described under Alternative A. Alternative C would withdraw the most acres of any alternative, providing the greatest benefit to soils.

Alternative D

Impacts on air quality from wildland fire management, forestry management, lands and realty management, and coal management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Air Quality Management. The air quality management goals and objectives under Alternative D would be identical to those for Alternative B (Proposed RMP) and Alternative C. Alternative D would include the following air quality management actions:

- Require electrification of at least 50 percent of all new engines used for gas compression at centralized compressor stations.
- Require non-electric compressor engines to meet EPA and CDPHE emission limits.
- Require new and existing drill rig and frac pump engines to meet or exceed EPA Tier 2 emission standards within 1 year of the ROD. By 2015, require all drill and frac pump engines to use natural gas.
- Require twice-daily watering at construction sites and associated roads, development of fugitive dust control plans, and additional abatement measures if necessary.
- In the oil and gas development area, require road design, construction, and surfacing methods that would achieve at least 94 percent fugitive dust emission reduction using asphalt, chip-seal, or gravel in combination with watering or dust suppressants.
- Require at least 80 percent of condensate and produced water to be piped from production sites to consolidated facilities for treatment or transfer to trucks for haulage.
- Require glycol dehydrators to achieve at least 90 percent VOC emission control (which also reduces methane emissions).
- Require condensate tanks and produced water tanks to achieve at least 90 percent VOC emission control (which also reduces methane emissions).
- Require green completion to capture VOCs and methane emissions during well completion (unless an exemption is authorized).

- Prohibit venting of natural gas during well completion, except during emergencies.

Estimated maximum annual emissions from oil and gas development under Alternative D are summarized in Table 4.2.1-4. Alternative D emissions would generally be less than Alternative A emissions, with the exception of three HAPs. However, Alternative D emissions would be greater than emissions under Alternative C criteria and HAPs.

Table 4.2.1-4
Estimated Maximum Annual Emissions from Oil and Gas Development, Alternative D

Pollutant	Maximum Emissions, Tons per Year
CO	726
NO_x	383
PM_{10}	177
$PM_{2.5}$	25
SO_2	1
VOC	2,599
Benzene	41
Ethylbenzene	0.5
Formaldehyde	44
Hexane	234
Toluene	43
Xylene	32

Source: URS 2011.

Acronyms and Abbreviations:

CO	carbon monoxide
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
SO_2	sulfur dioxide
VOC	volatile organic compound

Near-Field Comparisons to Non-Ozone NAAQS and CAAQS. As a result of the more stringent emission controls for most pollutants, Alternative D near-field air pollutant concentrations would be lower than the concentrations estimated for Alternative A. However, particulate matter concentrations would be similar to those modeled for Alternative A because the more stringent fugitive dust controls associated with Alternative B (Proposed RMP), and Alternatives C and D were modeled and reported.

Near-Field Comparisons to Hazardous Air Pollutant Thresholds. Alternative D HAP concentrations and cancer risks would be less than those shown for Alternative A.

Far-Field Comparisons to Non-Ozone NAAQS and CAAQS. As shown in the ARTSD, predicted concentrations for non-ozone pollutants under Alternative D would be less than Alternative A predicted concentrations for CO, PM_{10}, and $PM_{2.5}$. Alternative D SO_2 concentrations would generally be greater than those for Alternative A, and Alternative D would also have some Class II areas with greater annual NO_2 concentrations. For all pollutants, Alternative D non-ozone pollutant concentrations would be greater than those for Alternative B (Proposed RMP) and Alternative C. Modeled concentrations would be below the NAAQS for each of the modeled pollutants and averaging times.

Far-Field Comparisons to PSD Increments. As shown in the ARTSD Alternative D predicted concentrations would be less than predicted concentrations for Alternative A for PM_{10}. However, at some receptors, Alternative D concentrations would exceed Alternative A NO_2 and SO_2 concentrations. Alternative D concentrations of NO_2, PM_{10}, PM_{25}, and SO_2 would be less than PSD increments.

Deposition. Predicted Alternative D deposition analysis indicates that nitrogen and sulfur deposition rates would be less than or equal to Alternative A deposition rates and below the Levels of Concern at modeled Class I and sensitive Class II areas. Alternative D deposition rates would be greater than or equal to deposition rates for the Proposed RMP and Alternative C.

Lake Chemistry. Predicted Alternative D changes in lake chemistry would be much less than acid neutralizing capacity changes under Alternative A and greater than those for the Proposed RMP and Alternative C. Alternative D lake chemistry impacts at the most sensitive lake, Upper Ned Wilson Lake, would still be insignificant; the LAC is 21.2 eq, and the predicted change is 0.6 eq.

Visibility. Predicted Alternative D visibility impacts would be less than those for Alternative A, which showed visibility changes of 1.0 dv or more for up to 1 day at Flat Tops Wilderness, up to 1 day at Big Mountain View, and 20 to 69 days at Roan Cliffs View. Similar to the Proposed RMP and Alternative C, Alternative D would have no days of visibility change of 1.0 dv or more at any Class I or sensitive Class II area or view.

Impacts from Livestock Grazing Management. Alternative D would allow 36,500 AUMs on 442,200 acres within the CRVFO. This level would cause an increase in methane, vehicle exhaust, and fugitive dust emissions compared with Alternatives A, B, and C that is proportionate to the change in AUMs. Since this issue was not identified as an issue of concern during the scoping process for air quality impacts, and since the CRVFO determined that the relative contribution of emissions associated with this activity were *de minimis*, emissions from this activity were not calculated in the emissions inventory.

Impacts from Comprehensive Trails and Travel Management. On-road and off-road vehicle use generates engine exhaust and fugitive dust emissions. Road and trail maintenance is an additional small source of vehicle emissions and fugitive dust generation. Under Alternative D, the CRVFO would not designate any areas as open to OHV use, 40,400 acres would be closed to OHV use, and 464,800 acres would limit OHVs to 1,005 miles of designated routes.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The primary impact on air resources in the CRVFO planning area would be from oil and gas development. Under Alternative D, approximately 4,198 wells on 525 multi-well pads would be developed on non-Roan Plateau land or mineral estate under BLM jurisdiction. Total disturbance would be approximately 5,276 acres, reduced to 3,439 acres with interim reclamation. Approximately, 648,400 federal mineral estate acres within the planning area would be managed as open to fluid minerals leasing and development. The air quality impacts from oil and gas development under Alternative A are presented in the Air Quality Management section. Air quality impacts to public health are discussed in detail in Section 4.6.1. Alternative D would have the greatest level of oil and gas activity, coupled with a high level of emission control.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts would be similar to those described under Alternative A. Under Alternative D, approximately 477,400 acres of the planning area would be open to salable mineral development.

Cumulative Air Quality Impacts

Cumulative air quality impacts are determined by modeling cumulative air quality emissions, which include CRVFO project emissions and expected future emissions from nearby areas. Appendix L presents the cumulative impact results from the ARTSD under four scenarios with different levels of development and mitigation.

Alternative A

Impacts from Air Quality Management. Alternative A cumulative emissions included the following sources for all pollutants except volatile organic compounds:

- CRVFO Alternative A Project sources.
- Cumulative oil and gas sources in the CRVFO but not included as part of the project (such as sources on the Roan Plateau, sources on private land, and sources on US Forest Service land).
- Alternative A oil and gas sources within the adjacent White River Field Office (WRFO).
- Oil and gas sources within the Vernal Field Office and the Little Snake Field Office.
- Reasonably foreseeable future action (RFFA) sources.

Cumulative VOC emissions reported below do not include RFFA emissions, nor are they a full representation of cumulative VOC emissions, because VOCs were not modeled with CALPUFF and were instead modeled with CAMx. Detailed information on photochemical grid modeling emission inventories for ozone modeling is provided in the ARTSD (URS 2011). Estimated cumulative criteria pollutant emissions from oil and gas development under Alternative A CALPUFF modeling are summarized in Table 4.2.1-5.

Table 4.2.1-5
Estimated Cumulative Annual Emissions from Oil and Gas Development, Alternative A

Pollutant	Maximum Emissions, Tons per Year
CO	17,341
NO_x	12,948
PM_{10}	23,625
$PM_{2.5}$	3,760
SO_2	268
VOC	41,695

Source: URS 2011.

Acronyms and Abbreviations:

CO	carbon monoxide
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
SO_2	sulfur dioxide
VOC	volatile organic compound

The cumulative far-field ambient air quality impact assessment was performed using methods similar to the Project far-field CALPUFF analysis, except that air resource impacts were determined using the cumulative emission sets described above. The following specific air resource assessments were performed:

- Maximum predicted CO, NO_2, PM_{10}, $PM_{2.5,}$ and SO_2 concentration comparisons to NAAQS and CAAQS
- Maximum predicted NO_2, PM_{10}, PM_{25}, and SO_2 modeled concentration comparisons to applicable PSD increments
- Maximum predicted nitrogen and sulfur deposition
- Maximum predicted changes to lake acid neutralizing capacity
- Maximum predicted number of days of 1.0 dv or greater visibility change

Comparisons to Non-Ozone NAAQS and CAAQS. CALPUFF modeling analyses for cumulative impacts under Alternative A did not show any violations of CO or SO_2 standards at any receptor. Annual NO_2 concentrations also would be below NAAQS and CAAQS at all receptors. However, CALPUFF modeling predicted potential exceedances of the following standards in localized areas at Class II receptors:

- NO_2 1-hour
- PM_{10} 24-hour and annual
- $PM_{2.5}$ 24-hour and annual

Predicted future concentrations of NO_2 under Alternative A cumulative emissions indicated possible exceedances of the new 1-hour NO_2 standard (GPO 2010a) in several locations in the CRVFO and nearby Field Offices. Many of the greatest concentrations would be near RFFA sources, such as compressor stations. Realizing that modeling for the stringent 1-hour NO_2 standard would be challenging, EPA recently issued guidance for modeling NO_2 emissions to demonstrate compliance with the new 1-hour standard (EPA 2010c). For air quality permitting, the guidance suggests site-specific modeling using detailed data for each facility in order to avoid over-predicting NO_2 concentrations. Based on a lack of facility-specific data and the large number of modeled sources, this type of facility-specific modeling was not performed as part of this analysis. Consequently, the CALPUFF model results may have over-predicted NO_2 concentrations. Over-prediction during the 20-year life of the project might also be likely to occur because CALPUFF cumulative emission inventories do not account for future NO_2 emission reductions at existing sources, and because the potential for lower background NO_2 concentrations could not be taken into account. Recent EPA regulations will significantly reduce NO_2 emissions from stationary source engines, non-road engines, and motor vehicles.

Colorado continues to be designated attainment for the annual NO_2 NAAQS. Attainment designations for the new 1-hour NO_2 standard have not been determined. All new, modified, or reconstructed major sources of NO_2 will be required to perform NO_2 modeling and undergo PSD air quality permitting to demonstrate compliance with the 1-hour NO_2 standard.

Predicted future concentrations of PM_{10} and $PM_{2.5}$ that would result from cumulative emissions under Alternative A indicate possible exceedances of these standards in small areas, one of which would be near a coal mine. Contour plots indicating areas with high PM_{10} concentrations are included in the ARTSD (URS 2011).

PSD Increment Consumption. PSD increment comparisons performed under NEPA are provided for informational purposes only and are not regulatory PSD increment consumption analyses. Alternative A cumulative impacts were predicted to be below PSD increments at all modeled receptors for all pollutants and

averaging times, except for the NO_2 annual, PM_{10} 24-hour, PM_{25} annual and 24-hour, and PM_{10} annual averaging times. For each of these three pollutants and averaging times, PSD increments were predicted to be exceeded at some Class II gridded receptors. Predicted concentrations would be well below PSD increments for all pollutants and averaging times at Class I and sensitive Class II area receptors.

Deposition. Modeling for cumulative emissions under Alternative A indicated that nitrogen and sulfur deposition rates would be well below the Levels of Concern at all modeled Class I and sensitive Class II areas.

Lake Chemistry. Alternative A predicted changes in lake chemistry would generally be greater than those for the Proposed RMP and less than Alternatives C and D. For six of the seven lakes included in the analysis, modeled changes in acid neutralizing capacity would be below the Limits of Acceptable Change at these lakes, which allow a decrease in acid neutralizing capacity of up to 10 percent change from baseline acid neutralizing capacity. The Upper Ned Wilson Lake is an extremely sensitive lake with regard to acid deposition and it has a LAC that is reported slightly differently than lakes with higher baseline ANC values.

The LAC for extremely sensitive lakes is that no more than 1 μeq/l cumulative loss in Acid Neutralizing Capacity is acceptable (USFS 2011). For Upper Ned Wilson Lake, this amount is equal to 21.2 eq of no change from baseline acid neutralizing capacity. The cumulative predicted decrease in acid neutralizing capacity at Upper Ned Wilson Lake is 7.5 eq; therefore, cumulative impacts would not be significant.

Visibility. Cumulative Alternative A modeling predicted visibility reductions of more than 1.0 dv at some Class I and sensitive Class II areas, as summarized in Table 4.2.1-6. The number of days per year varied, depending on the type of visibility post-processing method and the year modeled (2001, 2002, or 2003). The ARTSD shows detailed cumulative visibility results and provide visibility impact comparisons among the alternatives, as well as comparisons among modeled years and post-processing methods. The maximum number of days with predicted cumulative visibility impacts of 1.0 dv or more at any Class I area would be 58 days at the Flat Tops Wilderness. Although visibility impacts at sensitive Class II areas and scenic views are not required to be modeled, the resulting inpacts are provided for disclosure purposes only. Roan Cliffs View, which is located within the CRVFO oil and gas development area, is predicted to have as many as 349 days with a visibility change of 1.0 dv or more from natural conditions.

Table 4.2.1-6
Alternative A Visibility Impacts

Class I Areas	Maximum Number of Days with ≥1.0 dv Visibility Change		Sensitive Class II Areas and Scenic Views	Maximum Number of Days with ≥1.0 dv Visibility Change	
	Project	Cumulative		Project	Cumulative
Arches National Park	0	6	Colorado National Monument	0	26
Eagles Nest Wilderness	0	8	Dinosaur National Monument	0	180
Flat Tops Wilderness	1	58	Big Mountain View	1	208
Maroon Bells-Snowmass Wilderness	0	24	Holy Cross View	0	2
Mount Zirkel Wilderness	0	17	Holy Cross Wilderness View	0	2
West Elk Wilderness	0	6	Rabbit's Ear View	0	21
			Roan Cliffs View	69	349

Source: URS 2011.

Acronyms and Abbreviations:

dv deciview

Ozone NAAQS. Photochemical grid modeling was used to assess impacts on ambient ground-level ozone from air emissions associated with the four alternatives and cumulative sources throughout the 48 contiguous United States. Ground-level ozone is formed in atmospheric reactions involving NO_x and VOCs that are emitted from a large variety of sources, including natural sources, such as plants and wildland fires, and from man-made sources, such as oil and gas equipment, many different types of stationary sources, prescribed burns, and vehicle exhaust. Comprehensive emission sets were used in the analysis, including sources throughout the 48 contiguous United States, portions of Canada and Mexico, and portions of the Atlantic Ocean, Pacific Ocean, and Gulf of Mexico. The ozone assessment focused on impacts throughout Colorado and surrounding states.

April and July were selected for future-year predictive modeling because Colorado ozone monitoring data indicate that these months typically exhibit high ozone concentrations in rural and urban areas, respectively. Ozone modeling for these 2 months was performed for a 2006 base year and for a 2028 future year, when project emissions are predicted to be at their peak.

Because reliable ozone monitoring data for the base case year are needed to perform the ozone analysis, predictions of ozone compliance were performed at locations where ozone monitors were operating during 2006. The closest ozone monitors to the CRVFO are Sunlight Mountain, located in the CRVFO, the Gothic monitor, located near the southern CRVFO boundary, and the Ripple Creek Pass monitor, located near the northern CRVFO boundary. Some rural monitors collected 2006 ozone data year-round, while others collected data during July and other warm weather months but did not collect data during April. The ozone modeling procedures are discussed in more detail in the ARTSD (URS 2011).

Ozone impacts attributable to CRVFO Project and cumulative emissions are not expected to cause or contribute to violations of the ozone NAAQS. Time series plots for Gothic and other rural monitors illustrated that 8-hour daily maximum ozone concentrations predicted for each alternative were less than the baseline 2006 modeled concentrations on every day of each episode.

Ozone baseline design values and future design values predicted for rural monitors in and near the CRVFO under Alternative A are provided in Table 4.2.1-7. The future design values are directly comparable to the ozone NAAQS. For all alternatives, current and predicted ozone levels at rural ozone monitoring sites in Colorado were expected to be in compliance with the federal 8-hour ozone standard, which is currently set at 0.075 ppm. In addition, ozone impacts attributable to CRVFO project emissions do not extend to any monitors in the Denver metropolitan area.

On some of the modeled days, absolute predicted concentrations exceeded the numerical value of the federal 8-hour ozone standard (0.075 ppm) at ozone monitor locations and at unmonitored locations. These predicted concentrations did not indicate a violation of the NAAQS for the following reasons:

- Daily maximum ozone concentrations do not compare directly with the NAAQS—Compliance with the ozone NAAQS is determined by comparing the 3-year average of the fourth highest daily maximum 8-hour average concentration with the NAAQS. The format of the ozone NAAQS is intentionally designed to allow multiple high ozone days over a 3-year period.
- Spatial consistency of high ozone concentrations is needed—Ozone concentrations exceeding 0.075 ppm must occur repeatedly at the same location for a violation to occur.

Table 4.2.1-7
Alternative A Ozone Impacts

Ozone Monitor Location	Episode	Relative Response Factor	Baseline Design Value (ppm)	Future Design Value (ppm)
Sunlight	April	0.99	70	69
(in CRVFO)	July	0.91	70	63
Gothic	April	0.99	67	66
(near south boundary)	July	0.97	67	64
Ripple Creek Pass	April	1.00	66	65
(slightly north)	July	0.99	66	65
Colorado National Monument	April	0.99	69	68
(west)	July	0.95	69	65
Dinosaur National Monument	April	1.00	66	65
(northwest)	July	0.97	66	64
Rocky Mountain National Park	April	0.99	75	74
(northeast)	July	0.93	75	69
Rocky Mountain National Park	April	0.99	73	72
(Collocated, northeast)	July	0.93	73	67
Shamrock	April	0.99	71	70
(south)	July	0.98	71	69
Mesa Verde National Park	April	1.00	72	71
(southwest)	July	0.98	72	70

Source: URS 2011.

Acronyms and Abbreviations:

CRVFO Colorado River Valley Field Office
ppm parts per million

- Photochemical grid modeling predictions are not exact—These models cannot achieve complete accuracy in their predictions. These models incorporate huge quantities of data, particularly meteorological and emissions data, for the contiguous United States. Data inputs for the modeling package come from many sources and include many assumptions and data gaps. Even if perfectly accurate data inputs could be obtained, photochemical grid models cannot accurately predict every chemical transformation under all atmospheric conditions. Model predictions can be off by ±20 percent in terms of unpaired peak accuracy and still be within EPA model performance goals.
- 2028 inventory versus 2018 inventory—Although the emission inventories for the four alternatives and for oil and gas development within nearby BLM FOs were based on year 2028 emissions, regional and national emission inventories were available for 2018. Year 2028 NO_2 and VOC emissions might be more or less than 2018 emissions. For example, economic growth could mean that ozone precursor emissions are greater in 2028 than in 2018. However, emission reduction efforts implemented to meet a more stringent future ozone NAAQS could mean that 2028 emissions would be less than 2018 emissions.

Additional monitoring data collected in or near the CRVFO are needed to determine if high absolute ozone concentrations predicted within the CRVFO during April could cause concern in localized areas. New ozone monitors were installed in Meeker and Rangely, Colorado, during 2010 and will provide additional ambient air quality data in the Piceance Basin. Although it will take several years for these monitors to acquire enough data to develop representative multi-year baseline design values, data from these monitors can be used to inform management actions in the near term and to better assess ozone compliance over the next 3 years.

Alternative B (Proposed RMP)

Impacts from Air Quality Management. The Proposed RMP includes an adaptive management approach to implementing the range of development scenarios and mitigation measures modeled in the ARTSD and evaluated in the Draft RMP. The purpose of the CARPP in Appendix L is to address air quality issues that BLM identified in its analysis of potential impacts to air quality resources for the CRVFO RMP/EIS. The CARPP is an adaptive management approach to implementing air resources decisions and outlines BLM's commitments for managing air resources. The CARPP considered a range of emissions levels and air quality impacts from the mitigation and development scenarios in the ARTSD and future modeling efforts to make implementation-level decisions. The Proposed RMP would include a level of development and mitigations scenarios within the range of alternatives in the Draft RMP/Draft EIS implemented with an adaptive management plan (CARPP). With continuing advancements in technology, such as increased number of wells per pad, the BLM decided to analyze the greatest number of wells combined with restrictive protections for other resources. To analyze the full range of possible impacts on other resources and the most oil and gas development, the Proposed RMP considered the full level of the development assumed in the RFD, which is the same number of wells and acres of disturbance as Alternative D. The Proposed RMP would include stipulations and protective measures for other resources similar to the preferred alternative in the Draft RMP/Draft EIS. The stipulations in the Proposed RMP for this Final EIS would be more protective than in Alternatives D or A. The cumulative impacts from the Proposed RMP would be expected to be within the range of Alternatives A and D. Continuous implementation of the CARPP will allow for ongoing air quality analysis to ensure evaluation will continue and impacts are within the expected range in this Proposed RMP/Final EIS.

Alternative C

Air Quality Management. Estimated cumulative annual emissions from oil and gas development under Alternative C are summarized in Table 4.2.1-8. Alternative C cumulative emissions included the following sources for all pollutants except VOCs:

- CRVFO Alternative C Project sources.
- Cumulative oil and gas sources in the CRVFO, but not included as part of the project (such as sources on the Roan Plateau, sources on private land, and sources on National Forest System lands).
- Alternative C oil and gas sources within the adjacent WRFO.
- Oil and gas sources within the Vernal FO and the Little Snake FO.
- RFFA sources.

Far-Field Comparisons to Non-Ozone NAAQS and CAAQS. Maximum Alternative C cumulative impacts for non-ozone criteria pollutants would generally be similar to Alternative A cumulative impacts, with the exception of 24-hour PM_{10} concentrations, which are noticeably less than Alternative A concentrations because of the stringent fugitive dust controls. For Alternative C, a location near a coal mine is the only location with cumulative PM_{10} 24-hour impacts predicted to exceed the NAAQS.

Far-Field Comparisons to PSD Increments. Alternative C cumulative PSD increment comparisons would be similar to those for Alternative A. However, the maximum Alternative C 24-hour PM_{10} cumulative impact at Class II gridded receptors would be noticeably less than the Alternative A impact.

Table 4.2.1-8
Estimated Cumulative Annual Emissions from Oil and Gas Development, Alternative C

Pollutant	Maximum Emissions, Tons per Year
CO	24,663
NO_x	16,475
PM_{10}	16,471
$PM_{2.5}$	2,954
SO_2	286
VOC	39,717

Source: URS 2011.

Acronyms and Abbreviations:

CO	carbon monoxide
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
SO_2	sulfur dioxide
VOC	volatile organic compound

Deposition. The predicted Alternative C cumulative deposition analysis indicated that nitrogen and sulfur deposition rates are greater than Alternative A deposition rates. However, the incremental increase in deposition s insignificant compared with background concentrations. Alternative C deposition rates are below the Levels of Concern at modeled Class I and sensitive Class II areas.

Lake Chemistry. Predicted Alternative C cumulative changes in lake acid neutralizing capacity would be slightly greater than Alternative A and the Proposed RMP impacts, but would remain below the LAC at all seven of the modeled lakes. Alternative C lake chemistry impacts at the most sensitive lake, Upper Ned Wilson Lake, would still be insignificant; the LAC is 21.2 eq, and the predicted change is 9.2 eq.

Visibility. Table 4.2.1-9 summarizes cumulative visibility impacts in terms of visibility changes from estimated natural conditions. Under Alternative C, the maximum number of days at any Class I area with predicted visibility changes ≥1.0 dv would be 62 days at the Flat Tops Wilderness, which is 4 more days than the maximum number of days predicted for Alternative A and 11 more days than the maximum number of days predicted for the Proposed RMP. The Flat Tops Wilderness, Big Mountain View, and Roan Cliffs View would have 1, 1, and 69 fewer impacted days for the project, respectively. Class I areas with greater cumulative impacts than under Alternative A include Arches National Park (3 more days), Eagles Nest Wilderness (7 more days), Flat Tops Wilderness (4 more days), Mount Zirkel Wilderness (11 more days), and West Elk Wilderness (3 more days). The only Class I area with fewer cumulative impacts than under Alternative A would be Maroon Bells-Snowmass Wilderness (6 fewer days). Class II areas with greater cumulative impacts than under Alternative A would be Colorado National Monument (2 more days), Dinosaur National Monument (22 more days), Holy Cross View (4 more days), and Rabbit's Ear View (9 more days). Class II areas with fewer cumulative impacts than under Alternative A would be Big Mountain View (91 fewer days) and Roan Cliffs View (8 fewer days).

Table 4.2.1-9
Alternative C Visibility Impacts

Class I Areas	Maximum Number of Days with ≥1.0 dv Visibility Change		Sensitive Class II Areas and Scenic Views	Maximum Number of Days with ≥1.0 dv Visibility Change	
	Project	Cumulative		Project	Cumulative
Arches National Park	0	9	Colorado National Monument	0	31
Eagles Nest Wilderness	0	15	Dinosaur National Monument	0	202
Flat Tops Wilderness	0	62	Big Mountain View	0	117
Maroon Bells-Snowmass Wilderness	0	18	Holy Cross View	0	6
Mount Zirkel Wilderness	0	28	Holy Cross Wilderness View	0	6
West Elk Wilderness	0	9	Rabbit's Ear View	0	30
			Roan Cliffs View	0	341

Source: URS 2011.

Acronyms and Abbreviations:
dv deciview

Ozone NAAQS. Ozone impacts attributable to cumulative emissions under Alternative C would be similar to those for Alternative A. In some cases, predicted ozone concentration increases associated with Alternative C would have a slightly greater geographic extent and in some cases a slightly greater magnitude in areas without ozone monitors. At monitored locations within Colorado, three sites are predicted to have slight changes in future design values. Compared with Alternative A, Alternative C is predicted to have a slight decrease (62 parts per billion [ppb] compared with 63 ppb) at the Sunlight Monitor, and slight increases at two Rocky Mountain National Park sites (70 ppb compared to 69 ppb at one site and 68 ppb compared to 67 ppb at the other). All predicted future design values would be less than the ozone NAAQS of 75 ppb.

Alternative D

Air Quality Management. Estimated cumulative annual emissions from oil and gas development under Alternative D are summarized in Table 4.2.1-10. Alternative D cumulative emissions included the following sources for all pollutants except volatile organic compounds:

- CRVFO Alternative D Project sources.
- Cumulative oil and gas sources in the CRVFO but not included as part of the project (such as sources on the Roan Plateau, sources on private land, and sources on US Forest Service land).
- Alternative D oil and gas sources within the adjacent WRFO.
- Oil and gas sources within the Vernal FO and the Little Snake FO.
- RFFA sources.

Far-Field Comparisons to Non-Ozone NAAQS and CAAQS. Maximum Alternative D cumulative impacts for non-ozone criteria pollutants would generally be similar to Alternative A cumulative impacts, with the exception of 24-hour PM_{10} concentrations, which would be noticeably less than Alternative A concentrations. For Alternative D, a location near a coal mine would be the only location with cumulative PM_{10} 24-hour impacts predicted to exceed the NAAQS.

Table 4.2.1-10
Cumulative Annual Emissions From Oil and Gas Development, Alternative D

Pollutant	Maximum Emissions, Tons per Year
CO	26,140
NO_x	17,212
PM_{10}	17,570
$PM_{2.5}$	3,135
SO_2	297
VOC	50,038

Source: URS 2011.

Acronyms and Abbreviations:

CO	carbon monoxide
NO_x	nitrogen oxides
PM_{10}	particulate matter 10 microns or less
$PM_{2.5}$	particulate matter 2.5 microns or less
SO_2	sulfur dioxide
VOC	volatile organic compound

Far-Field Comparisons to PSD Increments. Alternative D cumulative PSD increment comparisons would be similar to those for Alternative A. However, the maximum Alternative D 24-hour PM_{10} cumulative impact at Class II gridded receptors would be noticeably less than the Alternative A impact.

Deposition. The cumulative deposition analysis for Alternative D indicated that nitrogen and sulfur deposition rates would be greater than Alternative A deposition rates. However, the incremental increase in deposition would be insignificant compared with background concentrations. Alternative D deposition rates would be below the Levels of Concern at modeled Class I and sensitive Class II areas.

Lake Chemistry. Predicted Alternative D cumulative changes in lake acid neutralizing capacity would be greater than Alternative A, B, and C impacts and would be below the LAC at all of the seven modeled lakes. Alternative D lake chemistry impacts at the most sensitive lake, Upper Ned Wilson Lake, would still be insignificant; the LAC is 21.2 eq, and the predicted change is 10.5 eq.

Visibility. Table 4.2.1-11 summarizes cumulative visibility impacts in terms of visibility changes from estimated natural (near pristine) conditions. Under Alternative D, the maximum number of days at any Class I area with predicted visibility changes ≥1.0 dv would be 68 days at the Flat Tops Wilderness, which would be 10 more days than the maximum number of days predicted for Alternative A, 17 more days than the Proposed RMP, and 6 more days than Alternative C. The Flat Tops Wilderness, Big Mountain View, and Roan Cliffs View would have 1, 1, and 69 fewer impacted days for the project, respectively. Class I areas with greater cumulative impacts than under Alternative A include Arches National Park (3 more day), Eagles Nest Wilderness (8 more days), Flat Tops Wilderness (10 more days), Mount Zirkel Wilderness (12 more days), and West Elk Wilderness (7 more days). The Maroon Bells-Snowmass Wilderness would have the same number of impacted days as Alternative A. Class II areas with greater cumulative impacts than under Alternative A would be Colorado National Monument (6 more days), Dinosaur National Monument (29 more days), Holy Cross View (6 more days), Holy Cross Wilderness (5 more days), Rabbit's Ear View (1 more day), and Roan Cliffs View (1 more day). The Big Mountain View would have 68 fewer impacted days than Alternative A. Detailed results are provided in ARTSD (URS 2011).

Table 4.2.1-11
Alternative D Visibility Impacts

Class I Areas	Maximum Number of Days with ≥1.0 dv Visibility Change		Sensitive Class II Areas and Scenic Views	Maximum Number of Days with ≥1.0 dv Visibility Change	
	Project	Cumulative		Project	Cumulative
Arches National Park	0	9	Colorado National Monument	0	32
Eagles Nest Wilderness	0	16	Dinosaur National Monument	0	209
Flat Tops Wilderness	0	68	Big Mountain View	0 (-1)	140
Maroon Bells-Snowmass Wilderness	0	24	Holy Cross View	0	8
Mount Zirkel Wilderness	0	29	Holy Cross Wilderness View	0	7
West Elk Wilderness	0	13	Rabbit's Ear View	0	31
			Roan Cliffs View	0	350

Source: URS 2011.

Acronyms and Abbreviations:
dv deciview

Ozone NAAQS. Ozone impacts attributable to cumulative emissions under Alternative D would be similar to those for Alternative A at most locations. In some cases, Alternative D predicted ozone concentrations in localized unmonitored areas would have a slightly greater geographic extent and in some cases a slightly greater magnitude, when compared with the Proposed RMP and Alternatives A and C. At monitored locations within Colorado, two sites would have slight increases in future design values under Alternative D compared with Alternative A. Alternative D is predicted to have a slight increases at two Rocky Mountain National Park sites (70 ppb compared with 69 ppb at one site, and 68 ppb compared with 67 ppb at the other). All predicted future design values would be less than the ozone NAAQS of 75 ppb.

4.2.2 Climate Change

Climate change analyses are composed of several factors, including GHG emissions (including CO_2, methane [CH_4], and nitrous oxide [N_2O]) and concentrations, land use management practices, and surface albedo (a measure of how strongly a surface reflects light from light sources such as the sun). Decreased albedo (e.g., caused by melting snow and ice) means that more light (and heat) is absorbed by the earth's surface.

The tools necessary to quantify the incremental climatic impacts of GHG emissions associated with specific activities are presently unavailable. That is, the current state of the science allows us to calculate potential quantities of greenhouse gases that may be added to the atmosphere from a particular activity. However, the current state of the science does not allow us to analyze or predict how global or regional climate systems may change as a result of a particular activity, such as a natural gas development field. Currently, BLM does not have an established mechanism to accurately predict the effect of resource management-level decisions from the planning effort on global climate change. Therefore, the climate change analysis for this RMP accounts for and discloses factors that may contribute to global climate change. Qualitative and quantitative evaluations of potential contributing factors within the planning area are included where appropriate and practicable. Quantification of greenhouse gas emissions is the most significant climate change factor assessed in this analysis. To put the greenhouse gas emissions into context for the public and the decisionmaker, the analysis then provides a relative comparison of GHG emissions across sectors.

This section describes the impacts of management actions of the Proposed RMP alternatives on climate. Existing climate conditions are described in Section 3.2.1.2.

The following assumptions are central to this analysis:

- The assessment of climate changing pollutant emissions and climate change is in its formative phase, so it is not yet possible to know with confidence the net impact on climate.
- The lack of scientific tools to predict climate change caused by localized changes in greenhouse gas emissions limits the ability to quantify potential future impacts for each alternative.
- Climate change is a global phenomenon in which larger changes in global GHG emissions are likely to have greater study area resource impacts than smaller changes in local GHG emissions.
- Future EPA regulatory actions to reduce GHG emissions are not considered in this analysis.
- In the future, as tools improve for predicting climate changes due to resource management, the BLM may be able to reevaluate decisions made as part of this planning process and to adjust management accordingly.

Greenhouse Gas Emissions Regulation and Trends

The oil and gas industry has been reducing GHG emissions voluntarily, even as natural gas production has increased. According to the EPA, annual methane emissions have declined by 33.1 million metric tons (26 percent) since 1990. This decline is the result of improvements in technology and management practices and replacement of old equipment (EPA 2010d).

The EPA is in the early stages of regulating GHGs as air pollutants under the CAA. In its *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, the EPA determined that greenhouse gases are air pollutants subject to regulation under the Clean Air Act. The EPA is regulating CO_2,

CH_4, N_2O, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. In addition, aggregate GHG emissions are regulated in terms of CO_2e emissions. (Refer to Chapter 3 for an explanation of CO_2e emission calculations.)

The first EPA regulation to limit emissions of GHGs imposed CO_2 emission standards on light-duty vehicles, including passenger cars and light trucks (GPO 2010e). The EPA has been gathering detailed GHG emission data from thousands of facilities throughout the United States and will use these data to develop an improved national greenhouse gas inventory and to inform future GHG emission control regulations. Beginning in 2010, many facilities across the United States estimated GHG emissions in accordance with the EPA's "Greenhouse Gas Mandatory Reporting Rule" and were required to report annual GHG emissions beginning on March 31, 2011. Many oil and gas facilities began estimating GHG emissions in 2011 and had to submit their first annual GHG emission reports on March 31, 2012, in accordance with Subpart W of 40 CFR, Part 98.

Beginning in 2011, GHG emissions from some facilities became subject to federal air quality permitting programs, such as the Title V Operating Permit Program and the PSD Program. Historically, GHG emissions were not measured by facilities under these programs and air quality permits did not address greenhouse gases. However, the EPA and state and local air quality permitting agencies began reviewing GHG emissions under these programs in accordance with EPA's "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule" (GPO 2010d). This review may lead to more accurate estimates of GHG emissions from these facilities and may prompt GHG emission monitoring in some cases.

Based largely on GHG emission data submitted under the "Greenhouse Gas Mandatory Reporting Rule," the EPA plans to develop stationary source GHG emissions reduction rules that could mandate substantial reductions in US GHG emissions. Alternatively, Congress may develop cap-and-trade legislation as another means to reduce GHG emissions. Future EPA-mandated GHG emission reductions from oil and gas sources were not considered in this climate change impacts analysis; consequently, this climate change impact analysis likely overestimates future GHG emissions associated with CRVFO planning area activities.

Greenhouse Gas Emission Reduction Due to Fossil Fuel Substitution

Combustion of natural gas produces fewer GHG emissions than combustion of most other fossil fuels. Consequently, natural gas may displace coal and oil as companies modify operations to reduce GHG emissions from power generation, heaters, boilers, vehicles, and other combustion sources. Table 4.2.2-1 provides a comparison of natural gas and other fossil fuel combustion emissions. In terms of GHG emissions per million British thermal units (MMBtu) of heat input, natural gas replacement would reduce GHG emissions from current coal-burning sources by approximately 44 percent, and would reduce GHG emissions from petroleum-fueled sources by approximately 25 to 28 percent.

To the extent that economics, natural gas availability, and regulatory requirements encourage natural gas replacement of coal or petroleum, global GHG emissions could be reduced by increased production of natural gas. For example, the US Energy Information Administration (EIA) predicts that fuel switching will prompt an 83 percent increase in electric power sector natural gas consumption from 2009 to 2030 (EIA 2009). In fact, Colorado mandated that five coal-fired power plants be converted to natural gas.

Table 4.2.2-1
Comparison of Greenhouse Gas Emissions from Fossil Fuel Combustion

Fuel	Emissions (kg/MMBtu)			
	CO_2	CH_4	N_2O	CO_2e
Natural gas	53.02	0.001	0.0001	53.07
Coal*	94.38	0.011	0.0016	95.11
Diesel fuel	73.25	0.003	0.0006	73.50
Gasoline	70.22	0.003	0.0006	70.47

Source: 40 CFR Part 98, Subpart C, Tables C-1 and C-2 (GPO 2010b).

Acronyms and Abbreviations:

CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
kg	kilogram
MMBtu	million British thermal units
N_2O	oxides of nitrogen

*The coal CO_2 emission factor is based on a mixture of coal types and represents coal used in electricity generation. The range of coal CO_2 emissions factors is 93.4 to 103.54 kg/MMBtu.

While natural gas will displace some fossil fuels, renewable energy is expected to replace some natural gas use in a variety of applications, such as home heating and electric power generation. The EIA predicts that total natural gas consumption in the United States will fall by 14 percent from 2009 to 2030 (EIA 2009). If natural gas consumption decreases, natural gas production in the CRVFO may be less than the levels of development included in one or more of the alternatives within this analysis.

Environmental Consequences

EPA estimates that national GHG emissions in 2006 were 6,801,812,000 metric tons CO2e (EPA 2008). National GHG emissions in 2006 represented a 14 percent increase from estimated 1990 national GHG emissions (5,964,166,000 metric tons CO2e). EPA categorized the major economic sectors contributing to US emissions of GHG compounds as:

- Electric power generation (34.5 percent)
- Transportation (28.6 percent)
- Industrial processes (19.9 percent)
- Agriculture (7.7 percent)
- Commercial land uses (5.7 percent)
- Residential land uses (3.6 percent)

The primary activities that generate GHG emissions within the planning area are construction and operation of oil and gas facilities. Other GHG emission sources include: wildfires and prescribed burns; highway and off-highway vehicle travel and OHV use; construction and operation of mineral and renewable energy development projects; fuel combustion for space heating and water heating in urban areas and rural residences; and livestock grazing.

The three most commonly emitted GHGs from oil and natural gas sources are CO_2, CH_4, and N_2O. Under each alternative, CH_4 contributes the largest quantity of total CO_2e from project oil and gas sources. GHGs are primarily emitted as fugitive emissions (CH_4) from natural gas production, gas venting (CH_4) during well completion, and engine exhaust emissions (CO_2 and N_2O) from gas compression and production heaters. Other greenhouse gases, including sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons, are not emitted by oil and gas activities or are emitted only in trace quantities. GHG emissions outside the study area, such as those from electricity generation at power plants outside the study area, are not included in project emissions.

Impacts on climate change would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have negligible impacts on climate change under any of the four alternatives. Additionally, there are numerous methodologies for calculating biological carbon sequestration. Depending on the methodology used, estimates of biologically stored or removed carbon can vary greatly. Because there is not yet a single generally accepted standard for estimating biological carbon sinks and removals, the analysis for this RMP qualitatively discusses potential biological carbon changes due to BLM activities and authorized uses.

Alternative A

Impacts from Air Quality Management. Air quality management actions under Alternative A would not specifically address climate change or GHG emissions. However, Alternative A management actions would require compliance with federal and state air quality regulations so that future GHG reduction requirements imposed by the EPA or the CDPHE would decrease Alternative A GHG emissions and may reduce climate change impacts.

Table 4.2.2-2 summarizes the maximum annual GHG emissions from project sources under Alternative A. Greenhouse gas emissions are provided in terms of metric tons per year (mtpy) for each individual GHG and in terms of CO_2e for each individual GHG and for combined GHGs. Although CO_2 would be emitted in the greatest absolute quantity, CH_4 emissions would have the greatest global warming impact of the three GHGs, as shown by the CO_2e emissions attributable to CH_4. On a unit-production basis, approximately 4.89 metric tons of CO_2e would be emitted for every million standard cubic feet (MMscf) of gas produced.

Table 4.2.2-2
Alternative A Maximum Annual Project Oil and Gas Greenhouse Gas Emissions

Pollutant	Emissions (mtpy)			
	CO_2	CH_4	N_2O	CO_2e
Individual Greenhouse Gas	181,575	13,973	2.17	
CO_2e of Each Greenhouse Gas and Total CO_2e	181,575	293,432	672	475,680

Source: URS 2011.

Acronyms and Abbreviations:

CH_4	Methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
mtpy	metric tons per year
N_2O	oxides of nitrogen

It is not possible at this time to determine whether GHG emissions that would result from the project sources under Alternative A would cause a significant impact. The global biological and atmospheric carbon cycles are complex and interdependent on each other, and it is not possible to determine the impact that GHG emissions from Alternative A would have on global climate change. However, the relative magnitude of Alternative A emissions can be assessed by comparing these emissions with other GHG emission inventories. As shown in Table 4.2.2-3, GHG emission increases associated with Alternative A would be approximately 0.38 percent of the 2007 Colorado state GHG emission inventory and would be approximately 0.01 percent of the 2008 US GHG emission inventory, based on CO_2e given in million (10^6) metric tons. Based on the assumptions utilized in the emissions inventory calculations associated with Alternative A, GHG emissions would increase national natural gas sector emissions by 0.38 percent as compared with the total US emission inventory for natural gas systems.

Table 4.2.2-3
Alternative A Maximum Annual Project Oil and Gas Greenhouse Gas Emission Comparisons

Inventory Description	CO_2e Emissions (10^6 mtpy)	Alternative A Percentage
State Inventories (Year 2007) [1]		
Colorado	124	0.38%
Utah	80	0.60%
Wyoming	90	0.53%
US Inventories (Year 2008) [2]		
Total US Greenhouse Gases	6,957	0.01%
US natural gas systems [3]	126	0.38%
US coal mining	68	0.70%
US landfills	126	0.38%
US fossil fuel combustion	5,573	0.01%

Sources:
[1]WRI 2010
[2]EPA 2010d
[3]Natural gas systems include natural gas production (e.g., wells), processing, transmission, and: distribution.
Acronyms and Abbreviations:
mtpy metric tons per year

Based on the GHG emission sources included in this analysis, Alternative A would have a greater greenhouse gas emission impact on a gas-production basis than the other alternatives. For every 1 MMscf of natural gas production, 4.90 metric tons of CO_2e would be emitted by Alternative A oil and gas activities.

Incremental climate change impacts associated with Alternative A cannot be predicted accurately. However, depending on regulatory and market forces, potential incremental climate change impacts may be slightly more or slightly less than the climate change impacts discussed below in Cumulative Climate Change Impacts.

Impacts from Wildland Fire Management. Wildland fires and prescribed burns can produce large quantities of CO_2 and smaller quantities of CH_4 and N_2O. Vehicles, equipment, and aircraft used for fuel treatments and post-fire land stabilization also contribute negligible amounts of GHG emissions from vehicle engine exhaust. Additionally, changes to albedo and reduced carbon bio-sequestration would likely result in the short term, but as areas are revegetated, biological carbon sequestration would increase. Fire management programs would be the same under all alternatives.

Impacts from Forestry Management. Timber harvesting can create minor GHG impacts from equipment engines during logging, from vehicle traffic on unpaved and paved roads and from burning of logging slash. While the various alternatives would establish different acreages open to commercial forestry operation, all alternatives would have the same probable sale quantities of 1.8 MMBF in the CRVFO area. Thus, while the locations of commercial logging operations may vary somewhat among alternatives, total GHG emissions from timber harvesting would be similar under all alternatives. Additionally, logging would remove existing stocks of bio-carbon. However, since the consumptive use of the forest products is outside of the scope of the BLM's analysis process (i.e. whether the forest products will be processed into paper or whether they will be used for furniture or to build houses) and since potential GHG emissions would vary greatly depending on what the forest products are used for, this analysis is qualitative. Additionally, forest harvesting may have effects on surface disturbance, albedo, and changes to existing stored sources of soil organic carbon. If harvested areas are re-vegetated in the future, atmospheric CO_2 would be absorbed by the vegetation, creating a biological carbon sink.

Impacts from Livestock Grazing Management. Alternative A would allow up to 17,200 AUMs on 152,200 acres within the CRVFO. Livestock also are a source of GHG emissions from digestive fermentation and manure decomposition. When vehicles are used for transporting livestock to and from grazing allotments, the resulting vehicle traffic is a negligible source of GHG emissions. Additionally, changes in biological carbon sequestered due to changes in forage and livestock surface disturbance could occur.

Impacts from Comprehensive Trails and Travel Management. On-road and off-road vehicles are the predominant sources of GHG emissions associated with visitor activities. In addition to on-road vehicle travel, many visitors engage in some type of OHV use.

Impacts from Lands and Realty Management. Actions related to lands and realty management programs include acquiring, disposing of, and exchanging land, establishing mineral withdrawal areas, establishing ROW avoidance and exclusion areas, and granting ROWs. Such actions have the potential for creating GHG impacts from infrastructure construction or from future uses of lands that the BLM acquires or disposes of other entities. Establishment of mineral withdrawal areas may have the minor beneficial effect of avoiding GHG impacts from mineral development projects that might otherwise occur. Establishment of ROW avoidance and exclusion areas may reduce or eliminate some potential ROW construction projects or alter the routing of other projects.

Impacts from Energy and Minerals Management. Construction and operations equipment used in energy and mineral development are a source of GHG emissions from equipment engines and fugitive releases of CO_2 and CH_4. See the Alternative A Impacts from Air Quality Management section for information concerning GHG emissions and emission controls.

Alternative B (Proposed RMP)

Impacts on climate from wildland fire management, forestry management, comprehensive trails and travel management, and lands and realty management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Air Quality Management. The Proposed RMP includes an adaptive management approach to implementing the range of development scenarios and mitigation measured modeled in the ARTSD and evaluated in the Draft RMP. The purpose of the CARPP in Appendix L is to address air quality issues BLM

identified in its analysis of potential impacts to air quality resources for the CRVFO RMP/EIS. The CARPP is an adaptive management approach to implementing air resources decisions and outlines BLMs commitments for managing air resources. The CARPP considers a range of emissions levels and air quality impacts from the mitigation and development scenarios in the ARTSD and future modeling efforts to make implementation-level decisions. The Proposed RMP includes a level of development and mitigations scenarios within the range of alternatives in the Draft RMP/Draft EIS implemented with an adaptive management plan (CARPP). With continuing advancements in technology, such as increased number of wells per pad, the BLM decided to analyze the greatest number of wells combined with restrictive protections for other resources. To analyze the full range of possible impacts on other resources and the most oil and gas development, the Proposed RMP considered the full level of the development assumed in the RFD, which is the same number of wells and acres of disturbance as in Alternative D. The Proposed RMP would include stipulations and protective measures for other resources similar to the preferred alternative in the Draft RMP/Draft EIS. The stipulations in the Proposed RMP of this Final EIS would be more protective than Alternatives D or A. The cumulative impacts from the Proposed RMP would be expected to be within the range of Alternatives A and D. Continuous implementation of the CARPP would allow for ongoing air quality analysis to ensure that impacts are within the expected range and evaluated in this Proposed RMP/Final EIS.

It is not possible at this time to determine whether GHG emissions that would result from the project sources associated with the Proposed RMP would cause a significant impact. The global biological and atmospheric carbon cycles are complex and interdependent on each other, and it is not possible to determine the impact that GHG emissions from the Proposed RMP would have on global climate change. However, the relative magnitude of emissions under the Proposed RMP can be assessed by comparing these emissions with other GHG emission inventories. GHG emission increases associated with the Proposed RMP are less than 0.23 percent of the 2007 Colorado GHG emission inventory and are approximately 0.004 percent of the 2008 US GHG emission inventory, based on CO_2e given in million metric tons. Based on the assumptions utilized in the emissions inventory calculations associated with the Proposed RMP, GHG emissions would increase national natural gas sector emissions by 0.22 percent as compared with the total US emission inventory for natural gas systems.

Impacts from Livestock Grazing Management. The types of impacts are similar to those described under Alternative A, but the magnitude of impacts would be less under the action alternatives.

Impacts from Energy and Minerals Management. Construction and operations equipment used in energy and mineral development are a source of GHG emissions from equipment engines and fugitive releases of CO_2 and CH_4. See the Alternative B Impacts from Air Quality Management section above for information concerning GHG emissions and emission controls.

Alternative C

Impacts on climate from wildland fire management, forestry management, comprehensive trails and travel management, lands and realty, and energy and minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Air Quality Management. Air quality management actions under Alternative C would include the following provisions that would decrease GHG emissions, compared with uncontrolled emissions:

- Mandatory compressor electrification at compressor stations would decrease CO_2, CH_4, and N_2O emissions.
- Emission capture and destruction of vapors from condensate and produced water tanks would decrease CH_4 emissions.
- Piping gas and liquids from well pads to consolidated tankage and dehydration facilities would decrease CO_2, CH_4, and N_2O emissions.
- Green completion techniques would decrease CH_4 emissions.
- Glycol dehydrator vent emission controls would decrease CH_4 emissions.

In addition, future GHG reduction requirements imposed by the EPA and the CDPHE could further decrease Alternative C GHG emissions and may reduce climate change impacts.

Impacts would be similar to those described under Alternative A. Table 4.2.2-4 summarizes the maximum annual GHG emissions from project sources under Alternative C. In terms of CO_2e, GHG emissions under Alternative C would be approximately 44 percent less than those under Alternative A. Furthermore, unit-production CO_2e emissions under Alternative C are estimated to be 3.31 metric tons of CO_2e per MMscf, which is approximately 32 percent less than Alternative A.

Table 4.2.2-4
Alternative C Maximum Annual Project Oil and Gas Greenhouse Gas Emissions

Pollutant	Emissions (mtpy)			
	CO_2	CH_4	N_2O	CO_2e
Individual Greenhouse Gas	60,677	9,800	1.04	
CO_2e of Each Greenhouse Gas and Total CO_2e	60,677	205,806	323	266,806
Alternative B (Proposed RMP) Increase (Decrease) From Alternative A	-67%	-30%	-52%	-44%

Source: URS 2011.

Acronyms and Abbreviations:

CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
mtpy	metric tons per year
N_2O	oxides of nitrogen

It is not possible at this time to determine whether GHG emissions that would result from the project sources associated with Alternative C would cause a significant impact. The global biological and atmospheric carbon cycles are complex and interdependent on each other, and it is not possible to determine the impact that GHG emissions from Alternative C would have on global climate change. However, the relative magnitude of Alternative C emissions can be assessed by comparing these emissions with other GHG emission inventories. As shown in Table 4.2.2-5, GHG emission increases associated with Alternative C would be less than 0.23 percent of the 2007 Colorado GHG emission inventory and approximately 0.004 percent of the 2008 US GHG emission inventory, based on CO_2e given in million metric tons. Based on the assumptions utilized in the emissions inventory calculations associated with Alternative C, GHG emissions would increase national natural gas sector emissions by 0.22 percent as compared with the total US emission inventory for natural gas systems.

Table 4.2.2-5
Alternative C Maximum Annual Project Oil and Gas Greenhouse Gas Emission Comparisons

Inventory Description	CO_2e Emissions (10^6 mtpy)	Alternative B (Proposed RMP) Percentage
State Inventories (2007) [1]		
Colorado	124	0.23%
Utah	80	0.35%
Wyoming	90	0.31%
US Inventories (2008) [2]		
Total US Greenhouse Gases	6,957	0.00%
US natural gas systems [3]	126	0.22%
US coal mining	68	0.41%
US landfills	126	0.22%
US fossil fuel combustion	5,573	0.01%

Sources:
[1]WRI 2010
[2]EPA 2010d
[3]Natural gas systems include natural gas production (e.g., wells), processing, transmission, and distribution.
Acronyms and Abbreviations:

CO_2e carbon dioxide equivalents
mtpy metric tons per year

Incremental climate change impacts associated with Alternative C cannot be predicted accurately. However, depending on regulatory and market forces, potential incremental climate change impacts may be slightly more or slightly less than the climate change impacts discussed below in Cumulative Climate Change Impacts.

Impacts from Livestock Grazing Management. The types of impacts would be similar to those described under Alternative A, but the magnitude of impacts would be less under the action alternatives.

Impacts from Energy and Minerals Management. Impacts would be similar to those described for the Proposed RMP.

Alternative D

Impacts on climate from wildland fire management, forestry management, comprehensive trails and travel management, and lands and realty would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Air Quality Management. Air quality management actions under Alternative D would be similar to, although somewhat less stringent than, those under Alternative C. Nonetheless, Alternative D management actions would decrease GHG emissions compared with uncontrolled emissions.

Alternative D impacts would be similar to those described under Alternative A. Table 4.2.2-6 summarizes the maximum annual GHG emissions from project sources under Alternative D. In terms of CO_2e, GHG emissions under Alternative D would be approximately 28 percent greater than those under Alternative A and 129 percent greater than Alternative C. These changes would be due primarily to electrification of compressor engines at compressor stations. Although Alternative A requires no electrification, Alternative C would require 100 percent electrification, and Alternative D would require that 50 percent of these compressors be electrified. Due to air quality management actions that decrease GHG emissions, unit-production CO_2e

Table 4.2.2-6
Alternative D Maximum Annual Project Oil and Gas Greenhouse Gas Emissions

Pollutant	Emissions (mtpy)			
	CO_2	CH_4	N_2O	CO_2e
Individual Greenhouse Gas	198,221	19,586	2.63	
CO_2e of Each Greenhouse Gas and Total CO_2e	198,221	411,308	816	610,346
Alternative D Increase (Decrease) From Alternative A	9%	40%	21%	28%
Alternative D Increase (Decrease) From Alternative C	227%	100%	153%	129%

Source: URS 2011.

Acronyms and Abbreviations:

CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
mtpy	metric tons per year
N_2O	oxides of nitrogen

emissions under Alternative D are estimated to be 3.98 metric tons of CO_2e per MMscf, which is approximately 19 percent less than under Alternative A, but 20 percent more than Alternative C.

It is not possible at this time to determine whether GHG emissions that would result from project sources associated with Alternative D would cause a significant impact. The global biological and atmospheric carbon cycles are complex and interdependent on each other, and it is not possible to determine the impact that GHG emissions from Alternative A would have on global climate change. However, the relative magnitude of Alternative D emissions can be assessed by comparing these emissions with other GHG emission inventories. As shown in Table 4.2.2-7, GHG emission increases associated with Alternative D would be approximately 0.49 percent of the 2007 Colorado state GHG emission inventory and would be approximately 0.009 percent of the 2008 US GHG emission inventory, based on CO_2e given in million metric tons. Based on the assumptions utilized in the emissions inventory calculations associated with Alternative A, GHG emissions would increase national natural gas sector emissions by 0.48 percent compared to the total US emission inventory for natural gas systems.

Table 4.2.2-7
Alternative D Maximum Annual Project Oil and Gas Greenhouse Gas Emission Comparisons

Inventory Description	CO_2e Emissions (10^6 mtpy)	Alternative D Percentage
State Inventories (2007) [1]		
Colorado	124	0.49%
Utah	80	0.77%
Wyoming	90	0.68%
US Inventories (2008) [2]		
Total US Greenhouse Gases	6,957	0.01%
US natural gas systems [3]	126	0.48%
US coal mining	68	0.90%
US landfills	126	0.48%
US fossil fuel combustion	5,573	0.01%

Sources:
[1]WRI 2010
[2] EPA 2010d)
[3]Natural gas systems include natural gas production (e.g., wells), processing, transmission, and distribution.
Acronyms and Abbreviations:

CO_2e	carbon dioxide equivalents
mtpy	metric tons per year

Incremental climate change impacts associated with Alternative D cannot be predicted accurately. However, depending on regulatory and market forces, potential incremental climate change impacts may be slightly more or slightly less than the climate change impacts discussed below in Cumulative Climate Change Impacts.

Impacts from Livestock Grazing Management. Climate change impacts would be similar to those described under Alternative A, but the amount of impacts would be less under the action alternatives.

Impacts from Energy and Minerals Management. Construction and operations equipment used in energy and mineral development are a source of GHG emissions from equipment engines and fugitive releases of CO_2 and CH_4. See the Alternative D Impacts from Air Quality Management section above for information concerning GHG emissions and emission controls.

Cumulative Climate Change Impacts

Cumulative climate change impacts are caused by CRVFO GHG emissions and increases in regional, national, and global GHG emissions. GHG emissions increase with increased population growth, industrial activity, transportation use, energy production, and fossil fuel energy use. As mentioned earlier, CRVFO emissions may or may not increase state, national, or global GHG emissions due to regulatory and market forces. Possible cumulative impacts are summarized below.

- Cumulative GHG emissions may increase if project GHG emissions add to global GHG emissions.
- Cumulative GHG emissions may not increase or may increase by a smaller quantity if some or all project emissions are offset due to decreased oil and gas production in other oil and gas basins with greater GHG emissions on a unit-production basis.
- Cumulative GHG emissions may not increase or may increase by a smaller quantity if natural gas produced under the alternatives is used to replace combustion of high GHG-emitting fossil fuels.

Efforts are under way by the State of Colorado to reduce GHG emissions. For example, the Colorado Climate Action Plan has a goal to reduce GHG emissions by 20 percent from year 2005 levels by year 2020 (Ritter 2007). The State of Colorado is also a national leader in requiring greater use of renewable energy sources. Under Colorado law, investor-owned utilities must provide renewable or recycled energy for at least 12 percent of their retail electricity sales in Colorado during the years 2011 to 2014, increasing to 30 percent during the year 2020 and beyond.

Quantification of cumulative climate change impacts, such as changes in temperature, precipitation, and surface albedo, is beyond the scope of this analysis. The maximum potential increase in cumulative GHG emissions from all CRVFO activities (e.g., oil and gas development, wildfires, and livestock grazing) and carbon sequestration cannot be predicted with accuracy. Furthermore, CRVFO GHG emissions and carbon sinks are small relative to state, regional, and global GHG emission inventories. Consequently, global- or regional-scale modeling would be unlikely to yield meaningful predictions of climate change impacts in relation to GHG emissions attributable to CRVFO activities.

However, climate change predictions are available for the region. These climate trends are based on global GHG emission inventory projections and global climate change modeling. To the extent that BLM-authorized activities would increase GHG emissions such that global GHG emissions are greater than the quantities used in previous modeling, climate changes may be slightly greater than those summarized below. Many of the

following predicted climate changes for the CRVFO and western Colorado are derived from color shadings on US climate change maps (USGCRP 2009). Therefore, climate change predictions are within the given range and may not reach the maximum or minimum extents of the range. Past climate trends and future predictions for western Colorado are summarized below (IPCC 2007; PCGCC 2007; RMCO-NRDC 2008; EPA 2010a; USGCRP 2009).

- The average temperature increased by 1 to 3° F from a 1961-to-1979 baseline average to the average temperature measured from 1993 to 2008. By 2099, the average temperature is predicted to increase by 5 to 10° F above the 1961-to-1979 baseline. Temperatures are expected to increase more in winter than in summer, more at night than during the day, and more in the mountains than at lower elevations.
- The annual number of days above 90° F and the frequency of extreme heat events will increase.
- Annual average precipitation increased between 5 and 15 percent between 1958 and 2008. Based on modeling using a high emissions scenario, predicted precipitation changes indicate increased precipitation in the winter (up to +15 percent) and substantial decreases in the spring (from -5 percent to -20 percent) and summer (-5 percent to -15 percent). Fall precipitation is predicted to be within -5 percent to +5 percent.
- End-of-summer drought increased during the last 50 years, and drought is expected to be more prevalent in the future.
- Annual runoff will decrease by 10 to 20 percent by 2041 to 2060, compared with 1901 to 1970.
- Snowfall is predicted to decline in and near the CRVFO.
- Peak streamflow from melting snow is occurring earlier. In 2002, peak streamflow occurred up to 5 days earlier than during 1948. From 2080 to 2099, peak streamflow is predicted to occur 15 to 35 days earlier than during the 1951 to 1980 period.
- Very heavy precipitation occurred up to 10 percent more often between 1958 and 2007.
- Reduced winter snowpack causes less water to flow into the Colorado River, less water available for downstream residential and agricultural users, and shorter ski seasons, unless additional snowmaking is used to prolong the season.
- Earlier snowmelt means that peak streamflows occur earlier in the year, weeks before the peak needs of ranchers, farmers, recreationists, and others. In late summer, rivers, lakes, and reservoirs have lower flows and less capacity, which cause the following effects:
    - Less water availability for irrigating crops and watering animals.
    - Reduced crop and livestock productivity if additional irrigation is not available.
    - Increased water temperatures that adversely affect coldwater fish and reduce recreational fishing.
    - Reduced mid- and late-summer streamflows that shorten tourism and recreation opportunities, such as whitewater rafting and boating.
- More frequent, more severe, and longer-lasting droughts are occurring and are expected to become more prevalent.

- Warmer and drier conditions will stress ecosystems and wildlife due to the following effects:
    - Shrinkage of coniferous forests within Colorado and replacement with larger savannas and woodlands.
    - Greater pest infestations in pine forests, such as the pine beetle infestation in Colorado's lodgepole forests.
    - Contraction of aspen forests due to sudden aspen decline linked to reduced snowpack and drought.
    - Grassland and rangeland expansion into previously forested areas.
- Land will have increased susceptibility to fire with more frequent, larger, and more intense fires.
- Geographic flora and fauna will shift to the north or to higher elevations. Some species may be at greater risk of extinction if they cannot successfully migrate or adapt.
- Longer growing seasons may increase productivity for some crops, decrease productivity for others, and increase agricultural pest populations, including weeds and insects.
- Warmer and drier conditions will adversely affect air quality due to the following effects:
    - Increased ambient concentrations of particulate matter as less vegetated soils are more susceptible to wind erosion.
    - Increased ozone formation.
    - Reduced visibility due to increased particulate matter and wildfire smoke.
- Climate changes may have the following effects on human health:
    - Heavy precipitation increases frequency and severity of flooding and may contaminate water supplies.
    - Heat waves stress some individuals, particularly older adults.
    - Increased concentrations of ozone, particulate matter, and smoke stress some individuals, particularly those with asthma or other lung disease and those who exercise strenuously during poor air quality episodes.

4.2.3 Soils

This section presents the impacts on soils from management actions of other resources and resource uses discussed in Chapter 2. Existing conditions concerning soils are described in Chapter 3, Section 3.2.3. Impacts on soil resources from implementation of each alternative are summarized in the following subsections. All land uses would conform to *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado* (BLM 1997a), which describe conditions needed to sustain public land health and relate to all uses of the public lands. Specifically, Standard 1, which addresses soil resources, is incorporated as a goal. Environmental consequences resulting from proposed management actions or allowable use decisions have been analyzed based on their ability to contribute to help maintain/achieve (i.e., benefit) or hinder (i.e., impact) meeting Standard 1.

Direct and indirect impacts of land uses on soil resources are generally best mitigated by avoiding or minimizing the impact to the degree practicable with stipulations (e.g., NSO, CSU, and TL). The various management actions and allowable use decisions outlined in Chapter 2 and stipulations described in Appendix B emphasize this approach for maintaining, improving, and conserving soil resources. Impacts that cannot be avoided would at least be minimized by the application of COAs or BMPs.

Surface-disturbing activities increase erosion and sediment loads in streams, reduce productivity and soil organic matter, reduce permeability and infiltration, and may contaminate soils. Soils are susceptible to impacts from surface disturbance and compaction, which can lead to decreased permeability, accelerated erosion, soil loss, and reduced productivity. Management actions involving ground-disturbing activities, reducing vegetation diversity and cover, trampling and compaction of soils, and removing soil organic matter contribute to adverse impacts. The greatest impacts on soil resources come from activities on fragile soils, steep slopes, or geologically unstable locations.

Anticipated impacts on soil resources would occur from surface disturbances associated with natural disturbances and land uses such as: minerals and energy development, livestock grazing, OHV use, recreation, travel management, issuance of ROWs, and wildland fire.

Management actions for other resources involving approvals, avoidance areas, allowable uses, or stipulations that are related to soils are discussed below.

Methods and Assumptions

The analysis was based on the following assumptions:

- Soil resources are managed to ensure long-term soil health and productivity, as defined by Standard 1 of the BLM *Standards for Public Land Health and Guidelines for Livestock Management in Colorado*; upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, landform, and geologic processes. Adequate soil infiltration and permeability allow for the accumulation of soil moisture necessary for optimal plant growth and vigor, minimize surface runoff, and improve groundwater recharge.
- Management actions that prohibit surface disturbances (e.g., closures to mineral leasing [CLs], NSOs) improve ground cover, retain soil organic matter, increase soil moisture storage, reduce erosion, or promote healthy plant communities would maintain or improve soil conditions.

- Highly erodible soils (those where small changes in vegetation cover or level of disturbance can result in large changes in erosion rates) exist in areas with greater than 30 percent slope, fragile or saline soils types, or in locations of previous mass displacements, and are generally avoided, or require specific development plans to minimize erosion and maintain productivity.
- Erodible soils on slopes greater than 50 percent would be left undisturbed unless no other available option would meet the needs of the associated resource lessee or user, and exception criteria for activities on slopes greater than 50 percent are met before project implementation.
- Substantial surface disturbance to soil, including compaction of soil or loss of vegetation cover, could increase water runoff volume and velocity, increase downstream sediment loads, and could lower soil productivity, thereby degrading water quality, altering channel morphology, 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, duration and extent of disturbance, quality of existing vegetation, existing soil types, and amount of precipitation.
- Roads and trails would be properly designed for the level of use according to BLM Road Manuals and Gold Book standards.
- Surface disturbances would be restored or mitigated.
- Many of the resources and uses have NSO and CSU stipulations that extend beyond or overlap the NSO and CSU stipulations listed for protection of soil resources, thus, providing additional safeguards for soil resources. For these reasons, impacts on soil resources from NSO and CSU stipulations associated with other resources will not be addressed unless there are noteworthy exceptions.
- Stipulations for steep slopes and fragile soils, conditions of approval, the application of BMPs, and specific mitigation measures identified in activity-level planning and NEPA-level review would prevent or further reduce impacts on soil resources.

Environmental Consequences

Impacts on soils would result from some of the decisions proposed under other resources and resource uses. Resource uses and proposed decisions not addressed below were deemed to have no or only negligible impacts on soils under any of the four alternatives. Impacts from WSA and transportation facilities management would be similar under all alternatives.

Alternative A

Impacts from Soils Management. Under Alternative A, approximately 5,900 acres would be protected by stipulation GS-NSO-14, which prohibits surface occupancy and surface-disturbing activities for the protection of the Glenwood Springs debris flow. This area would have similar protection under stipulation GS-NSO-16 for ACECs. These stipulations would have beneficial impacts on soil resources because they would maintain soil stability, permeability, and productivity and would minimize the impacts of soil erosion within the CRVFO debris flow zones.

Approximately 86,100 acres of the planning area would be protected by stipulation GS-NSO-15 for steep slopes greater than 50 percent for oil and gas facilities, which would prohibit surface occupancy and surface-disturbing activities for oil and gas facilities on slopes greater than 50 percent, but does not apply to pipelines. In addition, approximately 172,600 acres of the planning area would be further protected by stipulation GS-CSU-4 for erosive soils on slopes greater than 30 percent, which would require special design, construction, operation, and reclamation measures. Overall, Alternative A is less protective than the Proposed RMP and Alternatives C or D, because the other alternatives would apply the NSO for steep slopes to all surface-disturbing activities including pipelines.

Impacts from Water Resource Management. Under Alternative A, approximately 46,100 acres of the planning area would be protected by stipulation GS-NSO-3 for major river corridors, which would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of six major rivers. Additionally, approximately 5,400 acres would be protected by stipulation GS-NSO-13 for domestic watershed areas, which would prohibit surface occupancy and surface-disturbing activities within watersheds providing domestic water for the communities of Rifle and New Castle. These stipulations would directly benefit soil resources by limiting or preventing surface-disturbing activities in those areas. Conditions of approval and the application of BMPs and specific mitigation measures identified in activity-level planning and NEPA-level review would prevent or reduce impacts on soil resources. Alternative A provides the least protection for soils because the other alternatives (the Proposed RMP and Alternatives C and D) would expand NSO stipulation protections for all municipal watersheds and public water supplies.

Impacts from Vegetation Management—Forests and Woodlands. Under Alternative A, the CRVFO would provide intensive management on forestlands growing commercial species (lodgepole pine, Engelmann spruce, or Douglas-fir) on productive growing sites (producing 20 cubic feet of wood fiber per acre per year), or on lands not withdrawn for other resource needs. In addition, the CRVFO would provide limited management on woodlands or noncommercial species (pinyon-juniper, Ponderosa pine, subalpine fir, or aspen) or on sites producing less than 20 cubic feet of wood fiber per acre per year. This alternative allows for only limited treatment of vegetation, although a full range of methods would be available. Mechanical, manual, or chemical treatments could result in short-term soil compaction, loss of vegetation cover, erosion, and changes in soil chemistry.

Restoration and vegetation treatment projects aimed at improving vegetation health and cover would reduce erosion potential and increase soil productivity. Restrictions and BMPs in sensitive areas would mitigate some of the negative impacts associated with treatments by protecting fragile soil resources. These management actions would improve soil stability and prevent soil loss associated with accelerated slope erosion. In the long term, vegetation treatments would improve cover and increase plant diversity, thereby stabilizing soil, improving overall watershed function and condition, and increasing permeability and soil organic matter, which allows greater infiltration and soil moisture storage. Alternative A provides the least protection for soils because the other alternatives (the Proposed RMP and Alternatives C and D) would implement a higher level of vegetation management, which would protect soil resources in the long term.

Impacts from Vegetation Management—Riparian. Soils in wetlands and riparian areas are unique in the Field Office, play an important ecosystem role, and are sensitive to disturbance. The combination of high permeability and the wet or waterlogged nature of the soils make them susceptible to compaction, erosion, sedimentation, vegetation and root mass destruction, and disturbances to nutrient cycling.

Under Alternative A, approximately 1,700 acres of the planning area would be protected by stipulation GS-NSO-2 for riparian and wetland zones that would prohibit surface occupancy and surface-disturbing activities within riparian vegetation. Additionally, a substantial amount of acres would be protected by stipulation GS-CSU-2 that would require special design and construction and implementation measures within 500 feet of riparian or wetland vegetation.

By preventing and limiting ground-disturbing activities, these stipulations would minimize soil compaction and displacement and associated erosion in these areas.

Impacts from Vegetation Management—Weeds. Under Alternative A, management actions for weeds would allow the use of herbicides to combat invasive/noxious weeds. Herbicides would produce small quantities of soil pollutants and could initially decrease vegetation cover. In addition, vehicles used for spraying could result in some soil compaction and displacement. Alterations in soil conditions could result in increased erosion and sediment and contaminant transport to nearby drainages. However, the herbicides would dissipate in the soil horizons over time, and desirable vegetation cover would return. Weed management actions would provide similar benefits to soils in all alternatives.

Impacts from Fisheries and Aquatic Wildlife Management. Under Alternative A, approximately 12,400 acres of the planning area would be protected by stipulation GS-NSO-5 for the Rifle Falls and Glenwood Springs fish hatcheries that would prohibit surface occupancy and surface-disturbing activities within a 2-mile radius of the hatcheries. By preventing and limiting ground-disturbing activities, this stipulation would minimize soil compaction and displacement and associated erosion in these areas. However, this stipulation could result in the relocation of surface-disturbing activities to areas with moderate to severe erosion hazards, as defined by the NRCS. Under Alternative A, fisheries and aquatic wildlife management would have a negligible to minor beneficial impact on soil resources. Fisheries and aquatic wildlife management in the Proposed RMP and Alternative C would implement additional NSO stipulations for fisheries and aquatic wildlife management, providing greater benefits for soils.

Impacts from Terrestrial Wildlife Management. Under Alternative A, nine wildlife seclusion areas, two state wildlife areas, and raptor nesting areas would be protected by NSO stipulations that would prohibit surface occupancy and surface-disturbing activities. In addition, some TLs would provide soil protection by preventing surface-disturbing activities during wet periods when soils are susceptible to displacement, compaction, and increased erosion. There would be an indirect benefit to soils by the protection of wildlife habitat and by restricting or controlling surface-disturbing activities, use and occupancy.

Although wildlife play a natural role in the ecosystem and add nutrients to soils, depending on the density of wildlife use, the soils could sustain some localized impacts. Wildlife stipulations reserve specific areas to create a favorable location for wildlife; therefore, when larger areas are set aside, the concentration of animals and associated soil impacts would likely be reduced.

In addition, habitat treatments would result in short-term impacts through soil compaction and displacement, but overall, there would be benefits by promoting vegetation regrowth and improving overall groundcover. Alternative A would provide more benefit to soils than under Alternative D, which would apply NSO stipulations only for raptor and waterfowl nest sites, but much less benefit than under the Proposed RMP and Alternative C, which would both implement more NSO stipulations and preserve more area for wildlife.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Under Alternative A, approximately 8,600 acres would be protected by stipulation GS-NSO-12 for special status plants and terrestrial wildlife and by an NSO stipulation for a 0.25-mile buffer around sage-grouse lek sites that would prohibit surface occupancy and surface-disturbing activities. In addition, some timing limitations would provide soil protection by preventing surface-disturbing activities during periods of wet weather, when soils are susceptible to displacement, compaction, and increased erosion. Overall, special status plant and terrestrial management would have a minor benefit to soil resources by limiting surface-disturbing activities.

Impacts from Cultural Resource Management. Under Alternative A, cultural resources would be protected by a general NSO stipulation for historic properties that would prohibit surface occupancy and surface-disturbing activities within 100 meters (328 feet) of historic properties. Alternative A would have the fewest beneficial impacts of all alternatives. The Proposed RMP and Alternatives C and D would all prohibit surface-disturbing activities within 0.25 mile of heritage areas, and the Proposed RMP and Alternative C would implement a 200-meter buffer for historic properties, which would protect greater area for soils.

Impacts from Visual Resources Management. VRM class designations would limit (Class I and II) or allow (Class III and IV) surface-disturbing activities in specific areas, thereby affecting soil resources. Managing areas as VRM Class I and Class II would reduce surface disturbance and would retain existing vegetation, thereby reducing soil impacts. Areas managed as VRM Class III or IV would be subject to actions that allow for greater landscape modification and therefore greater surface disturbance. These areas could be subject to surface-disturbing activities including complete vegetation removal, which drastically increases the potential for loss of soil stability, wind and water erosion, and sedimentation to streams.

Under Alternative A, approximately 22,800 acres would be classified as VRM Class I and 311,400 acres as VRM Class II. These two VRM classes would provide protection for soil resources through the stipulations provided. Stipulation GS-NSO-16 for VRM Class I areas within ACECs would prohibit surface occupancy and surface disturbances in these areas. Approximately 9,500 acres would be protected by stipulation GS-NSO-18 for slopes over 30 percent with high visual sensitivity in the I-70 viewshed. In addition, stipulation GS-CSU-5 would apply a CSU restriction to VRM Class II areas. Relocation of operations by more than 200 meters (656 feet) may be required to protect visual values. Alternative A would designate the least area to VRM Class I and II and the most area to VRM Class III and IV, which would allow for the most adverse impacts of all alternatives on soils.

Impacts from Wildland Fire Management. Wildland fire management would cause a range of impacts on soils, both beneficial and adverse, depending on the type of activity (suppression, unplanned natural fire managed for resource benefit, prescribed fire, manual and mechanical treatments, or rehabilitation), type of soil, location, and timing of the activity. Impacts to soil resources from fire are complex and involve changes in nutrient cycling, water infiltration and runoff, and erosion potential.

The intensity of impacts to soils from fire depends on the severity of the burn, the fuel condition class of the vegetation community, and the condition of the soils before the burn. High-severity wildland fires remove all or a majority of vegetation and soil surface cover, which drastically increases the potential for wind and water erosion and sedimentation to streams. These fires also change soil structure and chemistry, resulting in the development of hydrophobic layers that increase post-fire runoff, sedimentation, and nutrient loading in nearby waterways. Additional impacts to soil could be caused by containing and suppressing wildland fires. Contaminants related to fire suppression include chemical retardants for suppression and fluids related to

vehicles and equipment (i.e. oil, gasoline, and antifreeze), which could pollute soils, alter soil chemistry, and migrate to waterways. Use of heavy fire equipment to construct roads, fire lines, or other fire-fighting facilities could cause soil compaction, displacement, and destruction to vegetation

Suppressing fires in areas of excessive fuel buildup could minimize, in the short term, high-severity fires and the associated impacts of vegetation loss and erosion. However, continued suppression of wildland fires could result in increased fuel loading and could increase the risk of high-severity fires and adverse soil impacts in the long term. Impacts on soils associated with a large-scale, severe wildland fire could be much greater because of a high percentage of vegetation cover loss and intense deep heating, resulting in soil sterilization and the creation of hydrophobic surface layers. The suppression of fire would allow for less habitat improvement and age-class diversification. The lack of fire often leads to increased fuel loading, which can lead to more catastrophic fires in the long term.

Alternatively, moderate or low-severity fires are often beneficial in providing age-class diversification and improving herbaceous cover, which would improve soil productivity, increase infiltration, decrease surface runoff, and soil erosion in the long term. Beneficial moderate- to low-severity fires are generally a goal of prescribed burn and management of unplanned fires in fire management and fuels reductions plans. Contaminants related to fire management such as fuel for prescribed fire ignition, fluids related to vehicles and equipment, such as oil, gasoline, antifreeze, and nutrient and bacterial contamination from fire crews and camps, could pollute soils, alter soil chemistry, and migrate to waterways. Use of heavy fire equipment to construct roads, fire lines, or other fire-fighting facilities could cause soil compaction, displacement, and destruction of vegetation.

Fire management may also involve the use of manual/mechanical treatments to lessen fuel loading and reduce risk of severe wildfire. Use of manual treatment such as chainsaws, and mechanical treatment, such as hydro axes, in most sites would reduce canopy cover and increase diversity of understory vegetation, which would improve soil stability. However, use of heavy equipment could cause soil compaction, displacement, and destruction to vegetation. Additionally, mechanical equipment could increase weed introduction and spread.

Mechanical equipment, used in post-fire stabilization and rehabilitation efforts, would cause short-term impacts but would be beneficial in the long term. Management prescriptions and post-fire stabilization and rehabilitation efforts, such as seeding and erosion control, would minimize some of the adverse impacts of fire. Seeding, mulching, and installing erosion controls (silt fences, straw wattles, and hay bales) would minimize post-fire erosion and sediment and contaminant delivery to waterways by slowing runoff velocities and intercepting rainfall.

Proposed fire management actions are the same across all alternatives; therefore, impacts on soils from wildland fire management would be the same across all alternatives. Under all alternatives, beneficial impacts would generally outweigh adverse impacts, as wildland fire and fuels management would generally improve habitat and diversify age-class structures.

Impacts from Forestry Management. Under Alternative A, a total of 17,900 acres of commercial forestland would be intensively managed to improve forest health and vigor and to provide timber products. The PSQ from suitable commercial forestlands in Alternative A is estimated at 1.8 MMBF. Major commercial

species include lodgepole pine, Engelmann spruce, Douglas-fir, and ponderosa pine (commercial forestland) and pinyon and juniper (woodland).

Alternative A would also manage 82,400 acres of primarily pinyon-juniper woodlands. Wood products, such as posts, poles, and firewood, would be produced on these lands. Reduction of pinyon-juniper encroachment into rangeland ecosystems and fuels reduction would be the focus of treatments in woodland stands, primarily through thinning by hand crews and the use of mechanized equipment for clearing and thinning. Reducing the cover of encroaching pinyon-juniper stands would lead to an increase in understory vegetation, such as grasses and forbs, thus providing greater protection for soils.

Timber harvest has the potential for creating soil impacts from equipment during logging operations and from vehicle traffic on unpaved and paved roads. The result would be soil compaction and displacement and soil erosion. The severity of impacts would depend on slope, soil characteristics, and implementation of stipulations, BMPs, and mitigation measures. Impacts would be minor to moderate before understory regrowth occurs and would generally have long-term benefits to soil productivity. Alternative A places a moderate emphasis on forest health, which is beneficial for soil resources. The Proposed RMP and Alternative D are the most aggressive alternatives and would therefore be more protective than Alternative A.

Impacts from Livestock Grazing Management. Under Alternative A, 39,200 AUMs would be allowed and approximately 488,300 acres of BLM land would be available for livestock grazing. The potential impacts on soil resources from grazing include long-term damage to riparian soils and vegetation, bacterial contamination, nutrient loading, and increases in compaction, displacement, and erosion, leading to potential sedimentation of nearby waterways. Adverse impacts in areas where livestock congregate could include loss of vegetation cover due to grazing and trampling, decrease in soil productivity, increase in erosion, and nutrient losses from pastures. In addition, range improvements such as allotment fences, watering tanks, and stock ponds would involve the removal of groundcover, soil compaction, and displacement, which could increase erosion potential and sedimentation but would be beneficial in the long term.

Livestock grazing within the CRVFO would be managed according to applicable laws and regulations and in accordance with the *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado*. Adhering to these standards and guidelines would minimize impacts from livestock grazing management by maintaining plant vigor, minimizing damage to sensitive areas from trampling, and increasing litter accumulation, resulting in the maintenance or improvement of organic matter content, soil structure, permeability, and productivity. Meeting the standards would ensure that upland soils would exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform. Impacts would therefore be minor area-wide but potentially moderate in specific areas where livestock tend to congregate (e.g., riparian areas). Alternative A would have the most acres and AUMs available for livestock grazing and the least management restrictions; therefore, soil impacts would likely be greatest under Alternative A.

Impacts from Recreation and Visitor Services Management. Alternative A would designate eight SRMAs (60,400 acres) and eight RMAs (64,100 acres). NSO stipulations would limit surface-disturbing activities and would provide protection to vegetation within the areas covered by the stipulations. Stipulation GS-NSO-16 would apply to five SRMAs, and stipulation GS-NSO-17 would limit surface-disturbing activities within RMAs.

Recreation and visitor services management would include the designation of SRMAs under all alternatives. The goal of SRMAs would be to emphasize recreation by managing for specific recreation opportunities and recreation setting characteristics on a sustained or enhanced long-term basis. SRMAs would concentrate recreational use in certain areas, which would also concentrate impacts on soils, especially in high-use areas, such as campgrounds, parking lots, boat launches, and trailheads. Vehicle accessed camping sites, which occur at a high level throughout the fall big game hunting seasons, are expected to impact soils through surface compaction. Motorized use, such as motorcycles or OHVs, would create the greatest adverse impacts on soils from compaction, erosion, and contamination with vehicle fluids including oil, gas, and antifreeze. Mechanized use in SRMAs, such as mountain biking, would affect soils less than motorized use but would create more impacts than nonmotorized uses, such as horseback riding, hiking, and boating.

Under all alternatives, visitor use is expected to increase and potential impacts on soils and vegetation are expected to increase as a result. An increase in visitor use would create the need for additional facilities and trails to accommodate recreationists. Development would create site-specific impacts on soils, such as loss of vegetation cover, soil erosion and compaction, and weed introduction and expansion. The Proposed RMP and Alternative C would impact soils less than the other alternatives by reducing an emphasis on recreation and other land uses and applying stipulations to more acres.

Impacts from Comprehensive Trails and Travel Management. Currently, under Alternative A, the planning area has large tracts of land open to cross-country OHV use. The CRVFO has 295,900 acres open to cross-country travel, 38,000 acres limited to travel on existing routes, and 123,000 acres limited to travel on designated routes. Cross-country OHV use results in adverse impacts on soil resources by increasing erosion and compaction and by damaging riparian areas and streambanks, resulting in increased sedimentation and contaminant transport of nearby drainages. Areas with OHV use limited to designated routes have reduced impacts on soil erosion and compaction.

OHV use could affect soil resources by causing surface disturbance, potentially contaminating soils with vehicle fluids, channeling surface runoff, and changing vegetation structure. Roads and OHV routes can be primary sources of sediment and salinity delivery to rivers and streams. Of special concern are routes with a clay-based native surface and routes within riparian zones. The magnitude and extent of motorized recreation have a greater effect on soil and water resources than nonmotorized recreation. OHV recreation use during periods of high soil moisture conditions could accelerate localized erosion and damage vegetation.

Under all alternatives, trails and travel management would have adverse impacts on soils. Alternative A would create the greatest impacts on soils by allowing for open cross-country travel across a large portion of the CRVFO. No other alternative would allow for open OHV use.

Impacts from Lands and Realty Management. Lands and realty actions include land exchanges and disposals, granting ROWs for transportation systems, utilities, communication sites, renewable energy development, and designating right-of-way avoidance and exclusion areas. Ground-disturbing activities associated with lands and realty management have the potential for creating adverse impacts on soils. Some disturbances such as construction of pipelines and buried fiber-optic lines could be reclaimed immediately after they were installed, resulting in less adverse impacts than actions such as building new roads and communication sites, which would have long-term adverse impacts on soils.

ROW exclusion areas would result in beneficial long-term impacts on soils by excluding these areas from ROW development. Alternative A would exclude the least amount of acres from ROW actions.

Under all alternatives, adverse impacts from lands and realty actions on soils would be greater than beneficial impacts. Under Alternative A, lands and realty management actions could result in the most adverse impacts on soils since the fewest acres would be excluded from ROW actions.

Impacts from Coal Management. Under Alternative A, approximately 28,500 acres of the federal mineral estate would be open to further consideration for coal leasing. Within areas open to coal leasing, approximately 1,600 acres would be designated as unacceptable for coal leasing based on multiple-use conflicts. While coal mining would result in surface-disturbing activities and impacts to soils, there currently are no active coal mines, and the potential for future activity is relatively low.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The primary impact in this section would be from oil and gas development. Under Alternative A, approximately 672,500 acres of the federal mineral estate would be managed as open to fluid minerals leasing and development, and 28,700 acres would be closed to fluid minerals leasing. Alternative A considered a moderate level of oil and gas development with the least stringent stipulations and the most acres open to leasing. The number of potential wells and acres of disturbance would be less in Alternative A than in the Proposed RMP or Alternative D, but more than in Alternative C.

Disturbance of soils associated with mineral resource development would contribute to adverse impacts on soils including mixing of soil horizons, loss of topsoil or vegetation cover, and reduced soil productivity. In particular, noxious weed infestation resulting from disturbance would impact soil productivity. Biological soil crusts could be crushed during surface disturbance, and soils would no longer be protected from wind and water erosion. Soil compaction and displacement would occur in association with well pads, roads, and pipelines. Furthermore, runoff associated with these compacted surfaces would result in accelerated erosion and soil loss. These impacts would increase challenges associated with reclamation of low-potential soils, particularly fragile and saline soil types. Initially impacts can be minimized by stockpiling topsoil, controlling erosion, and rehabilitating disturbed surfaces quickly. Long-term soil protection could be achieved by continued maintenance, which would reduce erosion, remediate soil contamination, and minimize the size of the pad footprint through interim reclamation. Contamination of soils from spills of chemicals used in or produced by oil and gas activities could cause long-term reduction in site productivity.

Alternative A would open the most acres to oil and gas development of any alternatives, but would permit less surface disturbance than Alternative D. Alternative A would provide more protection for soils than Alternative D, but less than the Proposed RMP or Alternative C. Because the Proposed RMP and Alternative C would close the most acres to fluid minerals leasing and include the most acres of NSO stipulations, they would result in the greatest benefit to soils.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, approximately 470,700 acres would be open to locatable mineral development. However, the CRVFO would recommend for withdrawal to the Secretary of the Interior approximately 34,500 acres for closure to the mining laws for locatable exploration or development. Approximately 470,700 acres would be open to salable minerals and non-energy leasable minerals. The CRVFO would close approximately 34,500 acres to mineral materials and non-energy solid mineral leasing.

Exploration and development of locatable, salable, and non-energy leasable minerals would result in surface occupancy and surface-disturbing activities through mineral extraction. Removal of vegetation and soil compaction and displacement would result in soil loss and erosion. However, plan of operations level development would be addressed in site-specific environmental analyses, while notice-level activity would be regulated to prevent undue and unnecessary degradation. Soil resources would be protected by mitigation to stabilize soil, to prevent unnecessary erosion, and to revegetate disturbed surfaces. Currently, these activities account for a small percentage of the planning area and have minor impacts on soil resources. However, it is anticipated that the demand for these resources may increase in the future.

Alternative A would withdraw the fewest acres for mineral development, and would potentially result in the most impacts to soils.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, approximately 27,000 acres would be managed in six ACECs and protected by management actions such as more restrictive VRM and travel designations, and application of stipulation GS-NSO-16, which would prohibit surface occupancy and surface-disturbing activities in those areas. Protecting the relevant and important values of the potential ACECs would maintain or improve soil conditions in areas where management prescriptions limit surface disturbance. Although ACEC designation alone does not necessarily provide protection, management actions included in ACECs are often more restrictive, which indirectly provides protection for soil resources. Allowing no uses that would cause irreparable damage to the relevant and important values in these areas would reduce surface-disturbing activities within those six ACECs, thereby protecting soil resources.

Alternative A would designate more acres of ACECs than under Alternative D, but would designate far fewer acres than under the Proposed RMP or Alternative C. Alternative C would designate nearly three times the amount of acres of ACECs as Alternative A. Alternative A would protect more soils from surface-disturbing activities than under Alternative D but much less than under the Proposed RMP and Alternative C.

Impacts from Wilderness Study Area Management. Under Alternative A, four WSAs, totaling 27,700 acres, would be managed to protect wilderness characteristics, which generally would prevent most ground-disturbing activities. Under all alternatives, motorized or mechanized travel would be prohibited in the four WSAs. These designations would essentially protect soil resources by minimizing surface-disturbing activities in those areas.

Impacts from Wild and Scenic River Management. Under Alternative A, 13 stream segments outside of the Roan Plateau planning area would be managed under interim protections to preserve the free-flowing condition, water quality, ORVs, and tentative classification. The CRVFO would provide interim protective management by not approving actions that alter the free-flowing condition of the eligible stream segments through impoundments, diversions, or channeling or by use of riprap, and by not approving actions that would measurably diminish the identified ORVs affecting the potential suitability of a stream segment. In addition, the CRVFO would not approve actions that would modify the setting or level of development of an eligible river segment to a degree that would change its tentative classification. Protecting the ORVs of the eligible wild and scenic river segments would help protect soil resources by preventing ground-disturbing activities in the stream corridors.

Alternatives A and C would provide the most protection to soils by excluding surface-disturbing activities within 0.5 mile of all 13 stream segments eligible for inclusion in the NWSRS. The Proposed RMP and Alternative D may offer less protection because no stream segments would be determined suitable under the NWSRS; however, the major rivers stipulation (NSO restrictions within a 0.5-mile buffer) would provide some overlapping surface disturbance protective measures.

Impacts from Transportation Facilities Management. Under Alternative A, the CRVFO would maintain approximately 258 miles of road and 48 miles of trail. Across alternatives, only slight differences exist in the total road miles to be maintained and at various intensity levels. Soil impacts are difficult to quantify due to the site-specific placement and maintenance needs. Maintenance of roads and trails could have short-term impacts on soil resources before revegetation and stabilization of exposed cuts and fills. These activities could result in some soil compaction and displacement associated with road and trail widening and maintaining of waterbars and runoff features. Soil impacts would lead to increased runoff and sediment delivery to nearby waterways. Long term, these improvements would probably benefit soil resources by improving road and trail runoff and minimizing erosion on nearby slopes. Across all alternatives, similar soil impacts are expected from the existing transportation system.

Alternative B (Proposed RMP)

Impacts to soils from forest and woodland vegetation management, rangeland vegetation management, weed management, wildland fire management, WSA management, and transportation facilities management would be the same as or similar to Alternative A. Impacts to soils from vegetation management, recreation and visitor services management, and coal management would be less than under Alternative A. Impacts under the Proposed RMP from all other resource and resource use decisions would be as described below.

Impacts from Soils Management. Impacts under the Proposed RMP would be similar to those under Alternative A, except that stipulation CRVFO-NSO-2 for slopes greater than 50 percent would apply to all surface-disturbing activities (not just oil and gas) and would also apply to pipelines. By restricting all ground-disturbing activities, this stipulation would minimize soil compaction and displacement and associated erosion on 86,100 acres. The Proposed RMP would provide greater protection of soil resources than Alternative A. In addition, the Proposed RMP would apply CRVFO-CSU-1 for slopes steeper than 30 percent or areas with fragile or saline soils (as determined by the NRCS soil descriptions), regardless of slope. These fragile and saline soils have high erosion potential and are more difficult to reclaim post-disturbances. This stipulation, which would cover 457,800 acres, gives BLM the ability to move projects by more than 200 meters and require special design and implementation/reclamation measures to minimize erosion and enhance reclamation. By including all areas mapped as fragile or saline soils and areas steeper than 30 percent, CRVFO-CSU-1 is more stringent than the analogous CSU stipulations under Alternative A and covers the majority of the field office. The soil stipulation protections under the Proposed RMP are equivalent in Alternatives C and D.

Impacts from Water Resource Management. The Proposed RMP would continue the NSO for six major river corridors as in Alternative A. In addition, protections for domestic watersheds would be expanded to include all municipal watersheds and permitted public water systems (CRVFO-NSO-3 and CRVFO-CSU-2). The stipulation CRVFO-NSO-5 for perennial streams, water bodies, and riparian areas would further protect approximately 49,300 acres of the planning area by prohibiting surface occupancy and surface-disturbing activities within a 325 feet buffer. In addition, the stipulation CRVFO-CSU-3 protects around intermittent and ephemeral streams with a 100-foot buffer. By limiting ground-disturbing activities along water resources,

these stipulations would minimize soil compaction and displacement and associated erosion in these areas. However, these stipulations could result in the relocation of surface-disturbing activities to other areas.

Under the Proposed RMP, the water resource stipulations would provide more protection to soils than under Alternative A because NSO stipulation would apply to more acres. The Proposed RMP and Alternative C would provide the same protections to soils, which is more protective than Alternative D, which would not implement the NSO for streamside management zones.

Impacts from Vegetation Management—Riparian. The Proposed RMP offers soils protection from riparian vegetation management similar to the water resource management discussed above. The Proposed RMP would continue the NSO and CSU stipulations that would require special design, construction, and implementation measures within riparian or wetland vegetation. Riparian stipulations could allow for surface-disturbing activities to occur under the Proposed RMP, but would essentially provide more protection for soil resources than is currently being provided under Alternative A.

Impacts from Fisheries and Aquatic Wildlife Management. Under the Proposed RMP, the stipulation for fish and other aquatic dependent species would prohibit surface occupancy and surface-disturbing activities within 325 feet of all perennial water bodies. The stipulation CRVFO-NSO-6 stipulation for fish hatcheries would continue to apply under the Proposed RMP but would include all upgradient portions of the watershed on BLM lands instead of being based on a fixed distance around the facility. By preventing and limiting ground-disturbing activities, these stipulations would minimize soil compaction and displacement and associated erosion in these areas. However, these stipulations could result in the relocation of surface-disturbing activities to other areas that could affect soils. Overall, fisheries and aquatic wildlife management in the Proposed RMP would provide more protection for soil resources than Alternatives A and D and similar protections to Alternative C.

Impacts from Terrestrial Wildlife Management. Under the Proposed RMP, priority wildlife habitat would be protected by an NSO stipulation (CRVFO-NSO-7) that would prohibit surface occupancy and surface-disturbing activities to protect vegetation cover and forage on state wildlife areas and on BLM lands with high and overlying wildlife values. The Proposed RMP would provide greater protection for soil resources than Alternative A. Decisions in the Proposed RMP and Alternatives C and D would provide a long-term benefit to soil resources by reducing soil loss during wet conditions by closing over 131,000 acres to motorized and mechanized travel from December 1 to April 15 and by prohibiting motorized use on specific routes during the fall big game hunting seasons. In addition, closing state wildlife areas to leasing for fluid minerals would protect soils in a natural condition by limiting fluid mineral infrastructure and development.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under the Proposed RMP, impacts to soils would be similar to management for water resources. The NSO stipulation for major rivers would benefit both special status fish and soil resources by limiting surface disturbances. In addition, stipulation CRVFO-CSU-5 would incorporate the needed protections for all occupied tributary streams.

By restricting ground-disturbing activities, these stipulations would minimize soil compaction and displacement and associated erosion in these areas. Overall, special status fisheries and aquatic wildlife management would have a positive impact on soil resources.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Impacts to soil resources from special status plants and animals would be similar to the general vegetation and wildlife management previously discussed. In addition, the Proposed RMP would provide more acres of NSO for BLM sensitive plants (1,100 acres) and greater sage-grouse priority habitat than Alternatives A, C, or D. The Proposed RMP would protect the most acres of soils from surface-disturbing activities.

Impacts from Cultural Resource Management. The Proposed RMP (and Alternative C) would provide greater protection of cultural resources than Alternative A by increasing the NSO buffer for historic properties from 100 meters to 200 meters and by including a 0.25-mile NSO buffer around heritage areas (CRV-NSO-37). Cultural resource stipulations under the Proposed RMP and Alternative C would prevent the most acres of surface disturbance, resulting in the most protection for soils. NSO stipulations under Alternatives A and D would protect fewer acres of soils.

Impacts from Visual Resource Management. Under the Proposed RMP, more acres would be managed as VRM Class I and II, and slightly different stipulations would apply. Stipulation CRVFO-NSO-22 would apply to VRM Class II areas with slopes over 30 percent and high visual sensitivity to preserve the visual setting and integrity. Under the Proposed RMP, more of the planning area would be protected from surface-disturbing activities by VRM Class 1 and II designations, thus providing benefits to soil resources.

Impacts from Forestry Management. Impacts under the Proposed RMP would be similar to those under Alternative A but would include intensive management of approximately 28,000 acres of commercial forestland and woodland and limited management of approximately 352,800 acres of forest and woodland. In addition, the CRVFO would prohibit commercial timber harvest on 123,300 acres of forest and woodland. The PSQ from suitable commercial forestlands would be 0.9 MMBF for the Proposed RMP, compared with 1.8 MMBF for Alternative A.

Under the Proposed RMP, the CRVFO would implement immediate salvage or accelerated harvests following adverse events (e.g., pine and spruce beetle infestations, other insect outbreaks, disease, blowdown, or wildfire) to regenerate stands and to capture the economic value of forest products before that value is lost. Timely implementation of treatment actions could reduce large-scale, severe wildfire hazards, thereby minimizing the potential for post-fire hydrophobic soil development, soil loss, and increased runoff. The Proposed RMP would likely result in short-term soil impacts, but also would implement broader forest health treatments, leading to long-term forest and soil health.

Impacts from Livestock Grazing Management. Livestock grazing **i**mpacts under the Proposed RMP would be less than Alternative A because of a reduction in available AUMs and a reduction in acres open to grazing. Under the Proposed RMP, 35,500 AUMs would be allowed, and approximately 441,600 acres of public land would be available for livestock grazing. In addition, the CRVFO would close 48 allotments due to poor suitability for livestock grazing and would close one allotment due to resource concerns. These decreases in AUMs and allotment closures would result in beneficial impacts to soils by minimizing compaction, displacement, erosion, and sedimentation. Since fewer acres and AUMs would be available to livestock under the Proposed RMP, compared with Alternatives A and D, adverse impacts on soils would be less.

Impacts from Recreation and Visitor Services Management. The Proposed RMP would designate five SRMAs (62,800 acres) and six ERMAs (40,900 acres). Stipulation CRVFO-NSO-25 would apply to the five

SRMAs and would limit surface-disturbing activities and provide protection to soils within the NSO area. Stipulation CRVFO-CSU-11 would limit surface-disturbing activities within the ERMAs.

Direct and indirect impacts to soils would be similar to Alternative A, such as loss of vegetation cover, soil erosion and compaction, and weed introduction and expansion. Compared with Alternative A, the Proposed RMP emphasizes recreation use in SRMAs and ERMAs. This is beneficial to soils however, because those RMAs that are managed for higher use and more facilities would have more site-specific impacts to soils. The Proposed RMP also has additional protective soil stipulations that should help mitigate recreation impacts.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, the CRVFO would not have any acres open to cross-country travel. Approximately 464,000 acres would be limited to travel on designated routes only. This reduction of total acres open to cross-country OHV use would result in a substantial beneficial impact on soil resources by reducing the potential for erosion and compaction in areas open to cross-country travel. Designating all travel routes would comprehensively benefit soils by limiting user-created routes and implementing efforts to decommission/rehabilitate routes that are unnecessary or causing resource damage. Compared with Alternative A, the impact from travel management on soil resources would be similar across the Proposed RMP and Alternatives C and D, resulting in positive benefits to soils and watershed health.

Impacts from Lands and Realty Management. Any new land use authorizations (such as ROWs, permits, leases, and easements) could impact soils through compaction and vegetation removal, which could lead to erosion. Under the Proposed RMP, approximately 282,800 acres would be managed as ROW avoidance areas (including renewable energy sites, such as solar, wind, hydro, and biomass development). In addition, approximately 39,400 acres would be managed as ROW exclusion areas (including renewable energy sites, such as solar, wind, hydro, and biomass development). Exceptions to the ROW avoidance areas would be granted only if the proposed authorization would not create substantial surface disturbance or would create only temporary impacts. The Proposed RMP would have fewer impacts on soils than Alternatives A or D, and similar impacts as Alternative C.

Impacts from Coal Management. Under the Proposed RMP, no lands are currently identified as containing potentially developable coal resources based on geologic and economic constraints and lack of expressions of interest. Only areas of potentially developable coal resources may be identified at the RMP planning level as acceptable for further consideration for leasing (43 CFR 3420.1-4). Therefore, no lands are currently identified as acceptable for further consideration for coal leasing. While coal mining would result in surface-disturbing activities and could have moderate impacts on soil resources, there are currently no active coal mines in the planning area, and the potential for coal development in the future is relatively low.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under the Proposed RMP, approximately 603,100 BLM surface acres would be managed as open to fluid minerals leasing and development. Impacts under the Proposed RMP would be similar to those under Alternative A, but slightly fewer acres of land with high potential for oil and gas would be open to leasing. Under the Proposed RMP, the CRVFO would close 98,100 acres of the federal mineral estate to fluid minerals leasing and geophysical development.

The Proposed RMP and Alternative D are the same for the anticipated potential development of wells, which is an approximately 40 percent increase as compared with Alternatives A and C. However, the Proposed

RMP does close more acres to fluid minerals leasing, which may facilitate clustered development and minimize soil resource disturbances. Additionally, stipulations under the Proposed RMP would protect soil resources on steep slopes and fragile and saline soil types across the majority of the CRVFO.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under the Proposed RMP, all BLM lands are open to locatable minerals, unless already withdrawn or proposed for administrative withdrawal or wilderness designation. The Proposed RMP would recommend for withdrawal to the Secretary of the Interior approximately 181,200 acres for closure to the mining laws for locatable exploration or development. Approximately 342,700 acres would be open to mineral materials and non-energy solid mineral leasing development. The CRVFO would close approximately 162,500 acres to mineral materials and non-energy solid mineral leasing. Under the Proposed RMP, soil resources would benefit in those areas where these activities would be prohibited. Mineral development under the Proposed RMP would have less impact on soil resources than Alternatives A and D but more than C.

Impacts from Areas of Critical Environmental Concern Management. The Proposed RMP would include the designation of 11 ACECs, encompassing 46,400 acres. The Proposed RMP would designate more acres of ACECs than under Alternatives A and D, but would designate approximately 45,000 fewer acres than under Alternative C. The Proposed RMP would protect soils from surface-disturbing activities more than under Alternatives A and D, but substantially less than under Alternative C.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, two Deep Creek segments, totaling 4.5 miles, would be determined suitable, which would ensure the continued protection of their free-flowing condition, water quality, ORVs, and tentative classification; thus representing a long-term benefit to soil and water resources. The Proposed RMP would exclude surface-disturbing activities within Deep Creek Canyon.

Suitability determinations would be deferred for two Colorado River segments. The BLM would defer a suitability determination on Colorado River segments and would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River segments. Thus soil resources would indirectly benefit from decisions to protect the river corridor, such as the NSO stipulation for major rivers.

Alternative C

Impacts to soils from soils management, vegetation management, wildland fire management, wilderness and wilderness study area management, transportation facilities management, , and wild and scenic rivers management would be the same as or similar to those under Alternative A. Impacts to soils from management of all other resources and uses would be the same as or similar to those under the Proposed RMP, except as follows.

Impacts from Vegetation Management—Forests and Woodlands. The types of impacts under Alternative C would be similar to those under the Proposed RMP, except that the total PSQ would be reduced to 0.9 MMBF. Overall, Alternative C would be more protective of soils than the Proposed RMP or Alternatives A and D.

Impacts from Terrestrial Wildlife Management. Impacts under Alternative C would be similar to those under the Proposed RMP, except that state wildlife areas would be closed to fluid minerals leasing in Alternative C. Closure would provide slightly more protection for soils than the NSO stipulation in the Proposed RMP. Alternative C would provide the most protection for soils of all alternatives, followed by the Proposed RMP and Alternatives A and D.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts under Alternative C would be the same as or similar to those under Proposed RMP but would replace the CSU stipulation CRV-CSU-14 for sensitive amphibians with an NSO stipulation CRV-NSO-34 for sensitive amphibians. This NSO stipulation would provide additional protection of approximately 3,800 acres by prohibiting surface occupancy and surface-disturbing activities within 800 meters (0.5 mile) of identified breeding sites. Overall, Alternative C would provide the most protection for soils.

Impacts from Special Status Species Management – Plants and Terrestrial Wildlife. The NSO stipulations for sage-grouse and other special status wildlife from the Proposed RMP would be carried forward in Alternative C. In addition, under Alternative C, a 200-meter NSO buffer would apply to all special status plants, which would restrict surface-disturbing activities on approximately 28,000 acres. Alternative C would protect more acres of soils from surface-disturbing activities than any other alternative.

Impacts from Visual Resource Management. Impacts under Alternative C would be the same as or similar to, those under the Proposed RMP, except that fewer acres would be managed as VRM Class II. Based on VRM Class I and II designations, the protection of soil resources would be less than under the Proposed RMP.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, approximately 47,000 acres would be protected by stipulation CRV-NSO-43. This protection would prohibit surface occupancy and surface-disturbing activities. By preventing and limiting ground-disturbing activities, this stipulation would minimize soil compaction and displacement and associated erosion in these areas

Under Alternative C, managing for wilderness characteristics would benefit soils by limiting surface-disturbing activities. There are no lands proposed with wilderness characteristics outside existing WSAs under the other alternatives, so Alternative C would provide the most protection for soils.

Impacts from Forestry Management. Impacts under Alternative C would be the same as or similar to those under Proposed RMP, but would include intensive management of approximately 28,400 acres of commercial forestland and woodland and limited management of approximately 341,800 acres of forest and woodland. In addition, the CRVFO would prohibit commercial timber harvest on 135,000 acres of forest and woodland, the most restrictive of all alternatives.

Under this alternative, the CRVFO would not accelerate harvest levels to capture the economic values of forest products after adverse events. Salvage operations would be conducted to capture some commercial value and reduce potential for the large-scale, severe fires. This alternative would provide initial protection for soil resources by ensuring that adequate mitigation and BMPs are in place before implementation. However, the result in extreme cases could be large-scale, severe fire before salvage, which would have negative adverse impacts on soil resources. Alternative C places the least emphasis on forest health of all the alternatives.

Impacts from Livestock Grazing Management. Livestock grazing impacts under Alternative C would be less than Alternative A or the Proposed RMP because of a substantial decrease in the number of available AUMs and a decrease in the number of acres open to grazing. Under Alternative C, a total of 35,500 AUMs would be allowed and approximately 427,800 acres of public land would be available for livestock grazing. In addition, the CRVFO would close 55 vacant allotments due to poor suitability for livestock grazing and three active allotments due to resource concerns or conflicts. These decreases in numbers and allotment closures would result in a beneficial impact on soils by preserving vegetation and minimizing nutrient loading, bacterial contamination, compaction, displacement, erosion, and sedimentation. Alternative C would authorize the fewest AUMs and close the most allotments; therefore, this alternative would be the most protective of soils.

Impacts from Recreation and Visitor Services Management. Alternative C would designate two SRMAs (23,800 acres) and nine ERMAs (71,400 acres). Stipulation CRVFO-NSO-46 would apply to the two SRMAs and would limit surface-disturbing activities and provide protection to soils within the NSO area. CRVFO-CSU-18 would only restrict surface-disturbing activities within four of the identified ERMAs. Alternative C would have the fewest acres designated for SRMA development, but would allow for the most recreational development and use in the ERMA areas.

Impacts from Comprehensive Trails and Travel Management. Impacts under Alternative C would be the same as or similar to those under the Proposed RMP, but would have 200 more acres closed to OHV use and 200 fewer acres limited to travel on designated routes. In addition, more acres would be closed to OHV use from December 1 to April 30, which would help protect soils from compaction and erosion during periods of high soil moisture. Alternative C would be most protective of soil resources, followed by the Proposed RMP, and then by Alternatives D and A.

Impacts from Lands and Realty Management. Compared with the Proposed RMP, Alternative C would designate slightly fewer acres as ROW avoidance areas (196,800 acres) but would include more acres designated as ROW exclusion areas (39,900 acres). This alternative reflects a slight decrease in ROW avoidance areas, but an increase in ROW exclusion areas. Lands and realty management under Alternative C would be more restrictive than under any other alternative, thereby having the least impact on soil resources by preventing, limiting, or relocating surface-disturbing activities.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under Alternative C, more acres would be closed to fluid minerals leasing (179,700 acres) and slightly more acres would be protected by NSO or CSU stipulations than under Alternatives A or the Proposed RMP. However, impacts would be similar to those under Alternative A because most of the high potential areas for oil and gas resources have already been leased. Consequently, new stipulations would not apply to these areas, and the additional acres closed to oil and gas would be in areas where development is unlikely.

Under this alternative, approximately 521,500 acres of federal mineral estate would be managed as open to fluid minerals leasing and development. This is the same level of potential development and number of acres of disturbance as assumed in the Proposed RMP. These surface-disturbing activities would still have moderate impacts on soil resources where they occur through soil compaction, displacement, and increased runoff. Overall, Alternative C would be the most protective alternative.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative C, a substantial percentage of the planning area would be recommended

for withdrawal from locatable mineral exploration and development and closed to mineral material sales and non-energy solid mineral leasing, thus benefitting soil resources in those areas. Under this alternative, the CRVFO would recommend for withdrawal to the Secretary of the Interior approximately 219,000 acres for locatable mineral exploration or development. The CRVFO would close approximately 182,100 acres to mineral material disposal and non-energy solid mineral leasing.

Impacts would be similar to those described under Alternative A. Impacts would be adverse and both short term and long term. Alternative C would withdraw the most acres of any alternative, providing the greatest benefit to soils.

Impacts from Areas of Critical Environmental Concern Management. Alternative C would designate the most acres as ACECs. NSO stipulations to protect the ACEC values would cover approximately 60,000 acres, placing the most restrictions on surface disturbance among the alternatives. Under Alternative C, management of ACECs would provide additional protection of soil resources by limiting surface-disturbing activities.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be found suitable, which would offer a long-term indirect benefit to soil resources through the associated stipulations.

Alternative D

Impacts to soils from weed management, wildland fire management, , wilderness and wilderness study areas management, and transportation facilities management would be the same as or similar to those under Alternative A. Impacts from management of all other resources and uses would be the same as or similar to those under the Proposed RMP, except as described below.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife management in Alternative D would provide the least protection for soils resources of any alternative, because NSO stipulations for wildlife seclusion areas, core wildlife habitat, and state wildlife areas would be removed. Alternative D would have the least beneficial impact of all alternatives.

Impacts from Visual Resource Management. Impacts under Alternative D would be the same as or similar to the Proposed RMP, except that fewer acres would be managed as VRM Class II. Under this alternative, approximately 20,000 less acres would be managed as VRM Class II. Alternative D would have greater protections for soils than under Alternative A, but less than the Proposed RMP and Alternative C.

Impacts from Livestock Grazing Management. Impacts under Alternative D would be similar to the Proposed RMP. The increase in acres open to grazing and AUMs would result in a potentially higher impact on soils from compaction, displacement, erosion, and sedimentation. Based on acres closed to grazing and available AUMs, Alternative D would be more protective than Alternative A but less than the Proposed RMP and Alternative C.

Impacts from Recreation and Visitor Services Management. Alternative D would designate seven SRMAs (63,600 acres) and five ERMAs (33,000 acres). CRVFO-NSO-46 would apply to only two SRMAs and would limit surface-disturbing activities and provide protection to soils within the NSO area. No stipulations for controlled surface use are being proposed. Recreational ddevelopment would create direct

and indirect impacts on soils, such as loss of vegetation cover, soil erosion and compaction, and weed introduction and expansion. Alternative D would have similar soil impacts from SRMA development as the Proposed RMP. However, Alternative D has less acreage designated for ERMA development, and fewer protective stipulations overall.

Impacts from Comprehensive Trails and Travel Management. Similar to the Proposed RMP and Alternative C, Alternative D would have no land open to cross-country travel. Alternative D would close 31,400 acres to OHV use and would limit 473,500 acres to travel on designated routes. This alternative would result in approximately 6,000 fewer acres closed to travel than the Proposed RMP or Alternative C, resulting in potentially greater impacts to soil resources. Alternative D would result in far fewer adverse impacts on soils than under Alternative A because OHVs would be limited to designated routes.

Impacts from Lands and Realty Management. Alternative D would designate more acres as ROW exclusion and avoidance areas than Alternative A, but would designate fewer acres as ROW exclusion or avoidance areas than the Proposed RMP and Alternative C. This alternative would result in less protection for soil resources than is provided under the Proposed RMP and Alternative C.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts under Alternative D would be similar to those under Alternative A but with more development and less protective measures. Under this alternative, a high percentage of the planning area would be open to fluid minerals leasing. In addition, this development scenario accounts for a substantial increase in infrastructure and disturbed acres. This alternative would be the least restrictive and would have the most impacts on soils. Approximately 648,800 acres of federal mineral estate would be managed as open to fluid minerals leasing and development. However, this alternative accounts for the same amount of potential development of federal wells and surface disturbance as the Proposed RMP. Alternative D would prevent the least amount of surface disturbance of all alternatives, providing the least protection to soils.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts under Alternative D would be similar to the Proposed RMP. Under this alternative, approximately 432,600 acres would be open to locatable mineral development. However, the CRVFO would recommend for withdrawal to the Secretary of the Interior of approximately 132,700 acres for closure to the mining laws for locatable exploration or development.

Alternative D would withdraw more acres than under Alternative A but fewer than under the Proposed RMP, and substantially fewer acres than under Alternative C; therefore, Alternative D would create fewer impacts on soils than under Alternative A, but poses slightly more potential to impact soils than under the Proposed RMP or Alternative C.

Impacts from Areas of Critical Environmental Concern Management. Impacts from ACEC management under Alternative D would be similar to Alternative A, except only three of the six current ACECs would continue, totaling 20,200 acres. This is the fewest ACECs and the fewest acres protected for select resource values among the alternatives. Increased disturbance in some areas would likely occur compared with other alternatives. All ACECs under this alternative would be covered by NSOs, and 14,100 acres would be designated as ROW exclusion areas. Alternative D provides the least protection of soil resources by designating the least amount of acres to ACECs that limit surface-disturbing activities.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, there would be no eligible wild and scenic segments found to be suitable, and none of the NSO and CSU stipulations for WSRs would apply. This alternative would allow for surface occupancy and surface-disturbing activities in areas that were previously managed to protect eligible wild and scenic rivers. Under this alternative, more soil resources would be susceptible to ground-disturbing activities, unless otherwise protected by applicable stipulations. These negative impacts would probably have a minor effect on soil resources, as most of these areas would be protected by overlapping stipulations for major river corridors and perennial water bodies/riparian areas. Overall, Alternative D offers the least indirect protections for soil resources.

Cumulative Impacts

The geographic extent of the cumulative impacts analysis as it pertains to soil resources would be the CRVFO boundary and would include all federal, state, private, and other lands within this boundary. Potential cumulative impacts on soil resources by BLM land uses in the planning area would result from surface disturbances and vegetation loss that could lead to decreased soil productivity by increasing soil erosion and loss. Past and present activities with adverse impacts on soil resources include OHV use, mineral exploration and development, livestock grazing, vegetation treatments, (including prescribed burning), and wildfires. These activities cause surface disturbances by removing vegetation cover, by displacing and compacting soils, and by altering soil structure and chemistry. The result is reduced soil productivity through an increase in runoff and erosion, and ultimately soil loss.

RFFAs on federal, state, private, and other lands within and adjacent to the planning area that could have an adverse effect on soil resources include urban development, expansion of recreational use (including increased OHV use), and ongoing mineral exploration, development, and production. Urban development and associated increases in recreational and commercial land use will increase in the foreseeable future. Garfield County population projections estimate a 30 percent (from 63,000 to 98,000 people) increase in the next 10 years (Colorado State Demography Office 2007d). Industrial land use, especially oil and gas development on federal, state, private, and other lands within and adjacent to the planning area, will continue to increase. Oil and gas wells on non-BLM lands are expected to increase at a similar or greater rate than BLM wells, which currently account for 20 percent of the wells in Garfield County (COGCC 2010).

Many of BLM activities cross multiple landownership and therefore would affect neighboring lands. Examples include running livestock between USFS and BLM or private and BLM lands, roads, and trails that pass between lands with different surface owners. Regarding erosional processes, soil loss could be initiated on neighboring lands and then deposited on BLM land or vice versa.

Under all alternatives, soil resources would benefit from management in accordance with the *Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration*. Site-specific mitigation and BMPs for surface-disturbing activities would further reduce impacts on soil resources. Adherence to these standards would reduce many of the adverse impacts from future actions. In addition, existing and proposed stipulations designed to protect soil resources would be beneficial by minimizing erosion potential that would be expected on steep slopes and in areas with erodible soils as classified by the NRCS. Stipulations and limitations for other resources that prevent or limit surface-disturbing activities would provide additional protection for soil resources and thereby be beneficial. Examples include cultural, riparian, wildlife, and fisheries stipulations. Furthermore, timing limitations could benefit soil resources by limiting or preventing surface-disturbing activities during times of the year when saturated soil conditions exist or when precipitation and runoff events are frequent (e.g., winter and spring).

Throughout all alternatives, slopes steeper than 50 percent would be avoided and protected by an NSO stipulation, while slopes steeper than 30 percent would be protected by a CSU protection. In addition, soils with a severe erosion hazard would have CSU protection. However, stipulations for other resources that protect soils by preventing or limiting surface-disturbing activities would vary by alternative. In addition, land use activities that disturb vegetation cover and soils would also vary by alternative. Under Alternative A, current stipulations would apply, and land uses would continue at the existing rates of development. Soil resources would receive adequate protection under this alternative as a result of existing stipulations. The Proposed RMP would provide slightly more protection of soil resources than Alternative A. In general, Alternative C would provide the most protection for soil resources by permitting the least amount of surface-disturbing activities, by applying stipulations that would limit or prevent surface-disturbing activities, and by imposing mitigations to minimize impacts that would occur. Of the four alternatives, Alternative D would be the least restrictive, allowing use to increase beyond existing conditions. While soil stipulations would apply under this alternative, the projected levels of development and lack of protection afforded by other resource stipulations would result in losses of soil and increases in erosion throughout the planning area.

4.2.4 Water Resources

This section presents potential impacts on water resources from management actions of other resources and resource uses discussed in Chapter 2. Existing conditions concerning water resources are described in Chapter 3, Section 3.2.4. Details about the surface water quality, groundwater quality, water quantity, and the risk to water resources can be found in Section 3.2.4.

Issues

The following primary impacts for water resources were the focus of the impact analysis:

- Surface runoff and flooding – increased volume and velocity of runoff
- Sediment and turbidity - increased sediment loading and long range sediment transport
- Salinity – increased salinity loading to the Colorado River and its tributaries
- Damage to stream channel morphology and characteristics —increased erosion and sedimentation
- Water quality alteration - actions, activities, or accidents (spills, leaks) that could alter water quality parameters, including pH, dissolved oxygen, temperature, hardness, alkalinity,salinity, and turbidity
- Water depletions – resulting in water quality changes, sediment accumulation, and loss of aquatic species habitat
- Water rights– potential injury to BLM water rights or instream flow rights, and loss of associated beneficial uses
- WSR suitability impacts - potential future water projects that may result from WSR suitability determinations

Assumptions

- Land uses and water resources would be managed to ensure long-term water quality, as defined by Land Health Standard 2 (Riparian Systems) and Land Health Standard 5 (Water Quality) of the BLM *Standards for Public Land Health and Guidelines for Livestock Management in Colorado* (Appendix J). Land Health Standard 5 indicators include appropriate populations of macroinvertebrates, vertebrates, and algae and surface water and groundwater substances attributable only to humans (e.g., sediment, scum, floating debris, odor, and heavy metal precipitates on channel substrate) that are within the State of Colorado Water Quality Standards (5 CCR 1002-8).
- Land uses would be managed to maintain or move toward meeting the Colorado Standards for Public Land Health (BLM 1997a) on a landscape basis. These standards describe conditions needed to sustain public land health and relate to all uses of the public lands. The indictors across LHA Standards that relate to water resources are health of streambank vegetation, balance with the water and sediment being supplied by the watershed, floodplain vegetation, appropriate soil permeability rates, and appropriate stream channel morphology and characteristics.
- The Water Quality Control Division is responsible for adopting, enforcing, and administering state and federal water quality regulations in Colorado.
- Water quantity and quality is influenced by both natural and anthropogenic (human influenced) factors. The natural ecosystem has adapted to function within the water quality parameters related to natural hydrologic and geologic conditions of the watershed. The quality of alluvial groundwater in the Colorado River Basin can vary widely, and is affected by return flow quality, mineral weathering

and dissolution, cation-anion exchange with alluvial minerals, and organic compound loading from fertilizer and pesticide leaching.

- In the upper reaches of the watershed, riparian vegetation is healthy and streams and groundwater are fed directly by snowmelt and precipitation. Water quality tends to have low sediment and salinity. As groundwater flows downgradient and surface water flows downstream, the chemical and biological quality of the water changes as salts, sediment, and biological and chemical constituents accumulate.
- The highest sediment loads in surface waters occur during periods of high flow, in response to short duration, high intensity precipitation events creating long range sediment transport and localized mass wasting events. Increases of impervious surfaces and disturbance from OHV use, livestock grazing, and oil and gas activity cause increased stream discharge, alteration of peak flow timing, and modification of a stream's normal sediment loads. The highest dissolved salt concentrations occur during low flow periods, typically late fall and winter when stream base flow is fed primarily by groundwater (BLM 2004a).
- Chemicals associated with energy and mineral development and OHV use, nutrients and pathogens from livestock, and herbicides for vegetation treatment can migrate to surface and groundwater and adversely impact water resources.
- Substantial surface disturbance of soil and vegetation, including compaction, displacement, or removal of soil or vegetation cover, reduces infiltration and filtering capacity, increases volume and velocity water runoff, and increases long range sediment and contaminant transport. Energy and mineral development, recreation, grazing, travel management, and fuels management can impact water resources by increasing surface and subsurface disturbance.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location within the watershed, duration, and degree of disturbance, vegetation health, soil type, precipitation, and mitigating actions applied to the disturbance.
- An increase of pollutants in surface waters would affect other beneficial uses (e.g., recreation, stock watering, irrigation, and public drinking water supplies).
- Access roads would be properly designed to mitigate erosion, reduce impact to stream morphology, and reduce the introduction of sediments and contaminants into surface waters.
- Some surface-disturbing actions, such as vegetation management projects, could cause short-term adverse impacts on water quality immediately following treatments but could benefit water quality in the long term as vegetation becomes reestablished.
- The level of shallow groundwater is dependent on recharge rates and withdrawal rates. Management actions which increase surface runoff volumes would reduce infiltration which recharges groundwater aquifers. Increased withdrawal of groundwater or surface waters from areas of recharge may lower groundwater levels and in turn reduce streamflows.
- Activities that affect recharge areas, that involve withdrawal of surface water or groundwater, that cause the transport of contaminants to water sources, or that cause infiltration into the ground could have impacts on groundwater resources. Groundwater chemistry can be affected by recharge of surface water from streams and ditches or contaminant migration to groundwater.

- Subsurface disturbances, such as minerals and energy development, create a risk of groundwater contamination. In the Colorado River Basin, alluvial well depths are generally less than 200 feet (with few in excess of 400 feet) and typical water levels range in depth from 50 to 100 feet. The risk of groundwater contamination from oil and gas drilling and the practice of hydraulic fracturing are a water resources and public health concern. Impacts to surface and water quality and quantity are described in Section 3.2.4, and the specific impacts from each alternative are presented in the Fluids Mineral Management subsection below. An in-depth discussion of environmental and public health concerns related to drilling and hydraulic fracturing is presented in Section 4.6.1 Public Health and Safety, subsection Fluids Mineral Management.
- Direct and indirect impacts of land uses on water resources are generally best mitigated by avoiding or minimizing the impact to the degree practicable with stipulations (e.g., NSOs, CSUs) and designations (e.g., ACECs, WSAs, and WSRs). The various management action and allowable use decisions outlined in Chapter 2 and the stipulations described in Appendix B emphasize this approach for maintaining, improving, and conserving water resources. Impacts that cannot be avoided would at least be minimized by the application of COAs or BMPs (Appendix G).
- Many of resources and resource uses have NSO and CSU stipulations that extend beyond or overlap the NSO and CSU stipulations listed for protection of water resources. Although NSO or CSU stipulations for other resources and uses may offer additional benefits (e.g., reduced erosion, sedimentation, and water quality degradation) and indirectly support water resources, some of these benefits would be negligible or minor. However, some stipulations for fisheries and riparian vegetation and designations, such as WSRs, would directly benefit water resources. In addition, water NSO and CSU stipulations would provide adequate protection for water resources in most cases, but not under all alternatives. For these reasons, impacts on water resources from NSO and CSU stipulations associated with other resources are not addressed unless there are noteworthy exceptions.
- In an effort to quantify water depletions in the Colorado River for the four endangered big river fishes, USFWS issued a programmatic biological opinion that assumes 0.77 acre-feet of water is depleted per well within the BLM Colorado River Valley planning area (BLM 2008i). In the biological opinion, the 0.77 acre-feet depletion rate is an average based on current local data, and takes into account all aspects of water use to develop and transport natural gas resources. The agreement between the BLM, which includes lands in 8 field offices, and USFWS is that the assumed total average annual depletion from the basin is 4,046 acre-feet per year.
- Impacts from water use for fluid minerals development are contingent on the level of development and advances in technology to recycle and reuse water resources. The number of wells drilled per year varies on many factors which are presented in depth in Appendix R: Reasonable Foreseeable Development: Oil and Gas in the Glenwood Springs Field Office Administrative Boundary Area. Although the range of alternatives includes different acres open to leasing and total levels of development over the life of the plan, the number of wells drilled in any given year could be the same across all alternatives. Because the programmatic biological opinion is based on annual withdrawals from the Colorado River, all alternatives are assumed to have the same or similar cumulative annual water depletions.

Methods of Analysis

Discussed below are the differences among alternatives for management actions related to other resources, uses, and special designations as they would bear on water resources.

- Within the analysis of the alternatives, 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.
  - Degradation of water quality beyond the designated use, resulting in the failure of the water body to meet federal or state water quality standards.
  - Impaired water quality or quantity to a degree that could affect the survival rate of downstream aquatic or riparian species of concern.
  - Disturbed stream discharge (e.g., increase in peak flood flows or reduction in total flow volume) or a stream withdrawn or diverted out of its channel for a length of time sufficient to cause potentially negative impacts on downstream users, aquatic wildlife, or riparian vegetation.

- Management actions regarding closure or avoidance of specific areas (NSOs) or restrictions of disturbance (CSUs) are considered protective and beneficial. In addition, maintaining or decommissioning roads, installing or upgrading stormwater controls, and replacing improperly sized or non-functioning culverts benefit water resources. Activities beneficial to water resources include actions which:
  - Improve watershed conditions by protecting riparian areas and sensitive watersheds
  - Reduce flood hazards
  - Enhance or restore degraded water quality
  - Increase water recharge rates or reduce groundwater withdrawals
  - Increase the acquisition of water rights.

Environmental Consequences

All land uses in this Proposed RMP/Final EIS would conform to Colorado Standards for Public Land Health (BLM 1997a) that describe conditions needed to sustain public land health and relate to all uses of the public lands.

Impacts on water resources would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on water resources under any of the four alternatives.

Alternative A

Impacts from Water Resource Management. Under Alternative A, approximately 46,100 acres would be protected by stipulation GS-NSO-3 for major river corridors that would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of six major rivers. However, this stipulation does not apply to the Naval Oil Shale Reserves production area. Additionally, approximately 5,400 acres would be protected by stipulation GS-NSO-13 for two municipal watershed areas, which would prohibit surface occupancy and surface-disturbing activities within watersheds providing domestic water for the communities of Rifle and New Castle. These stipulations would directly benefit water resources by

limiting or preventing surface-disturbing activities in proximity to these waterways and protecting the shallow aquifers from contamination. In addition, COAs, BMPs (as listed in Appendix G), and specific mitigation measures identified during project implementation-level planning would reduce impacts on water resources.

Under this alternative, the CRVFO would take actions to maintain or improve existing water quality. Streams with identified water quality problems include Divide, Horse, Willow, and Poison Creeks, Upper Colorado River, and Milk and Alkali Creeks. Under a proposed management action, it would be determined if management of BLM lands is contributing to the impairment of state-identified water quality-impaired streams (i.e., the State's 303(d) list or Monitoring and Evaluation list) and streams identified from BLM LHAs and other inventories. Where the contributions are identified, the BLM would limit, restrict, or change actions or activities to improve water quality.

The BLM would take actions to achieve and maintain BLM objectives that provide sufficient water quantity on BLM lands for multiple use management and for the functionality of healthy riparian, wetland, aquatic, and upland systems. Additionally, specific project proponents and permittees would be required to allocate flows as possible mitigation for adverse impacts on water-dependent resources. These management actions would result in a beneficial, indirect, and long-term impact on water resources by increasing water flow but would decrease the water available to local agriculture and development.

To protect water quantity and flow rates, the CRVFO would continue to file for water rights and water use permits to protect all water uses on BLM lands, as allowed by state water law. Uses for which the BLM would apply for water rights include livestock, wildlife watering, wildlife habitat, recreation, and fire suppression. In addition, the BLM would make recommendations to the CWCB for protecting or enhancing instream flows on appropriate stream segments that cross BLM lands. The CRVFO would also oppose water right applications that might adversely affect water quantity and have negative impacts on wildlife, springs or wetlands, riparian vegetation, and aquatic species. Furthermore, the CRVFO would use other tools, including land and water acquisitions, realty actions, and cooperative agreements to secure minimal or necessary flows. The CRVFO also would comment on proposed water developments that could impact BLM land resources (e.g., new or enlarged storage reservoirs, pipeline projects, or diversions) to achieve its water management objectives. These objectives include improving stream flows, maintaining minimum pools in reservoirs, and providing public access to water bodies.

The CRVFO would require project proponents to acquire applicable permits required by Section 402 and 404 of the Clean Water Act from the State of Colorado Water Quality Control Division and US Army Corps of Engineers. The actions outlined above would result in a beneficial, direct and indirect, and long-term impact in maintaining the health of streams, surface water bodies, and groundwater resources, as well as their associated riparian ecological resources. These actions would help the BLM ensure that the water quality of all surface water and groundwater on or influenced by BLM lands contributes to achieving the water quality standards (e.g., numeric criteria, narrative criteria, and antidegradation requirements) established by State of Colorado requirements under state law (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.

Overall, Alternative A would be the least protective of water resources. The other alternatives would be more protective of municipal and public water supplies encompassing many of the public water intakes found throughout the CRVFO (CRVFO-NSO-3 and CRVFO-CSU-2 in the Proposed RMP or CRVFO-NSO-4 in Alternatives C and D. The Proposed RMP and Alternative C would be more protective of hydrologic features (intermittent, ephemeral and perennial drainages; wetlands; lakes; fens; or springs) and riparian areas through

the application of stipulations CRVFO-NSO-5, CRVCO-CSU-3 and CRVFO-CSU-2. In addition, constraints on surface disturbing activities in the Proposed RMP and Alternatives C and D would protect groundwater resources by reducing the subsurface impacts and the risk of spills in shallow aquifers.

Impacts from Soils Management. Under Alternative A, water resources would be protected by an NSO stipulation for debris flow hazard zones. Approximately 86,100 acres would be protected by stipulation GS-NSO-15 for slopes steeper than 50 percent for oil and gas facilities, which would prohibit surface occupancy and surface-disturbing activities for oil and gas facilities on slopes greater than 50 percent, but does not apply to pipelines. In addition, approximately 172,600 acres would be further protected by stipulation GS-CSU-4 for erosive soils and slopes greater than 30 percent, which would require special design, construction, operation, and reclamation measures.

The above stipulations would minimize degradation of water resources by maintaining stability, permeability, and productivity of soils, thus increasing infiltration and minimizing erosion related sediment transport having a beneficial, direct, and long-term impact on surface and groundwater quality and quantity. Additionally, COAs, the application of BMPs (as listed in Appendix G), and specific mitigation measures identified during project implementation-level planning would prevent or reduce impacts on water resources. Mitigation during surface-disturbing projects would reduce or eliminate the potential for soil erosion and sediment transport to nearby drainages. Alternative A would provide the least protection for water resources because all other alternatives would implement more protective stipulations. Under Alternative A, stipulation GS-NSO-15 would only be applied to oil and gas facilities and not include pipelines, whereas the other alternatives would apply steep-slope NSO across all resource uses. Stipulation GS-CSU-4 would apply to erosive soils and slopes greater than 30 percent whereas the stipulation CRVFO-CSU-1 protects slopes greater than 30 percent and fragile and saline soils. The other alternatives include special engineering design criteria and construction activities to address slope stability, erosion hazards, and surface runoff in areas of severe erosion hazards and fragile or saline soils.

Impacts from Vegetation Management—Forests and Woodlands. Under Alternative A, the CRVFO would provide intensive management on forestlands growing commercial species (lodgepole pine, Engelmann spruce, or Douglas-fir) on productive growing sites (producing 20 cubic feet of wood fiber per acre per year) on lands not withdrawn for other resource needs. In addition, the CRVFO would provide limited management on woodlands or noncommercial species (pinyon-juniper, Ponderosa pine, subalpine fir, or aspen) or on sites producing less than 20 cubic feet of wood fiber per acre per year. This alternative allows for only limited treatment of vegetation, although a full range of methods would be available. Mechanical, manual, or chemical treatments could result in short-term soil compaction, some loss in vegetation cover, erosion, and changes in soil chemistry, actions which frequently lead to increased runoff volume and velocity, reduced infiltration rates, and sediment and contaminant delivery to nearby waterways. Hydrologic changes caused by these actions could include changes in water chemistry and geomorphic function of streams that adversely affect aquatic species.

Managing vegetation communities to achieve Land Health Standard 1 could increase organic matter content, structure, infiltration, water storage capacity, and permeability, thereby improving the overall watershed function and condition. Restoration and vegetation-treatment projects aimed at improving vegetation health and cover would reduce erosion potential, increase groundwater infiltration rates and minimize sediment and contaminant delivery to nearby waterways. Restrictions and BMPs in sensitive areas would mitigate some of the negative impacts by protecting fragile soil resources and avoiding activities in proximity to waterways.

Alternative A provides the least protection for water resources because all other alternatives would implement stipulations to more intensively manage and improve forest health, and therefore are more protective of surface and groundwater quantity and quality in the long run.

Impacts from Vegetation Management—Riparian. Under Alternative A, approximately 3,700 acres would be protected by stipulation GS-NSO-2 for riparian and wetland zones that would prohibit surface occupancy and surface-disturbing activities within riparian areas. Additionally, 48,300 acres would be protected by stipulation GS-CSU-2, which would require special design, construction, and implementation measures within 500 feet of riparian or wetland vegetation. Riparian areas and wetlands provide many critical services for water resources. These areas are unique in their capacity to buffer flooding, filter incoming water, recharge groundwater through infiltration, support base flows through natural water storage release, protect shorelines, and support aquatic species. Riparian areas improve water quality by providing streambank stabilization and natural filtering and attenuation properties, which minimize sedimentation and nutrient transport to waterways. Natural water temperatures and associated dissolved oxygen levels are maintained by the shade riparian vegetation provides, thereby benefiting water quality, aquatic species, and riparian-dependent wildlife. Furthermore, riparian areas maintain water quantity by providing shade, creating water storage, and replenishing groundwater. Stipulations that protect these also protect water resources.

Alternative A would provide the least protection for water resources because all other alternatives would implement more protective riparian stipulations. The Proposed RMP and Alternative C would protect riparian areas with an NSO stipulation buffer of 328 feet and 50 feet, respectively. In addition, the CSU buffer in the other alternatives would be more restrictive on development within 500 feet of riparian or wetland zones. Improved wetland and watershed health is directly and indirectly beneficial to long-term surface and groundwater quantity and quality.

Impacts from Vegetation Management—Weeds. Under Alternative A, management actions for weeds would allow the use of herbicides to combat invasive/noxious weeds. Herbicides would produce small quantities of pollutants and could initially decrease vegetation cover. In addition, vehicles used for spraying could produce some soil compaction and displacement. Alterations in soil conditions could result in reduced infiltration and increased erosion, leading to sediment and contaminant transport to nearby drainages. However, over time the herbicides would dissipate in the soil and desirable vegetation cover would return. In the long run, Alternative A would provide the least protection for water resources because all other alternatives would provide for healthier plant communities, which help increase infiltration, increase filtering of surface and groundwater, and thereby reduce sediment and contaminant transport.

Impacts from Fisheries and Aquatic Wildlife Management. Under Alternative A, existing stipulation GS-NSO-5 would continue to protect the surface and shallow groundwater sources within a 2-mile radius of the Rifle Falls and Glenwood Springs fish hatcheries. The watershed protections under this stipulation would provide general benefits to water quality in Rifle Creek and Mitchell Creek and their tributaries, as well as downstream waters into which these creeks flow. By limiting ground-disturbing activities, these stipulations would have direct benefits to water resources by minimizing erosion and sediment and contaminant delivery in those areas.

Other alternatives would be more protective with additional NSO and CSU stipulations to protect water features that support aquatic species and fish hatcheries. The Proposed RMP protects more of the watershed upstream of the hatcheries (CRVFO-NSO-6), rather than the 2-mile radius as described in GS-NSO-5. In

addition, subsurface protection for the groundwater source feeding the fish hatcheries would be stipulated under the Proposed RMP. CRV-NSO-17 in Alternatives C and D would also be more protective of water supplies for fish hatcheries than GS-NSO-5 in Alternative A.

Other alternatives would be more protective of water features which benefit fisheries than Alternative A. The Proposed RMP and Alternatives C and D have added protections of water features, with CRVFO-NSO-5 combined NSO for water features, riparian areas and fisheries, (the Proposed RMP), CRV-NSO-16 328-feet buffer from perennial waters (Alternative C), or CRV-CSU-16 restrictions on trout bearing streams. In addition the other alternatives contain implementation actions to protect and enhance features that impact surface and groundwater quantity and quality to benefit aquatic organisms.

Impacts from Terrestrial Wildlife Management. Under Alternative A, a substantial number of acres would be protected by applicable wildlife stipulations (GS-NSO-4, GS-NSO-7, and GS-NSO-11) that would prohibit surface occupancy and surface-disturbing activities in wildlife areas. In addition, some timing limitations would provide water quality protection by preventing surface-disturbing activities during periods of wet weather, when soils are susceptible to displacement, compaction, and erosion. Essentially, these stipulations and timing limitations would benefit water resources by minimizing erosion and the potential for sedimentation and contaminant delivery to waterways in those areas, especially during spring runoff.

Water resources can sustain some localized damage from congregating animals. Wildlife activity could result in soil compaction and displacement through game trails and hoof action, thereby increasing runoff potential and sediment delivery. Heavy concentration of wildlife in waterways may also adversely affect water quality by increasing sedimentation associated with streambank failures and by increasing nutrient and fecal coliform levels to waterways. Habitat treatments could result in short-term impacts through changes in surface runoff and increased erosion. However, there would be long-term benefits to water resources by promoting vegetation regrowth, supporting soil productivity (enhance organic matter, permeability, infiltration rates, water storage capacity) and improving overall groundcover. Overall, terrestrial wildlife management could have minor short-term impacts on water resources in specific treatment areas, but would benefit water resources in other areas through stipulations and timing limitations that restrict surface disturbing activities. Alternative A would provide more benefit to water resources than Alternative D, which would only apply NSO stipulations for raptor and waterfowl nest sites, but Alternative A would provide much less benefit than under the Proposed RMP and Alternative C, both of which would apply more NSO stipulations that constrain surface-disturbing activities.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Under Alternative A, NSO stipulations for special status plants and terrestrial wildlife would indirectly benefit water resources. In addition, some timing limitations would provide water quality protection by preventing surface-disturbing activities during wet weather when soils are most susceptible to compaction and erosion. Essentially, these stipulations and timing limitations would benefit water resources by minimizing compaction, erosion, and sediment transport to waterways in those areas. Alternative A would be the least protective of surface and groundwater resources because it would protect the fewest acres from surface-disturbing activities.

Impacts from Cultural Resource Management. Cultural resource stipulations and actions would benefit water resources by minimizing erosion potential and reducing sediment and contaminant delivery to waterways. The Proposed RMP and Alternatives C and D would implement additional NSO stipulations, which would protect water resources more effectively than Alternative A.

Impacts from Visual Resource Management. VRM class designations would limit (Class I and II) or allow (Class III and IV) surface-disturbing activities in specific areas, thereby affecting soil resources. Managing areas as VRM Class I and II would likely reduce the likelihood of surface disturbances which could potentially impact water resources. Areas managed as VRM Class III or IV would be subject to actions that allow for greater landscape modification and therefore greater surface disturbance. Qualitatively, Alternative A would designate the least area to VRM Class I and II and the most area to VRM Class III and IV. Thus, Alternative A has the most potential over the life of the RMP to allow projects that could create soil displacement, surface and subsurface soil compaction, and vegetation removal. Such projects would reduce filtering and infiltration and would drastically increase the potential for loss of soil stability, wind and water erosion, and sedimentation to streams. Applying the proposed stipulations and BMPs for the protection of soil and water resources would mitigate the potential impacts by minimizing erosion potential and the potential for sediment and contaminant delivery to waterways.

Stipulation GS-NSO-16 for VRM Class I areas within ACECs would prohibit surface occupancy and surface disturbances in these areas. Approximately 9,500 acres (8,400 acres/1,100 acres federal mineral estate) would be protected by GS-NSO-18 for slopes over 30 percent with high visual sensitivity in the Interstate 70 viewshed. In addition, stipulation GS-CSU-5 would apply a CSU restriction to VRM Class II areas. Relocation of operations by more than 200 meters (656 feet) may be required to protect visual values. Overall, these stipulations would essentially benefit soil resources in those areas and in turn would benefit nearby water resources by minimizing erosion potential and the potential for sediment and contaminant delivery to waterways.

Impacts from Wildland Fire Management. Wildland fire management would cause a range of impacts on water quality, both beneficial and adverse, depending on the type of activity (e.g., intensity and severity of the fire, unplanned natural fire managed for resource benefit, prescribed fire, suppression, manual and mechanical treatments, or rehabilitation), proximity to drainages, soil type, topography, and timing of the activity. Impacts on water resources related to wildland fires are complex and involve changes in soil physics and chemistry, nutrient cycling, water infiltration and runoff, and erosion potential. The intensity of impacts to soils and water quality from fire depends on the severity of the burn, the fuel condition class of the vegetation community, and the condition of the soils before the burn. Suppressing fires in areas of excessive fuel buildup could minimize, in the short-term, fires and the associated impacts of vegetation loss and erosion. However, continued suppression of wildland fires could result in increased fuel loading and increased risk of high-severity fires, resulting in short- and long-term adverse impacts to water quality. High-severity burns would result in a high percentage of vegetation cover loss and intense deep heating, causing soil sterilization, and the creation of hydrophobic surface layers. Catastrophic wildfires amplify post-fire runoff, decrease infiltration, increase the severity of flooding, and increase sedimentation in nearby waterways.

Alternatively, moderate or low-severity fires are often beneficial in providing age-class diversification and improving herbaceous cover, which improve soil productivity, increase infiltration, and decrease surface runoff velocity and soil erosion in the long term. Beneficial moderate- to low-severity fires are generally a goal of prescribed burn and management of unplanned fires in fire management and fuels reductions plans.

Impacts to water resources could be caused by containing and suppressing wildland fires or prescribed burns. Contaminants related to fire suppression, including chemical retardants for suppression and fluids related to vehicles and equipment (such as oil, gasoline, and antifreeze), could pollute soils, alter soil chemistry, and migrate to waterways. Use of heavy fire equipment to construct roads, fire lines, or other fire-fighting facilities

could cause soil erosion, destruction to vegetation, and increased runoff. Contaminants related to fire management, such as fuel for prescribed fire ignition, fluids related to vehicles and equipment, and nutrient and bacterial contamination from fire crews and camps, could pollute soils, alter soil chemistry, and migrate to waterways.

Fire management may also involve the use of manual/mechanical treatments to lessen fuel loading and reduce risk of severe wildfire. Use of manual treatment (e.g., chain saws) and mechanical treatment (e.g., hydro axes) in most sites would reduce canopy cover and increase diversity of understory vegetation, which would improve soil stability and watershed function in the long run. However, use of heavy equipment could cause short-term erosion and destruction of vegetation. Additionally, mechanical equipment could increase weed introduction and spread.

Mechanical equipment, used in post-fire stabilization and rehabilitation efforts, would cause short-term impacts but would be beneficial in the long term. Management prescriptions and post-fire stabilization and rehabilitation efforts (e.g., seeding and erosion control) would minimize some of the adverse impacts of fire.

Proposed fire management actions are the same across all alternatives; therefore, impacts on water quality from wildland fire management would be the same across all alternatives. Under all alternatives, beneficial impacts would generally outweigh adverse impacts, as wildland fire and fuels management would improve habitat and diversify age-class structures.

Impacts from Cave and Karst Resource Management. Under Alternative A, BLM lands and lands above federal mineral estate lands would be protected by stipulation GS-NSO-16 for the Deep Creek cave area and ACECs that would prohibit surface occupancy and surface-disturbing activities in the Deep Creek cave area. Similar protection would be afforded by stipulation GS-NSO-49 for ACECs. By preventing and limiting ground-disturbing activities, which lead to erosion, sediment loading, and nutrient transport to nearby drainages, as well as reduced filtering and infiltration, Alternative A would be less protective of surface and groundwater quantity and quality than the Proposed RMP or Alternative C, which would add 680 acres of protection with CRV-NSO-44.

Impacts from Forestry Management. Under Alternative A, the CRVFO would manage approximately 17,900 acres of commercial forestland and 82,400 acres of woodland. The annual allowable harvest from suitable commercial forestlands is estimated at 1.8 MMBF. In addition, the CRVFO would manage all forestland supporting commercial forestland and woodland species, including the five forest management units: King Mountain, Black Mountain, Castle Peak, Seven Hermits, and the Naval Oil Shale Reserves (Roan Plateau Planning Area). Major commercial species include lodgepole pine, Engelmann spruce, Douglas-fir, and ponderosa pine (commercial forestland), and pinyon and juniper (woodland).

Timber harvest entails use of equipment during logging and vehicle traffic on unpaved roads. These activities have the potential for creating water resources impacts from vegetation removal and soil displacement and compaction. Soil compaction, erosion, and loss of productivity result in reduced infiltration and filtering, increased runoff and sediment transport, thus causing reduced groundwater recharge and changes in geomorphic function of streams. The severity of impacts would depend on slope, soil characteristics, proximity to hydrologic features, and implementation of mitigation measures. Impacts from these activities would be minor to moderate before understory regrowth. Restoration and vegetation-treatment projects would be aimed at improving vegetation health and cover. In the long run, managing forest health would

benefit water resources by increasing organic matter content, structure, infiltration, water storage capacity, and permeability of soils, thereby improving the overall watershed function and condition.

Alternative A would place a moderate emphasis on forest health, which is moderately beneficial for water resources. The Proposed RMP and Alternatives C and D would be more aggressive in actively managing forest health, and therefore more protective than Alternative A.

Impacts from Livestock Grazing Management. Under Alternative A, a total of 39,200 AUMs would be authorized, and approximately 488,300 acres of BLM land would be available for livestock grazing. The potential negative impacts on water resources from grazing include sediment loading, damage to riparian areas and stream banks, increases in bacterial contamination and nutrient levels in surface and groundwater, and loss of streamside and upland vegetation cover. Sediment and nutrient delivery is caused by stream bank alteration and loss of vegetation cover due to grazing and trampling. Sediment loading and nutrient contamination may result in algal blooms that can cause temperature increases and loss of dissolved oxygen which would negatively impact aquatic organisms. In addition, geomorphic function of channels could be altered by sedimentation, vegetation loss, and damage to waterways that could lead to increased channel degradation (e.g., headcutting, scouring, and streambank failure) or aggradation (sediment deposition). Range improvements, such as allotment fences, watering tanks, and stock ponds, would involve the removal of ground cover, soil compaction, and displacement that could temporarily increase erosion potential and sedimentation in nearby waterways but would protect water resources in the long run.

Livestock grazing would be managed according to applicable laws and regulations (including state water quality standards) and with Rangeland Health Standards and Guidelines for Grazing Administration (Appendix J). Adhering to these standards and guidelines would minimize impacts from livestock grazing management by maintaining plant vigor, minimizing damage to sensitive areas from trampling, and improving organic matter content, soil structure, permeability, productivity, and riparian-wetland function. This would ensure that upland soils would exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform, thereby minimizing water quality degradation. In addition, limiting grazing in riparian areas and access to streams and water bodies would directly benefit water quality by allowing vegetation to recover, minimizing streambank failures, and minimizing nutrient and fecal coliform levels. Healthy riparian areas act to filter pollutants from water, uptake nutrients, and maintain base flows. Overall, impacts would be minor area-wide but could be moderate in specific areas where livestock congregate (e.g., in riparian areas). Since Alternative A would have the most acres and AUMs available for livestock grazing and the least management restrictions, it would be the least protective of water resources.

Impacts from Recreation and Visitor Services Management. Under Alternative A, a total of 60,400 acres would be managed in eight SRMAs; 60,700 acres would be managed as RMAs; and the remaining acres would be managed as ERMAs. Protective stipulations associated with these include GS-NSO-16, which limits large surface-disturbing activities on five SRMAs, and stipulation GS-NSO-17, which limits large surface-disturbing activities within eight RMAs.

Recreation has site-specific, direct, and indirect impacts to surface water resources near frequent and high-use areas, such as campgrounds, parking lots, and trailheads. These types of high-use recreational areas can result in soil compaction, damage to stream banks and riparian areas, soil erosion, and transport of contaminants to water resources. Compacted soils increase volume and velocity of runoff and would result in sedimentation in nearby waterways. Long duration trail use (e.g., walking, horseback riding, OHV riding, and mountain biking),

especially during wet periods, would result in disruption of surface soil, compaction of surface and subsurface soil, and loss of vegetation cover, which leads to accelerated erosion and sediment delivery to nearby waterways. Trails that cross stream channels, often result in localized damage to riparian areas and changes to stream channels' geomorphology and function.

Under Alternative A, an NSO stipulation, which constrains ground-disturbing activities in select SRMAs and RMAs, would offer indirect protections to water resources. Alternative A would create fewer impacts than Alternative D, which would allow for the most development and use. The Proposed RMP and Alternative C would impact water resources less by designating fewer SRMAs and applying NSOs to more acres.

Impacts from Comprehensive Trails and Travel Management. Currently, under Alternative A, the planning area has large tracts of land open to cross-country OHV use. The CRVFO has 295,900 acres open to cross-country travel, 38,000 acres limited to travel on existing routes, and 123,000 acres limited to travel on designated routes. The impact from increased motorized use (e.g., full-sized vehicles, motorcycles, and ATVs), as well as horses and foot traffic, includes increased potential for compaction and erosion, increased velocity and volume of surface runoff, increased eroded soil, changed vegetation structure, increased transport contaminants, and degradation of nearby waterways. Soil compaction and loss of vegetation reduce filtering capacity and infiltration, which recharges groundwater.

The magnitude and extent of motorized recreation has a greater effect on soil and water resources than nonmotorized recreation. OHV use could potentially contaminate surface water and groundwater with vehicle fluids (e.g., oil, gas glycol, or battery acid) and sediment load. Roads and OHV routes can be primary sources of sediment and salinity delivery to rivers and streams. OHV recreation use during periods of high soil moisture conditions could accelerate localized erosion and damage vegetation. In areas of low water crossings, vehicle use within riparian zones and on trails near or in drainages may cause damage to streambanks and riparian areas, and transport contaminant and sediment loads to waterways. The overall impact on water resources would be moderate to severe and long-term where these activities occurred. However, the implementation of mitigation measures would prevent or minimize these impacts.

Under all alternatives, trails and travel management could have adverse impacts on water resources. Alternative A would allow for the greatest impacts on water resources by allowing for open cross-country travel. Areas with OHV use limited to designated routes would reduce impacts on water resources. No other alternative would allow for open OHV use, thereby reducing impacts to surface and groundwater quality and quantity.

Impacts from Lands and Realty Management. Actions related to lands and realty management programs include land acquisitions, disposals, and exchanges, establishment of mineral withdrawal areas, ROW avoidance areas, and exclusion areas, and grants for ROWs. Such actions have the potential for creating adverse, indirect, and long-term impacts on water resources from construction of infrastructure projects. However, these impacts would be reduced by the implementation of mitigation measures and BMPs. Under all alternatives, adverse impacts from lands and realty actions on water resources would be greater than beneficial impacts. Generally impacts would be minor with potentially moderate impacts in specific areas.

Establishment of mineral withdrawal areas and ROW avoidance and exclusion areas would have beneficial direct impacts on water resources by restricting development projects. Establishment of ROW avoidance and exclusion areas could have a beneficial, indirect, and long-term impact on water resources from avoiding

some potential ROW construction projects or from altering the routes of other projects. Under Alternative A, lands and realty management actions would result in potentially the most adverse impacts on water resources since the fewest acres would be excluded from ROW actions.

Impacts from Coal Management. Under Alternative A, approximately 28,500 acres of the federal mineral estate would be open to consideration for coal leasing. Within areas open to coal leasing, approximately 1,600 acres would be designated as unacceptable for coal leasing based on multiple-use conflicts. Stipulation GS-NSO-1 for surface coal mines would prohibit surface occupancy and surface-disturbing activities within the area of an approved surface coal mine. Additionally, stipulation GS-CSU-1 for underground coal mines would apply CSU restrictions to oil and gas operations within the area of federally leased coal lands. Coal mining has potential adverse impacts on water quality and quantity. Some coal mines use significant amounts of water from nearby sources during development, and runoff from coal mines contains harmful contaminants and frequently lowers the pH of waterways. Other impacts may result from release of pollutants capable of contaminating surface water during storm water runoff, or contaminating aquifers during groundwater recharge and alteration of drainage patterns, which would affect stream hydrographs and water supplies. The stipulations above would protect water resources by prohibiting additional surface-disturbing activities in those areas, which would minimize erosion and sediment and contaminant delivery to nearby drainages.

While coal mining would result in surface-disturbing activities and could have moderate impacts on water resources, there are currently no active coal mines, and the potential for coal development in the future is relatively low.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Current management of fluid minerals is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is located. It is estimated that 99 percent of future drilling activity will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the BLM mineral estate in this high potential area, approximately 88 percent has been leased and currently is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling activity is predicted in the areas identified as no-known potential.

Under Alternative A, approximately 672,500 acres of the federal mineral estate would be managed as open to fluid minerals leasing and development and 28,700 acres would be closed to fluid minerals leasing. With advancements in technology such as directional drilling, simultaneous operations, remote completions, and consolidated facilities, the amount of surface disturbance from any amount of oil and gas development is related to many factors. Among other factors, the acres open to development, the surface topographical constraints to accessing federal minerals, the drilling and completions technology to access the subsurface minerals, existing infrastructure, and road networks influence the amount of surface disturbance and its proximity to waterways. Throughout this and all alternatives, 95 percent of the high-potential area has already been leased for natural gas development. Depending on the time of lease, any number of protective stipulations may apply to specific lease parcels. Where lands have been leased since completion of the Supplemental 1999 Oil and Gas Leasing EIS, the stipulations in Table 4.2.7-4 would apply and help to reduce impacts.

Direct and indirect adverse impacts on water resources from fluid minerals development can occur during the drilling, completion, or operational phases of wells. Other impacts occur from surface-disturbing activities, traffic, waste management, water use, and the use, storage, and transportation of fluids (i.e., chemicals, condensate, and produced water). Surface-disturbing activities associated with facilities, such as well pads, roads, and pipelines, cause loss of vegetation cover, soil compaction and displacement, reduced infiltration, increased volume and velocity of runoff, and increased sedimentation and salinity in surface waters. Increased stream discharge, alteration of peak flow timing, and modification of a stream's normal sediment loads can occur where roads and pads are located near drainages. Short- and long-term adverse impacts would include physical changes in channel configuration associated with poorly aligned culverts, improperly sized culverts, and fill material. Increases in impervious surface often result in sediment transport and concentration of runoff. The increase in flow quantity and sediment loads can modify stream channel morphology and degrade water quality. Impacts can be minimized initially by proper casing of wells, stormwater management, stockpiling topsoil, controlling erosion, and quick rehabilitation of disturbed surfaces. Long-term soil protection could be achieved by continued maintenance which would reduce erosion and minimize the size of the long-term pad footprint through interim reclamation measures.

Oil and gas waste management practices have the potential to contaminate soils, surface water and groundwater in the event of a spill of fluids/chemicals, leaks from pipelines, leaks from pits, and compromised wells. Produced and flowback water would be either recycled for reuse in future hydraulic fracturing or disposed of in disposal wells or surface evaporation pits. Use, storage, and transportation of fluids such as produced water, hydraulic fracturing fluids, and condensate have the possibility of spills that could migrate to surface or groundwater. Contamination of soils from drilling and production wastes or chemicals spilled on the surface could migrate to surface or groundwater and cause reduction in site productivity.

The possibility that hydraulic fracturing fluids may migrate to shallow groundwater sources is still speculative based on ongoing studies by the EPA (EPA 2011b). Hydraulic fracturing occurs in the gas producing formations at depths greater than 5,000 feet in the CRVFO. Water, sand, and chemical additives are pumped into the formation at extremely high pressure, to create fractures that allow gas to flow into the well. Theoretically, improperly completed wells or perforations into zones of geological weakness (i.e., faults, folds, or fractures) could create conduits that allow hydrofracturing fluids, produced water, and methane to migrate to groundwater resources. If a groundwater source is contaminated, there are few cost-effective ways to reclaim that water source; thus, the long-term impacts of groundwater contamination are considerable. In addition to BLM Onshore Orders (43 CFR 3160) and COGCCs requirements for well completions (BLM 1997, COGCC 2010), CRVFO protects surface and shallow groundwater through stipulations and site-specific COAs for drilling, completions, and fluids management. Additional detail about oil and gas drilling and hydraulic fracturing is presented in Section 3.2.4 Affected Environment-Water Resources, Section 4.3.6 Impacts on Resource Uses-Mineral Resources, and Section 4.6.1 Impacts on Social and Economic Environment – Public Health and Safety.

The cumulative effect of water depletion in a watershed has adverse impacts to the flow of groundwater (i.e., springs and seeps), streams and rivers, and to overall water quality. In an effort to quantify water depletions in the Colorado River for the four endangered big river fishes, USFWS issued a programmatic biological opinion that assumes 0.77 acre-feet of water is depleted per well within the BLM Colorado River Valley planning area (BLM 2008i). In the biological opinion, the 0.77 acre-feet depletion rate is an average based on current local data, and takes into account all aspects of water use to develop and transport natural gas

resources. The agreement between the BLM, which includes lands in eight field offices, and the US Fish and Wildlife is that the assumed total average annual depletion from the basin is 4,046 acre-feet per year.

Impacts from water use for fluid minerals development are contingent on the level of development and advances in technology to recycle and reuse water resources. The number of wells drilled per year varies on many factors which are presented in depth in Appendix R: Reasonable Foreseeable Development: Oil and Gas in the Glenwood Springs Field Office Administrative Boundary Area. Although the range of alternatives includes different acres open to leasing and total levels of development over the life of the plan, the number of wells drilled in any given year could be the same across all alternatives. Because the programmatic biological opinion is based on annual withdrawals from the Colorado River, all alternatives are assumed to have the same or similar cumulative annual water depletions.

The number of acres in each leasing category (e.g., listed from greatest to least amount of surface disturbance, standard conditions, CSU and timing limitations, no surface occupancy, and closed) would quantify impacts in terms of acres of surface disturbance. Generally, areas that are closed to development or subject to NSO would experience little or no surface disturbance due to fluid minerals development; thus negligible or no adverse impacts on water resources would occur. Areas subject to standard conditions, or conditions of controlled surface use and timing limitations, would experience short- and long-term impacts on water resources from surface disturbances associated with minerals development.

Short- and long-term adverse impacts would include physical changes in channel configuration associated with poorly aligned culverts, improperly sized culverts, and fill material. Other impacts would include increased runoff potential from compacted surfaces with poorly designed runoff controls, such as pads, pipelines, and roads. Additionally, sediment and contaminant delivery to nearby waterways from denuded and poorly vegetated surfaces that lack adequate erosion and runoff controls would result from precipitation and runoff. Due to the scale of fluid minerals activities during past, present, and foreseeable development in the planning area, Alternative A would have moderate to high impacts on water resources.

In general, Alternative A would allow for the most acres open to leasing and least protective measures for water resources. The Proposed RMP and Alternative C would reduce acreages open to leasing and development, and Alternative D would allow development at similar levels as this alternative. Because the Proposed RMP and Alternative C would apply restrictive stipulations to protect sensitive resources, they would result in the greatest benefit to water resources. Given the protective measure in place on a given lease, the impacts identified may be reduced at specific locations. In addition, BMPs identified in Appendix G will help to reduce negative effects.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, approximately 470,700 acres of the planning area would be open to locatable mineral development. However, the CRVFO would recommend to the Secretary of the Interior for withdrawal of approximately 34,500 acres from locatable mineral exploration or development. Approximately 470,700 acres of the planning area would be open to salable minerals and non-energy leasable minerals. The CRVFO would close approximately 34,500 acres in the planning area to mineral materials and non-energy solid mineral leasing.

Exploration and development of locatable and salable minerals would result in surface occupancy and surface and subsurface disturbing activities through mineral development. Mineral development may result in

removal of vegetation, soil compaction and displacement, erosion, increased velocity and volume of runoff, changes to vegetation structure, and transport of contaminants, which would ultimately result in degradation of nearby waterways. Soil compaction and loss of vegetation reduce filtering capacity and infiltration, which recharges groundwater.

However, plan of operations level development would be addressed in site-specific environmental analysis, while notice level activity would be regulated to prevent undue and unnecessary degradation. Water resources would be protected by mitigation to stabilize soil, to prevent unnecessary erosion, to revegetate disturbed surfaces, and to disallow any dumping of waste materials that would affect water quality. Withdrawals (discussed under the subsection Lands and Realty Management, above) would further reduce the amount of land open to disturbance. Currently, these activities account for a small percentage of the planning area and have minor impacts on water resources. However, it is anticipated that the demand for these resources will increase in the future.

Alternative A would withdraw fewer acres than the Proposed RMP or Alternative C for mineral development and would potentially result in the most impacts to water resources. Alternative D would have the most acres open to mineral development and the least protective stipulations, so would be the least protective of water resources.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, approximately 27,000 acres of the planning area would be managed as four ACECs and protected by stipulation CRV-NSO-16, which would prohibit surface occupancy and surface-disturbing activities in those areas. Approximately 6,100 acres in the vicinity of the city of Glenwood Springs would be protected by the Glenwood Springs Debris Flow Hazard Zones ACEC. This designation would provide protection for water resources by limiting or preventing surface occupancy and surface-disturbing activities on BLM lands that contain erodible soils and steep slopes in proximity to the Colorado and Roaring Fork Rivers. Additionally, the Blue Hill, Bull Gulch, and Deep Creek ACECs would benefit water resources by limiting or preventing surface occupancy and surface-disturbing activities on erodible soils and in proximity to the Colorado River and Deep Creek.

Protecting the relevant and important values of the potential ACECs, especially ACECs designated to protect water features, would maintain or improve surface and groundwater quality and quantity. In addition, management actions included in ACECs, even those not related directly to water resources, are often more restrictive of surface disturbance, and indirectly provide protection for water resources. Protections associated with ACEC designation that would affect water resources include managing fluid minerals leasing as closed or open with no surface occupancy, more restrictive VRM designations, restrictions on livestock grazing, and travel limitations.

Alternative A would designate more acres of ACECs than under Alternative D but would designate fewer acres than under the Proposed RMP and Alternative C. The Proposed RMP and Alternative C would designate more than double and triple, respectively, the number of acres of ACECs than Alternatives A and D. Alternative A would protect water resources from surface-disturbing activities more than under Alternative D but less than under the Proposed RMP and Alternative C.

Impacts from Wilderness Study Area Management. Under Alternative A, four WSAs totaling approximately 27,700 acres would be managed under the BLM Manual 6330 – *Management of BLM Wilderness*

Study Areas (BLM 2012c) that would prevent most ground-disturbing activities. Under all alternatives, motorized or mechanized travel would be prohibited in the four WSAs. Approximately 15,200 acres of the planning area would be protected by the Bull Gulch WSA proximate to the Colorado River. This designation would thereby benefit local water quality by preventing surface occupancy and surface-disturbing activities adjacent to the Colorado River in that area. These designations would essentially protect water resources by minimizing surface-disturbing activities in those areas and preventing water quality degradation associated with sediment and contaminant delivery.

Impacts from Wild and Scenic Rivers Management. Under Alternative A, all stream segments would be managed under interim protection to preserve the free-flowing condition, water quality, ORVs, and tentative classification. The CRVFO would provide interim protective management to eligible stream segments by not approving actions that alter the free-flowing condition of the eligible stream segments through impoundments, channeling, or use of riprap, and by not approving actions that would measurably diminish water quality and the identified ORVs of a stream segment affecting its potential suitability. In addition, the CRVFO would not approve actions that would modify the setting or level of development of an eligible stream segment to a degree that would change its tentative classification. Protecting the ORVs of the eligible wild and scenic rivers would help protect water resources by avoiding direct impacts to waterways and preventing ground-disturbing activities in the river corridors. This would have direct benefits on water quality and quantity.

Alternatives A and C would provide the most protection to water quality by excluding surface-disturbing activities within 0.25 mile of eligible or suitable stream segments. The Proposed RMP would constrain surface-disturbing activities to benefit Deep Creek Canyon. Alternative D would not provide any exclusions because no stream segments would be determined suitable.

Impacts from Transportation Facilities Management. Under Alternative A, the CRVFO would maintain approximately 258 miles of road and 48 miles of trail within the planning area. Maintenance of roads and trails could have short-term impacts on water resources within the planning area before revegetation and stabilization of exposed cuts and fills. These activities could result in some soil compaction and displacement associated with road and trail widening and maintaining of waterbars and runoff features. Soil impacts would lead to increased runoff and sediment delivery to nearby waterways. Long term, these improvements would benefit water resources by improving road and trail runoff and minimizing erosion on nearby slopes and sediment delivery to waterways.

Alternative B (Proposed RMP)

Impacts on water resources from vegetation management—forests and woodlands, vegetation management—rangelands, vegetation management—weeds, wildland fire management would be less than or similar to impacts described under Alternative A. Under the Proposed RMP (similar to Alternative C), water resource stipulations would provide more protection than under Alternative A because NSOs would apply to more acres. The Proposed RMP and Alternative C would provide more protection for water resources than under Alternative D, which would not implement CRV-NSO-5.

Impacts from Water Resource Management. Under the Proposed RMP, approximately 46,100 acres would be protected by stipulation CRVFO-NSO-4 for major river corridors that would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of six major rivers within the CRVFO. Additionally, stipulations CRVFO-NSO-3 and CRVFO-CSU-2 for municipal

watersheds and public water supply areas would limit surface occupancy and surface-disturbing activities within watersheds providing public drinking water (stipulations CRVFO-NSO-3 and CRVFO-CSU-2). Compared with Alternatives A, C, and D, the Proposed RMP provides the most protections for municipal watersheds and public water supplies by incorporating primary and secondary source water protection areas that were delineated by local community groups, working in partnership with the State of Colorado's Source Water Assessment and Protection Program. Stipulation CRVFO-NSO-5 for perennial streams would further protect approximately 49,300 acres of the planning area by prohibiting surface occupancy and surface-disturbing activities within 328 feet from the ordinary high water mark of perennial water bodies or riparian vegetation. Lastly, stipulation CRVFO-CSU-3 protects intermittent and ephemeral streams with a 100ft buffer. The Proposed RMP would provide additional protection for water resources through these stipulations, thereby benefiting water resources by preventing surface-disturbing activities in proximity to waterways and minimizing sediment and contaminant delivery potential.

Under the Proposed RMP, the CRVFO would implement similar actions towards maintaining and improving water quality as discussed under Alternative A, but would include additional proactive measures. The CRVFO would monitor channel stability and morphology on streams with concerns identified through land health assessments or inventories, or on streams that could be impacted by major land use actions (e.g., timber sales). Implementation of these actions would help ensure streams on BLM lands are in geomorphic balance with the water and sediment being supplied by the watershed. This would involve assessing stream channel dimensions, sinuosity, and substrate to determine if they are appropriate for their landscape and geology, as well as ensuring that there is no accelerated degradation or deposition (i.e., aggradation).

The CRVFO would also manage streams that are not considered to be meeting PFC on a case-by-case basis and would implement improvements by modifying management actions and stream restoration techniques, as appropriate, to address causal factors. Management actions that could be modified include grazing practices, fluid minerals development, and recreational uses. The restoration techniques that could be modified include native plantings, fencing, energy dissipation structures, streambank protection, sediment retention basins, and properly designed and installed culverts (i.e., size, alignment, and slope). The impacts of the management efforts would be beneficial, direct, and long term, and would standardize the current intensive management to substandard or unstable stream channels and sensitive watersheds.

Groundwater studies would be pursued to identify important recharge zones and to characterize groundwater movement and surface interaction, especially for springs and fens (e.g., new water resource assessment for the Piceance Basin (USGS 2009)).

The CRVFO would monitor the quality of surface waters on BLM lands in areas of extensive or broad resource use to determine what use restrictions may be needed to prevent waters from being listed on the State of Colorado's 303(d) list or Monitoring and Evaluation list. The monitoring would include such parameters as dissolved oxygen, pH, TDS, and specific conductivity. Additional and more specific monitoring would occur as needed for parameters of concern associated with specific uses (e.g., fecal coliform for grazing, and total petroleum hydrocarbons for oil and gas).

The CRVFO would identify water quality problems and take actions to correct them. Under a proposed management action, it would determine if management of BLM lands is contributing to the impairment of state-identified water quality-impaired streams (i.e., 303(d) list or Monitoring and Evaluation list) and streams

identified from BLM land health assessments and other inventories. Where the contributions are identified, the BLM would limit, restrict, or change actions or activities to improve water quality.

Impacts from Soils Management. Impacts under the Proposed RMP would be similar to those under Alternative A, except that (1) stipulation GS-NSO-15 would be replaced by stipulation CRVFO-NSO-2 for slopes steeper than 50 percent, and (2) it would apply to pipelines. Stipulation GS-CSU-4 would be replaced by stipulation CRVFO-CSU-1 for slopes steeper than 30 percent on erosive soils. The new stipulation (CRVFO-CSU-1) would apply to soils with fragile or saline soil characteristics, which tend to have severe erosion hazard; and to slopes steeper than 30 percent regardless of whether both criteria are present. By preventing and limiting ground-disturbing activities, these stipulations would minimize soil compaction, displacement and associated erosion. This in turn would benefit water quality by minimizing sediment and associated contaminant delivery to nearby drainages. The Proposed RMP would provide greater protections to water resources compared with all other alternatives by applying stipulations to protect soils and mitigate most surface-disturbing activities.

Impacts from Vegetation Management—Riparian. The Proposed RMP would apply stipulation CRVFO-NSO-5 on 49,200 acres for the protection of perennial streams, water bodies, riparian areas, and aquatic dependent species. In addition, a substantial number of acres would be protected by stipulation CRVFO-CSU-3, which would require special design, construction, and implementation measures within 100 feet of intermittent and ephemeral streams. Stipulations that protect riparian and wetland health also benefit water quality by reducing flooding, protecting shorelines, and maintaining base flows. Riparian areas improve water quality by providing streambank stabilization as well as natural filtering and attenuation properties, which minimize sedimentation and nutrient transport to waterways. Additional stipulations for water resources, riparian and fisheries under the Proposed RMP would provide adequate protection for water resources from surface-disturbing activities in riparian zones.

Impacts from Fisheries and Aquatic Wildlife Management. Under the Proposed RMP, approximately 49,300 acres of the planning area would be protected by stipulation CRVFO-NSO-5 that would prohibit surface occupancy and surface-disturbing activities within 328 feet of all perennial streams, subsequently protecting all fish-bearing streams. In addition, stipulation CRVFO-NSO-6 increases the protection provided to the surface-water and shallow groundwater sources for the Rifle Falls and Glenwood Springs fish hatcheries. The watershed protections under this stipulation would provide general benefits to the water quality of Rifle Creek and Mitchell Creek and their tributaries, as well as downstream waters into which these creeks flow. By preventing and limiting ground-disturbing activities, these stipulations would have direct benefits on water resources by minimizing erosion and sediment and contaminant delivery in those areas. The Proposed RMP is the most protective alternative for water resources.

Impacts from Terrestrial Wildlife Management. Under the Proposed RMP, priority wildlife habitat would be protected by an NSO stipulation (CRVFO-NSO-7) that would prohibit surface occupancy and surface-disturbing activities to protect vegetation cover and forage on state wildlife areas and BLM lands with high and overlying wildlife values. The Proposed RMP would provide more protection to water resources than Alternative A.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under the Proposed RMP, endangered big river fish, as well as BLM sensitive flannelmouth sucker, bluehead sucker, and roundtail chub, are protected under the stipulation for major river corridors. This would prohibit surface

occupancy and surface-disturbing activities within 0.5 mile of the six major rivers across the CRVFO. Further protection for sensitive amphibians would be provided under the CRVFO-NSO-5 stipulation for perennial streams and aquatic dependent species. It would provide surface protections within a 328-foot buffer around all identified breeding sites. By preventing and limiting ground-disturbing activities, these stipulations would have direct benefits on water resources by minimizing erosion and sediment and contaminant delivery in those areas. The suite of decisions under the Proposed RMP offers the most protection to water resources.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Under the Proposed RMP, stipulations for special status species would offer more protection for water resources than under Alternatives A and D, and slightly less than under Alternative C, providing long-term benefits to water resources by limiting surface-disturbing activities.

Impacts from Cultural Resource Management. The protection of cultural resources would be provided by: (1) stipulation CRVFO-NSO-20 for heritage areas; (2) stipulation CRVFO-NSO-21 for eligible historic properties; (3) closure to fluid mineral leasing within the 3,700-acre Blue Hill ACEC; and (4) the designation of the Blue Hill and Grand Hogback ACECs. Overall, these decisions would essentially benefit soil resources in those areas, and in turn would benefit nearby water resources by minimizing erosion potential and the potential for sediment and contaminant delivery to waterways. Cultural resource stipulations under the Proposed RMP and Alternative C would prevent the most acres of surface disturbance, resulting in the most protection for soils and vegetation and long-term benefits to water quality.

I**mpacts from Visual Resource Management.** Impacts under the Proposed RMP would be similar to those under Alternative A, except that more acres of the planning area would be managed as VRM Class I and Class II, and slightly different stipulations would apply. Under this alternative, approximately 35,600 acres would be managed as VRM Class I and approximately 268,900 acres as VRM Class II. Stipulation CRV-NSO-42 for VRM Class I areas would protect Class I VRM values and would prohibit surface occupancy and surface-disturbing activities within areas designated VRM Class I. Stipulation CRVFO-NSO-22 for VRM Class II areas with slopes over 30 percent and high visual sensitivity would prohibit surface occupancy and surface-disturbing activities in such VRM Class II areas to preserve their visual setting and integrity. In addition, stipulation CRVFO-CSU-9 for VRM Class II areas would ensure that surface-disturbing activities within VRM Class II areas would comply with BLM Handbook 8431-1 to retain the existing character of the landscape. Under the Proposed RMP, essentially more of the planning area would be protected from surface-disturbing activities, thus providing benefits to water resources. Decisions under the Proposed RMP would be less beneficial for water quality than under Alternative C, but more than under Alternatives A and D.

Impacts from Cave and Karst Resource Management. Under the Proposed RMP, approximately 5,400 acres would be protected by stipulation CRV-NSO-24 for cave and karst occurrence areas that would prohibit surface occupancy and surface-disturbing activities in the area of 17 known cave and karst resources. In addition, the Deep Creek ACEC would have similar protection by stipulation CRVFO-NSO-28 for ACECs. By preventing and limiting ground-disturbing activities, the Proposed RMP's stipulations would be more protective than Alternative A, minimizing erosion and benefiting water quality.

Impacts from Forestry Management. Impacts under the Proposed RMP would be similar to those under Alternative A, but would include intensive management of approximately 28,000 acres of commercial forestland and woodland, and limited management of approximately 352,800 acres of forest and woodland. In addition, the CRVFO would prohibit commercial timber harvest on 123,300 acres of forest and woodland.

While the area and location of activities would vary between Alternative A and the Proposed RMP, the annual allowable harvest from suitable commercial forestlands would remain the same, at 1.8 MMBF.

Under this alternative, the CRVFO would implement immediate salvage or accelerated harvests following adverse events (e.g., pine and spruce beetle infestations, other insect outbreaks, disease, blow down, and wildfire) to regenerate stands and to capture the economic value of forest products before that value is lost. Without proper planning and adequate mitigation and BMPs in place, the result could be soil compaction and displacement, leading to an increase in runoff, erosion, and sediment and contaminant delivery to nearby waterways. However, timely implementation of these actions could reduce large scale, severe wildfire hazard, thereby minimizing the potential for post-fire hydrophobic soil development, increased runoff, and sediment and nutrient loading in nearby waterways. Despite short-term soil and water impacts associated with the implementation of commercial scale logging activities, the Proposed RMP and Alternative D would be the most protective of water resources because these alternatives have the most intense management of forest health, which leads to protection of water resources in the long run.

Impacts from Livestock Grazing Management. Livestock grazing impacts under the Proposed RMP would be less than Alternative A, because of a reduction in the number of available AUMs and a decrease in acres open to grazing. Under the Proposed RMP, a total of 35,500 AUMs would be authorized and approximately 441,600 acres of BLM land would be available for livestock grazing. Depending on the location of these changes, these decreases in AUMs and closures could result in beneficial, indirect, and long-term impacts on water resources by minimizing erosion, sediment delivery, nutrient and fecal coliform levels, and channel alterations. Since fewer acres and AUMs would be available to livestock under this alternative compared with Alternatives A and D, adverse impacts on water resources would potentially be less under the Proposed RMP and Alternative C.

Impacts from Recreation and Visitor Services Management. The Proposed Plan would designate five SRMAs (62,800 acres) and six ERMAs (40,900 acres). Stipulation CRVFO-NSO-25 would apply to the five SRMAs and would limit non-recreational surface-disturbing activities and provide protection to soils within the NSO area. Stipulation CRVFO-CSU-11 would limit non-recreational surface-disturbing activities within the ERMAs.

Compared with Alternative A, the Proposed RMP emphasizes recreation use in SRMAs and ERMAs which could have site-specific impacts to soils and water. However, the Proposed RMP also has additional protective water stipulations that should help mitigate recreation impacts.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, the CRVFO would not have any acres open to cross-country travel. On approximately 464,000 acres travel would be limited to designated routes, while 41,200 acres would be closed to OHV travel. Travel management would generally move from large tracts of land open to cross-country OHV use to limited areas composed of designated routes. This reduction of total acres open to cross-country OHV use would result in a beneficial, direct, and long-term impact on water resources by reducing the potential for erosion and compaction in areas open to cross-country travel. This would minimize impacts on riparian areas and sediment and contaminant delivery potential, thereby benefiting water resources.

Reducing acreage open to cross-country OHV use and designating routes reduces the ability for visitors to create new, unplanned routes which result in soil compaction and displacement and an increase in erosion

and sedimentation. Overall, designating routes results in localized impacts to soil and water resources adjacent to the routes. Thus the impacts from travel management in the Proposed RMP would remain moderate but would be more easily mitigated and controlled than under Alternatives A and D. In addition, stipulations that directly benefit water resources would be applicable under the Proposed RMP.

Impacts from Lands and Realty Management. Any new land use authorizations (such as ROWs, permits, leases, and easements) could impact water resources through compaction and vegetation removal, which could lead to erosion and sediment and contaminant delivery. Under the Proposed RMP, approximately 219,800 BLM surface acres would be managed as ROW avoidance areas (including renewable energy sites, such as solar, wind, hydro, and biomass development). In addition, approximately 39,400 acres of the planning area would be managed as ROW exclusion areas (including renewable energy sites such as solar, wind, hydro, and biomass development). All ACECs, eligible WSR segments, areas closed to fluid minerals leasing, and areas open to fluid minerals leasing with no surface occupancy would be managed as ROW avoidance areas (with exceptions granted only if the proposed authorization would not create substantial surface disturbance, or would create only temporary impacts). Furthermore, stipulations for streamside management zones would apply under the Proposed RMP. Thus, water resources should be better protected than under the other alternatives.

Impacts from Coal Management. Under the Proposed RMP, no BLM lands are currently identified as containing potentially developable coal resources based on geologic and economic constraints and lack of expressions of interest. Only areas of potentially developable coal resources may be identified at the RMP planning level as acceptable for further consideration for leasing (43 CFR 3420.1-4). Therefore, no lands are currently identified as acceptable for further consideration for coal leasing. While coal mining would result in surface-disturbing activities and could have moderate impacts on water resources, there are currently no active coal mines in the planning area, and the potential for coal development in the future is relatively low.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under the Proposed RMP, the CRVFO would manage approximately 603,100 acres of federal mineral estate as open to leasing and development and 98,100 acres of the federal mineral estate as closed to fluid minerals leasing and geophysical development. Greater constraints under the Proposed RMP would include stipulation CRVFO-NSO-5, which establishes a 100-meter buffer adjacent to perennial streams and other waterbodies, and stipulation CRVFO-CSU-3 that provides a 30-meter buffer along intermittent and ephemeral streams. The protection for municipal watersheds (CRVFO-NSO-3), including the City of Rifle watershed located in the high-potential area, prohibits surface disturbance and surface facilities within 1,000 horizontal feet of either side of a classified surface water supply stream segment for 5 miles upstream from the intake. This restriction covers a greater width and stream length than under Alternative A. Additional protection is provided by stipulation CRVFO-CSU-2, which enables the BLM to require relocation or special design and mitigation of projects for a horizontal distance of 1,300 ft beyond the 1,000 ft NSO area along the public water supply stream.

Under the Proposed RMP, water resources would benefit in those areas where fluid minerals development would be prohibited. The Proposed RMP would close more acres to fluid minerals development than under Alternatives A and D, creating reduced impacts to water quality.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The CRVFO would recommend withdrawal of approximately 181,200 acres for locatable

mineral exploration or development. Approximately 342,700 acres would be open to salable minerals and non-energy leasable minerals. The CRVFO would propose the closure of approximately 162,500 acres in the planning area to mineral materials and non-energy solid mineral leasing. Under this alternative, water resources would benefit in those areas where these activities would be prohibited. Mineral development under the Proposed RMP would have less impact on water resources than Alternatives A and D but more than C.

Impacts from Areas of Critical Environmental Concern Management. Impacts under the Proposed RMP would be similar to those under Alternative A, but would include the designation of approximately 46,400 acres as ACECs instead of 27,000 acres under Alternative A. The Proposed RMP (and Alternative C) would prevent fluid minerals leasing in the Blue Hill, Bull Gulch, Deep Creek, and Thompson Creek ACECs, thus providing additional protection to soil and water.

The Proposed RMP would designate more acres of ACECs than under Alternatives A and D but would designate fewer acres than under Alternative C (approximately 33,400 fewer acres).

Impacts from Wilderness Study Area Management. Impacts under the Proposed RMP would be similar to those under Alternative A, except these areas would be protected by stipulation CRVFO-NSO-29 for WSAs that would prohibit surface occupancy and surface-disturbing activities. In addition, stipulation CRVFO-CSU-13 for WSAs, if released from wilderness consideration, would apply CSU restrictions if Congress were to release these WSAs from wilderness consideration. The Proposed RMP is more protective than Alternative A.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, the BLM would determine that Deep Creek Segments 1 and 2 are suitable for inclusion into the NWSRS and would be managed to preserve the free-flowing condition, water quality, ORVs, and tentative classification. Under the Proposed RMP, Deep Creek stream segments would be protected by stipulation CRVFO-NSO-30 for the suitable stream segment classified as "wild" and stipulation CRVFO-CSU-14 on the suitable stream segment classified as "scenic" or "recreational."

The BLM would defer a suitability determination on Colorado River segments and would rely upon the *Upper Colorado River Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River segments. The Proposed RMP, with the stakeholder group cooperation, would allow for the operation of water stakeholder facilities in a manner that meets water supply objectives and protects the ORVs. Without measures to protect and manage flows, there could be a gradual reduction in flows necessary to support recreational use over the life of the plan.

All other segments would be determined not suitable and released from further protection under the Wild and Scenic Rivers Act. The Proposed RMP would constrain surface-disturbing activities along two stream segments, which is less than under Alternatives A or C. Alternatives A or C would provide the most indirect protections to water resources by constraining surface-disturbing activities along eligible or suitable stream segments. Alternative D would not provide additional protection to water quality because all eligible stream segments would be determined unsuitable.

Impacts from Transportation Facilities Management. Impacts under the Proposed RMP would be similar to those under Alternative A, except that the miles of roads and trails would vary by maintenance level. The Proposed RMP would be slightly more protective of water resources than A.

Alternative C

Impacts on water resources from rangeland vegetation management, weed management, and wildland fire management would be similar to those under Alternative A. Impacts to water resources from management actions related to water and riparian vegetation, fish and aquatic wildlife (as well as special status species), VRM, coal management and WSAs management would be the same as or similar to the Proposed RMP. Impacts from management of other resources and uses would be similar to the Proposed RMP, except as described below.

Impacts from Vegetation Management—Forests and Woodlands. The types of impacts under Alternative C would be similar to those under the Proposed RMP, except the total probable sale quantity would be reduced to 0.9 MMBF. Overall, Alternative C would be more protective of soils, and subsequently water quality, than Alternatives A and D, or the Proposed RMP.

Impacts from Terrestrial Wildlife Management. Impacts under Alternative C would be similar to those under Alternative A. However, a slightly larger area (less than under the Proposed RMP) within the planning area would be protected by applicable wildlife stipulations that would prohibit surface occupancy and surface-disturbing activities in wildlife areas. Alternative C would be the most protective of water quality by limiting surface disturbing activities in more wildlife management areas.

Impacts from Cultural Resource Management. Impacts under Alternative C would be similar to those under the Proposed RMP, but would replace the generic stipulation for historic properties with CRV-NSO-39 which limits disturbance within 200 meters of historic properties. Alternative C would be the most protective of water resources, as it stipulates more acres for NSO protections.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, approximately 45,800 acres would be managed for wilderness characteristics, including application of stipulation CRV-NSO-43. This would prohibit surface occupancy and surface-disturbing activities on BLM lands managed for wilderness characteristics outside WSAs. By preventing and limiting ground-disturbing activities, this stipulation would minimize erosion potential and water quality degradation associated with sediment and contaminant delivery in these areas.

Under Alternative C, management actions would benefit water resources by limiting surface-disturbing activities. There would be no lands proposed with wilderness characteristics outside existing WSAs under the other alternatives, so Alternative C would provide the most protection to soils and vegetation, and subsequently to water quality.

Impacts from Forestry Management. Impacts under Alternative C would be the same as or similar to those under Alternative A, but would include intensive management of approximately 28,400 acres of commercial forestland and woodland, and limited management of approximately 341,800 acres of forest and woodland. In addition, the CRVFO would prohibit commercial timber harvest on 135,000 acres of forest and woodland. While the area and location of activities would vary between Alternatives A and C, the annual allowable harvest from suitable commercial forestlands would remain the same, at 1.8 MMBF.

Under this alternative, the CRVFO would not accelerate harvest levels to capture the economic values of forest products following adverse events. Salvage operations would be conducted to capture some commercial value and reduce the large scale, severe fire potential. This alternative would provide initial protection for water resources by ensuring that adequate mitigation and BMPs are in place before implementation. However, the result in extreme cases could be large scale, severe fire before salvage, which would have negative adverse impacts on water resources. Alternative C would require the least management for forest health and consequently water resource protection.

Impacts from Livestock Grazing Management. Impacts under Alternative C would be similar to the Proposed RMP, but would include a slight decrease in acres of BLM land open to livestock grazing (427,800 acres). In addition, the CRVFO would close the following allotments for noncompliance with land health standards and habitat concerns: County Line, Smith Gulch, and Alkali Gulch. These decreases in acres available for grazing and closures would result in a beneficial, indirect, and long-term impact on soils by minimizing compaction, displacement, erosion, and sedimentation, and subsequently benefit water quality. Alternative C would authorize the same number of AUMs as the Proposed RMP, but close more acres to livestock grazing. Therefore, Alternative C would be slightly more protective of water resources compared with the other alternatives.

Impacts from Comprehensive Trails and Travel Management. Impacts under Alternative C would be similar to the Proposed RMP, but would have 461,300 acres open to travel on designated routes. Alternative C would also close 43,900 acres to OHV travel. Overall, Alternative C would be the most protective of water resources, by restricting OHV travel most extensively.

Impacts from Lands and Realty Management. Impacts under Alternative C would be similar to the Proposed RMP, but would include the designation of 39,900 BLM surface acres of ROW exclusion areas and 226,200 BLM surface acres of ROW avoidance areas. This alternative reflects a decrease in ROW avoidance areas, thereby being less restrictive than the Proposed RMP. In addition to the lands retained under the Proposed RMP, Alternative C would seek to retain wetlands and riparian areas, occupied sensitive species habitat, and lands managed for wilderness characteristics outside existing WSAs. Lands and realty management under Alternative C would have the least impact on water resources by preventing, limiting, or relocating surface-disturbing activities.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Alternative C would close 179,400 acres of federal mineral estate to oil and gas development. Additionally, 356,700 acres that are open to fluid minerals leasing and development would be protected with an NSO. As a result, this alternative would be more protective of water resources than any other alternative.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts under Alternative C would be similar to those under the Proposed RMP. The CRVFO would recommend withdrawal of approximately 179,400 acres for closure to locatable mineral exploration or development. Approximately 323,100 acres of the planning area would be open to salable minerals and non-energy leasable minerals. The CRVFO would propose the closure of approximately 182,100 acres to mineral materials disposal and non-energy solid mineral leasing. Alternative C would withdraw the most acres of any alternative, providing the greatest benefit to water resources.

Impacts from Areas of Critical Environmental Concern Management. Impacts under Alternative C would be similar to the Proposed RMP, but would designate the most acres (79,800 acres total) of the planning area as ACECs. Under Alternative C, management of ACECs would provide additional protection of water resources by limiting surface-disturbing activities.

Impacts from Wild and Scenic Rivers Management. Under Alternative C all eligible stream segments would be identified as suitable, and interim protective management would be applied. This protection would extend to 0.25 mile on both sides of the stream centerline and would protect water quality by excluding surface-disturbing activities.

Alternatives A and C would provide the most acres of indirect protection for water resources by constraining surface-disturbing activities within 0.25 mile of eligible or suitable stream segments. The Proposed RMP would indirectly protect water resources by constraining surface-disturbing activities within the Deep Creek canyon segments found as suitable. Alternative D would not provide any indirect protections for water quality because all stream segments would be determined unsuitable.

Alternative D

Impacts to water resources from weed management, wildland fire management, R&VS management, wilderness and wilderness study areas management, and transportation facilities management would be the same as or similar to those under Alternative A. Impacts from management of all other resources and uses would be the same as or similar to those under the Proposed RMP, except as described below.

Impacts from Water Resource Management. Impacts under Alternative D would be similar to the Proposed RMP, but would not include the constraints on surface-disturbing activities afforded by stipulation CRVFO-NSO-5. Additionally, Alternative D does not include protections for intermittent and ephemeral streams. The only NSO stipulations that would apply would be those for municipal watersheds major river corridors and watersheds upstream from fish hatcheries. This alternative could have a moderate impact on water resources by eliminating stipulations that benefit water resources.

Alternative D would provide more protection to water resources than under Alternative A because CRV-NSO-4 would apply to all municipal watersheds, as opposed to only the Rifle and New Castle watersheds, but less protection than under the Proposed RMP and Alternative C, because Alternative D would not implement stipulation CRV-NSO-5.

Impacts from Vegetation Management—Riparian. Impacts under Alternative D would be similar to Alternative A, but would not include the additional protection from surface-disturbing activities being provided by water and fisheries stipulations. Under this alternative, surface-disturbing activities could occur in riparian zones, resulting in moderate impacts on water resources. Overall, Alternative D would have the least protection for water resources.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A, but would provide additional protection of approximately 16,000 acres in the planning area by stipulation CRV-CSU-6 for trout-bearing streams. This would apply CSU restrictions within 100 meters (328 feet) of all trout-bearing streams, except those native cutthroat streams identified as conservation and core conservation populations of Colorado River cutthroat trout and greenback cutthroat trout. In addition, stipulation GS-NSO-5 for the Rifle Falls and Glenwood Springs fish hatcheries would be

replaced by stipulation CRV-NSO-17, which protects surface water and shallow groundwater in watersheds upstream from fish hatcheries instead of a fixed radius from the hatcheries.

Alternative D would be substantially less protective of water resources than the Proposed RMP and Alternative C, due to the lack of implementation of stipulations (NSO and CSU) for all streams, riparian areas, and aquatic dependent species.

Impacts from Terrestrial Wildlife Management. Impacts under Alternative D would be the same as or similar to those under the Proposed RMP except for the degree of impact. Fewer acres within the planning area would be protected by applicable wildlife stipulations that would prohibit surface occupancy and surface-disturbing activities in wildlife areas.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts under Alternative D, would be similar to those under the Proposed RMP, but would provide additional protection of approximately 1,900 acres in the planning area by stipulation CRV-NSO-31 for conservation and core conservation populations of Colorado River cutthroat trout. This would prohibit surface occupancy and surface-disturbing activities within 100 meters (328 feet) of streams containing conservation and core conservation populations of Colorado River cutthroat trout only. Alternative D would provide the least protection for water resources, because other alternatives extend protections to all perennial streams and riparian areas.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A, but would provide less protection by stipulations for special status plants and terrestrial wildlife that would prohibit surface occupancy and surface-disturbing activities. Alternative D would provide the least protection for water resources.

Impacts from Visual Resource Management. Impacts under Alternative D would be similar to those under the Proposed RMP, except that fewer acres of the planning area would be managed as VRM Class II. Under this alternative, approximately 217,900 BLM surface acres would be managed as VRM Class II. Alternative D would have greater protections for water resources than under Alternative A, but less than under the Proposed RMP or Alternative C.

Impacts from Livestock Grazing Management. Impacts under Alternative D would be similar to the Proposed RMP, but would allow slightly more AUMs (36,500) and acres open to grazing (442,200 acres). In addition, the CRVFO would close the following allotments for noncompliance with land health standards or to accommodate increased oil and gas production: County Line, Alkali Gulch, Alkali Creek, and the Dry Creek of Pete and Bill Creek. These decreases in numbers and closures would result in a beneficial, indirect, and long-term impact on soils by minimizing compaction, displacement, erosion, and sedimentation. These decreases in numbers and closures would result in a beneficial, indirect, and long-term impact on water resources by minimizing erosion, sediment delivery, fecal coliform levels, and in-channel alterations. Based on acres closed to grazing and available AUMs, Alternative D would be more protective than Alternative A, but less protective of water resources than the Proposed RMP or Alternative C.

Impacts from Comprehensive Trails and Travel Management. Impacts under Alternative D would be greater than under the Proposed RMP and Alternative C, but less than Alternative A because OHVs would be limited to designated routes. Under this alternative, approximately 464,800 acres would be open to travel

on designated routes with no land open to cross-country travel. This would result in approximately 800 more acres open to travel on designated routes within the planning area when compared with the Proposed RMP. In addition, NSOs and CSU protections for streams and riparian vegetation would not apply. Under this alternative, there would be an increase in activities in proximity to water resources, which would have a moderate impact in specific areas by increasing erosion potential, riparian vegetation removal, and sediment delivery to nearby waterways.

Impacts from Lands and Realty Management. Impacts under Alternative D would be the same as or similar to the Proposed RMP, but would include 148,300 fewer acres designated as ROW avoidance areas and 300 fewer acres as ROW exclusion areas, resulting in less protection for water resources than is provided under the Proposed RMP. Alternative D is the least protective alternative for water resources.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The level of anticipated development under Alternative D would be the same as the Proposed RMP, but Alternative D has fewer protective stipulations across resources. Under this alternative, a high percentage of the planning area would be open to fluid minerals leasing. In addition, this development scenario accounts for a substantial increase in infrastructure and disturbed surface acres. This alternative would be the least restrictive and would have the most impacts on water resources. Approximately 648,400 acres of federal mineral estate would be managed as open to fluid minerals leasing and development. This alternative accounts for the most development potential for well pads, access roads, pipelines, and a pro rata share of off-site facilities. The cumulative effects of large volumes of water depletion in the Colorado River basin for fluid minerals development would have high to very high impacts on the quantity and quality of groundwater and surface water resources.

Under this alternative, the CRVFO would manage approximately 48,800 acres of the federal mineral estate as closed to fluid minerals leasing. Major constraints (NSO stipulations) would be applied to approximately 203,000 acres of the planning area that are open to fluid minerals leasing. In addition, moderate constraints (CSU stipulations, site-specific relocation) would apply to approximately 297,800 acres that are open to fluid minerals leasing. Under this alternative, water resources would benefit in those areas where these activities would be prohibited. Overall, these activities would still have moderate impacts on water resources where they occur in proximity to hydrologic features. Alternative D would be the least protective alternative for water quality.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The CRVFO would recommend for withdrawal of approximately 132,700 acres for closure to the mining laws for locatable exploration or development. For salable and non-energy leasable minerals, 477,400 acres would be open for mineral development. Thus, 27,700 acres would be closed for mineral material disposal or leasing.

Alternative D would withdraw more acres than under Alternative A but fewer than under the Proposed RMP, and substantially fewer acres than under Alternative C. Therefore, Alternative D would create fewer impacts to water resources than under Alternative A but more than under the Proposed RMP and Alternative C.

Impacts from Areas of Critical Environmental Concern Management. Alternative D would designate the smallest area of ACECs, approximately 20,200 acres. All ACECs under this alternative would be covered by NSO stipulations. Alternative D would exclude the Blue Hill and Bull Gulch ACECs (14,100 acres) from

fluid minerals leasing, providing additional protection to vegetation, more than under Alternative A, which would exclude only 4,300 acres from fluid minerals leasing. Alternative D provides the least protection to soil and water resources by designating the least amount of acres to ACECs that limit surface-disturbing activities.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, there would be no eligible wild and scenic river segments determined to be suitable. Under this Alternative D, land use activities could occur in proximity to major waterways that could result in water quality degradation by sedimentation and contaminant delivery, and potential loss in water quality and quantity by consumptive activities.

Cumulative Impacts

The geographic extent of the cumulative impacts analysis as it pertains to water resources was the Colorado River watershed and its tributaries from the headwaters to the CRVFO western boundary, and would include all federal, state, private, and other lands within and adjacent to this boundary. Potential cumulative impacts on water resources would result from surface disturbances and vegetation loss in proximity to waterways that could lead to an increase in runoff and sediment and contaminant delivery. Activities with adverse impacts on water resources include OHV use, mineral exploration and development, livestock grazing, vegetation treatments (including prescribed burning), and wildfires. These activities would create surface disturbances by removing vegetation cover, displacing and compacting soils, and altering soil structure and chemistry. The result is exposed and denuded surfaces that increase runoff rates and erosion and deliver sediment and contaminants to nearby waterways. Sedimentation in waterways can cause changes in water chemistry as well as geomorphic adjustments that could have negative effects on stream function. Additional cumulative impacts to water resources come from water use and development by agriculture, irrigation and energy development.

Domestic, agricultural, commercial, and industrial use and demand is expected to rise, along with development. Water right applications for waters flowing from or through BLM lands are also expected to rise, along with the demand. Decreases in water quantity could adversely affect water quality aquatic habitat, and wildlife and fish populations. Major water development projects being initiated by counties and cities east of the Continental Divide could have adverse impacts on the Colorado River and other tributaries, such as the Eagle, Frying Pan, and Roaring Fork Rivers. Cumulatively, the overall water diversions would be anticipated to have impact on the Colorado River Compact. Reduced vegetation cover and disturbed soils associated with construction and development projects would leave denuded surfaces susceptible to soil detachment and transport during runoff, and increasing delivery of sediments and contaminants to nearby waterways. In addition, agricultural runoff would introduce nutrients, pesticides, and herbicides to surface water and shallow groundwater.

Oil and gas development has considerable cumulative impacts to water resources. Water depletions from the Colorado River basin, for drilling, cementing, dust abatement, and hydrostatic pipeline testing, may decrease overall flow patterns and volumes of springs/seeps, streams and rivers throughout the CRVFO. Decreased flow often compounds existing water quality impairments, and may lead to reduced water quality elsewhere. Many resource values throughout the CRVFO, such as aquatic and wildlife habitat, recreation, and grazing, are dependent on consistently good water quantity and quality. Soil and water contamination (via spills, leaks, or compromised down-hole well infrastructure) also contribute to overall impacts on water sources.

Expansion of communities along the Eagle, Colorado, Roaring Fork, and Crystal Rivers is anticipated to have impacts on water quantity and water quality. Urban development and associated increases in recreational and

commercial land use will increase in the foreseeable future. For example, population projections for Garfield County alone are expected to increase by 30 percent (from 63,000 to 98,000 people) in the next 10 years (Colorado State Demography Office 2007d). Industrial land use, especially fluid minerals development on federal, state, private, and other lands within and adjacent to the planning area, will continue to increase. Oil and gas wells on non-BLM land are expected to increase at a similar or greater rate than BLM wells, which currently account for 20 percent of wells in Garfield County (COGCC 2010).

Unavoidable water quality impacts would include temporary increases in suspended load in flowing streams as a result of culvert installation, vehicle use of low-water crossings, livestock use of streambanks and wetlands, and permitted channel fills resulting from construction of oil and gas pads, roads, and pipelines. Water quantity impacts would include water withdrawals for livestock use, fluid minerals resource development, and watering of roads for dust mitigation.

Reasonably foreseeable future actions on federal, state, private, and other lands within and adjacent to the planning area that could have an adverse effect on water resources include urban development, expansion of recreational use (including increased OHV use), livestock grazing, and ongoing mineral exploration, development, and production. Without proper mitigation and BMPs, these activities could have similar adverse impacts, as described above.

Under all alternatives, water resources would benefit from management in accordance with the Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration and applicable state and federal water quality standards. Site-specific mitigation and BMPs for surface-disturbing activities would further reduce impacts on water resources. Adherence to these standards would reduce many of the adverse impacts from future actions. In addition, existing and proposed stipulations designed to protect water resources would be beneficial in minimizing sediment and contaminant delivery potential by preventing or limiting surface-disturbing activities in proximity to hydrologic features. Stipulations and limitations for other resources that prevent or limit surface-disturbing activities would provide additional protection for water resources and thereby could be beneficial (e.g., fisheries, riparian). Furthermore, timing limitations could benefit water resources by limiting or preventing surface-disturbing activities during times of the year when saturated soil conditions exist or when precipitation and runoff are frequent (e.g., winter, spring).

Stipulations designed to protect water resources vary by alternative, as do stipulations for other resources that provide additional protection for water resources. Under all alternatives, the BLM would continue to oppose water right applications that could adversely affect water quantity or quality on BLM lands, or that could injure existing water rights for maintenance of habitat, wildlife, water quality, and fisheries. Under Alternative A, major rivers and domestic watersheds would be protected by stipulations, and additional protection would be provided by riparian stipulations. In addition, land uses under this alternative would continue at the existing rates of development.

The Proposed RMP would provide additional protections for water resources by applying stream and riparian protective stipulations and would include less projected land use and development than under Alternative A. Alternative C would provide the most protection for water resources by applying stipulations to protect all hydrologic features and by providing more riparian protection than the Proposed RMP. In addition, Alternative C would decrease land use activities and development. Of the four alternatives, Alternative D would be the least restrictive, allowing use to increase beyond existing conditions. Water resources would have little protection under Alternative D, and riparian protection would be less than under Alternatives A and C.

4.2.5 Vegetation

Methods and Assumptions

This section discusses the impacts on vegetation from implementing the proposed allowable uses and management actions for vegetation resources, as well as allowable uses and management actions for other resources and resource uses. The focus of the impact analysis was on the goals, objectives, and actions that have more than a negligible effect on vegetation. Objectives or actions that have no impacts or negligible impacts on vegetation resources were generally not addressed below. The impacts of management actions on vegetation depend on the vegetation type, and thus, the analysis below is divided into rangelands, forest and woodlands, and riparian areas. Significant plant communities are found in all vegetation types and are discussed separately at the end of this section.

The following primary indicators of vegetation impacts were the focus of the effects analysis:

- Change in vegetation cover (e.g., reduction or total loss of vegetation, increased bare ground)
- Change in vegetation composition and/or structure
- Change in noxious and/or invasive weed species distribution and extent
- Changes in plant vigor
- Changes in patch size (habitat fragmentation)
- Changes in functional condition rating of riparian and wetland areas

The main impacts on vegetation would occur from surface disturbances associated with minerals and energy development, wildland and prescribed fire, vegetation management activities (such as brushbeating and hydroaxing), livestock grazing, roads and trails, and issuance of ROWs.

Assumptions

The vegetation analysis was based on the following assumptions:

- Vegetation management actions and other land uses would be aimed at maintaining or moving towards meeting the *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado* (BLM 1997a) on a landscape basis. These standards describe conditions needed to sustain public land health and relate to all uses of the public lands.
- All plant communities would be managed toward achieving a mix of native species composition, cover, and age-classes across the landscape.
- The effects of any surface disturbance or other management action on vegetation would vary widely depending on a number of factors, such as the type of soils, aspect, slope, precipitation, the existing composition of the vegetation community, and plant reproductive characteristics.
- Riparian areas would be particularly sensitive to these changes because they depend on vegetation to stabilize banks and soils and need sufficient water quantity and quality to maintain vegetation.
- All activities that create ground disturbances or remove vegetation cover could increase opportunities for the introduction and spread of invasive and noxious weeds and invasive species, and reduce vegetation diversity, production, and desirable plant cover. Indirectly, this could reduce the ecological

health of rangelands and of forests and woodlands, and decrease riparian/wetland functioning conditions.

- Conversely, management actions or protective measures that limit surface disturbances would reduce the risk of noxious weed invasion and overall habitat fragmentation. Actions that would improve the cover and diversity of native vegetation (within the capability of each ecological site) would cause a site to be less susceptible to invasion by weeds.
- Without disturbance, forest and woodland communities would increase in age and cover, with reduced composition and cover of understory species.
- Vegetation recovery following disturbances would have a lower chance of success in those areas with poor soils, south-facing slopes, and low precipitation (e.g., salt desert shrublands).
- Activities that disturb soils could cause erosion, loss of topsoil, and soil compaction, which could affect the ability of vegetation to regenerate. Further, surface-disturbing activities and use and maintenance of unpaved roads could increase dust, which could cover vegetation and impair plant photosynthesis and respiration. Resulting impacts could include lowered plant vigor, altered or disrupted pollination, and increased susceptibility to disease.
- Noxious and invasive weeds would continue to be introduced and spread as a result of surface-disturbing activities, vehicle traffic, recreation, and wildlife and livestock grazing.
- Natural factors, such as climatic fluctuations and insect and disease outbreaks would continue to influence the health and productivity of vegetation communities.
- Many of the resources and uses have NSO or CSU stipulations that extend beyond or overlap the NSO or CSU stipulations listed for protection of riparian-wetland resources. Although NSO and CSU stipulations for other resources complement protections for riparian areas and their function, (e.g., reduced erosion and sedimentation), most of these additional benefits would be minor. In most cases, riparian NSO or CSU stipulations would provide adequate protection for riparian-wetland resources. For these reasons, impacts on riparian-wetland resources from NSO or CSU stipulations associated with other resources or uses will not be addressed unless there are noteworthy exceptions.
- For the most part, NSO stipulations for other resources and uses would not prevent vegetation management actions, such as herbicide treatments and vegetation manipulations with minimal surface disturbances, to achieve Land Health Standard 2 or 3, or to achieve desired vegetation objectives in this plan.
- The CRVFO does not currently have all riparian-wetland resources mapped, particularly those associated with ephemeral and intermittent drainages and small lentic sites associated with springs and seeps. Likewise, significant plant communities have been mapped along the Colorado and Roaring Fork Rivers, but many significant plant communities, particularly upland communities, remain unknown. It is assumed that riparian NSO and CSU stipulations and CSU stipulations for significant plant communities would apply to all riparian areas and significant communities identified in the future, regardless of whether they are currently mapped.
- CSU stipulations generally require special project design features or relocation of surface-disturbing activities (e.g., from a riparian area to an upland area), but rarely preclude the action altogether. Therefore, CSU stipulations were not considered to be beneficial to vegetation (except for CSU stipulations that would allow for avoidance of riparian areas, significant plant communities or special

status plant populations), because they would ultimately shift the disturbance from one area to another and impacts on vegetation would still result.

- Direct and indirect adverse impacts of management actions on vegetation are generally best mitigated by minimizing the disturbance to the degree practicable, followed by the application of COAs or BMPs such as revegetation or weed control.
- The CRVFO would implement relevant standard operating procedures (SOPs) and mitigation measures based on the *Final Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS* (BLM 2007i). The BLM would also follow protective measures identified in the USFWS and National Marine Fisheries Service (NMFS) Endangered Species Act Section 7 Consultation and Biological Opinion for the PEIS. BMPs for preventing infestations of noxious and invasive weeds (BLM 2009e) are available for land managers as well.

Environmental Consequences

Impacts on vegetation resources would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on vegetation resources under any of the four alternatives.

Vegetation—Forests and Woodlands

Alternative A

Impacts from General Vegetation Management. Under Alternative A, vegetation management activities in forests and woodlands would include the following: weed treatments (manual, chemical, or biological); timber management; hazardous fuels reduction (e.g., thinning of pinyon-juniper stands); vegetation treatments (mechanical, chemical, or prescribed fire) to stimulate regeneration of aspen stands; unplanned fire managed for resource benefit; and habitat restoration.

In general, vegetation treatments have the potential to affect most plant communities in much the same way: all are intended to reduce the cover of target plants and increase the cover of non-target vegetation. Vegetation treatments are intended to move plant communities toward desired conditions. Overall, the BLM would aim to achieve or trend toward achieving Public Land Health Standard 3, Healthy Productive Plant and Animal Communities, which would improve ecosystem function, vegetation diversity, and soil stability. Over the long term, vegetation and habitat treatments would likely increase the productivity and vigor of plant communities by removing decadent and thick stands of vegetation, increasing the percent cover of desirable plant species, improving ecological health, and reducing erosion.

Weed Management. Weed management actions include education, weed prevention, and weed treatment. Under all alternatives, weed prevention actions include requirements to use certified weed-free hay and certified weed-free seed on public lands to help prevent introductions of new weeds. In all alternatives, the BLM would continue to monitor and treat new and existing populations of noxious and invasive weeds, and would continue to work with partners from local, state, and federal agencies to control weeds on a broad scale. The Glenwood Springs Field Office *Integrated Weed Management Plan and Programmatic Environmental Assessment* (BLM 2009f) would require oil and gas operators to monitor and control weeds on all lands they disturb under all alternatives. The BLM would hold other project proponents (e.g., livestock operators and ROW holders) responsible for monitoring and controlling invasive and noxious weeds that result from any of

their new facilities, improvements, or other surface-disturbing activities. Treatment methods would include manual, biological, and chemical controls, both ground-based and aerial.

Impacts on non-target vegetation would differ, depending on the method used. Manual control would involve hand pulling, hand digging, clipping or cutting woody vegetation with chainsaws. In general the effects of manual treatment methods would be minimal, both because of the low level of surface disturbance associated with this method and the limited areas in which manual use is feasible. Biological control by domestic livestock could injure or kill non-target plants through browsing or trampling and could introduce weed seeds to uninfected sites, attached to an animal's fur or deposited in its feces. Biological control by domestic animals could also lead to soil compaction from trampling, increased soil erosion from loss of plant cover, and loss of biological soil crusts, which have an important role in hydrology and nutrient cycling. Biological control agents, such as insects and pathogens, do not typically have an effect on non-target plant species. All biological control agents utilized by the CRVFO would be thoroughly tested by the Agricultural Research Service before release to ensure they are host-specific.

Herbicides used in chemical weed control could come into contact with and impact non-target plants through direct spraying, drift, runoff, wind transport, or accidental spills. Potential impacts include one or more of the following: mortality, loss of photosynthetic foliage, reduced vigor, abnormal growth, or reduced reproductive output. Trucks or ATVs used during ground applications could crush or kill non-target plants. Application rate is a major factor in determining risk, with higher application rates associated with greater risk to plants. Because many herbicides target broadleaf species, herbicide treatments could reduce or eliminate native forbs in the treated areas, particularly with aerial applications. This could result in a long-term change in the plant community composition in which non-broadleaf species such as grasses may begin to dominate the site.

Weed treatments would benefit native plant communities by removing competition from weeds, which would provide more resources (e.g., water and nutrients) to native plants, allowing them to reestablish in sites previously dominated by weeds. However, if too little vegetation remains following treatment, other weeds may invade the area. To minimize this potential, areas with limited desirable species may be revegetated following treatment. Seeding or interseeding these types of areas can hasten the establishment of desirable native species and help prevent colonization by weeds. Proposed weed management actions and their impacts on vegetation would be similar across all alternatives.

Timber Management. Fuels projects and firewood collection would likely improve the health and structure of pinyon-juniper communities by removing dead and dying wood. Timber management could also be used to control insect and disease outbreaks by removing infected trees from the stand. Where fuel loads are excessive, vegetation treatments to reduce total biomass and "ladder fuels," which could carry a ground fire into the canopy, could reduce the risk of catastrophic fire and the long-term loss of forest structure. Impacts from timber management on forest and woodland vegetation would be similar to those under forestry management, Alternative A.

Prescribed Fire and Unplanned Natural Fire Managed for Resource Benefit. Impacts on vegetation from fire under all alternatives would be similar to those described under wildland fire management, Alternative A.

Vegetation Treatments. Vegetation treatments in forest and woodlands would include manual, mechanical, prescribed fire, or unplanned fire managed for resource benefit (see above for impacts from fire). Manual

treatments would involve the use of chainsaws to thin forest or woodland stands. In general, adverse impacts from manual treatments would be minimal, creating little surface disturbance.

Mechanical treatments would involve the use of vehicles (e.g., hydroax or brush hog) to cut, uproot, or chop vegetation. Levels of disturbance to soil and vegetation would depend on the method used—more surface disturbance would occur from a tracked vehicle versus a rubber-tired vehicle. Manual and mechanical vegetation treatments would reduce canopy cover and increase cover of understory vegetation, would increase soil moisture (because of a reduction in evapotranspiration), would create a variety of age-classes, and would change vegetation composition, density, canopy cover, and structure.

Adverse impacts would occur if a vegetation treatment failed. A vegetation treatment would be considered a failure if it were successful in removing the target vegetation but the desired vegetation community did not become established. A variety of impacts could result, including increased soil erosion from loss of vegetation cover, increased weed invasion, and long-term changes in habitat and species composition. The duration of these effects would vary by treatment method, habitat and community type, proximity of native seed sources, and the amount and timing of precipitation. If left alone, most failed treatments would eventually be revegetated by either the former plant community or, if weeds were present before the treatment, by a new and less desirable community dominated by non-native species.

Restoration. Disturbed areas would typically be reseeded or planted with desirable vegetation if the native plant community could not recover and occupy the site sufficiently. Seeding could include aerial, broadcast, or drill seeding, planting of shrub or tree plugs, and tilling or other soil preparation techniques.

Revegetation would create long-term benefits by decreasing bare soil, which would reduce the risk of weed invasion, decrease soil erosion and sedimentation, and restore or improve habitat conditions. However, revegetation could also create soil disturbance and lead to weed establishment and erosion if seeded (desirable) species did not successfully reoccupy the site. Seed drills could cause soil compaction and damage soil crusts. The use of tractors or ATVs during seeding could cause residual plants to be injured or killed during cultivation or raking. Before any proposed soil cultivation activities, cultural and biological surveys would be conducted, and a site-specific NEPA document would be prepared.

Prohibiting grazing for two growing seasons in areas that are reseeded would benefit vegetation communities by allowing vegetation to attain desired objectives for cover, species composition, and litter accumulation. Monitoring of revegetated areas would be critical to ensure that the area is recovering as intended or, if not, to provide a basis for additional weed control or seeding or both.

All alternatives would also include a CSU stipulation to protect significant plant communities (e.g., rare plant associations, communities in excellent ecological condition, remnant vegetation, and old-growth forests and woodlands). This would provide a beneficial impact on vegetation by avoiding or minimizing disturbances in these high-quality communities.

In general, Alternative A lacks a landscape-level approach to management of plant communities and successional stages. The Proposed RMP and Alternatives C and D would provide more benefit to vegetation than under Alternative A, as these alternatives propose specific direction with clearly defined objectives for old- growth maintenance and restoration, create more diverse age-class structure in affected plant

communities and manage vegetation communities to mimic natural stand conditions and regeneration processes.

Impacts from Soils Management. Soil protections that exclude surface-disturbing activities, such as NSO stipulation GS-NSO-15 for steep slopes greater than 50 percent (except for pipelines) and stipulation GS-NSO-14 for debris flow zones, would have a beneficial impact on vegetation by minimizing direct loss of vegetation, reducing soil erosion, and reducing the risk of weed invasion.

Soils management under Alternative A is less protective to vegetation than the Proposed RMP or Alternatives C or D because the other alternatives would apply the NSO stipulation for steep slopes to all surface-disturbing activities including pipelines. The implementation actions of monitoring sites that are not meeting Land Health Standard 1 and taking corrective action to improve soil conditions would also benefit vegetation by improving soil productivity and reducing erosion that would promote greater vegetation growth.

Impacts from Water Resources Management. Stipulations that constrain surface-disturbing activities, such as existing GS-NSO-3 for major river corridors and GS-NSO-13 for the domestic watersheds for the communities of Rifle and New Castle would have a beneficial impact on vegetation by reducing direct and indirect impacts.

This alternative would be less protective than the Proposed RMP which would apply an NSO stipulation to prohibit surface-occupancy within 325 feet of all water bodies and riparian areas. Alternative C is similar to the Proposed RMP with a proposed NSO for all hydrologic features but the buffer would only extend out to 50 feet. Alternative D provides similar protective measures and levels of protection as Alternative A. The Proposed RMP and Alternatives C and D would also expand the protection for domestic watershed areas to include all municipal watersheds.

Impacts from Fisheries and Aquatic Wildlife Management. Under this alternative, there are no specific management actions or allowable use decisions for fisheries and aquatic species except for an NSO stipulation that would protect a 2-mile radius around the Rifle Falls and Glenwood Springs fish hatcheries from surface-disturbing activities. By limiting ground-disturbing activities, this stipulation would provide direct benefits to vegetation by minimizing loss of vegetation within the area where this stipulation applies.

The NSO stipulation in Alternative A includes the most acreage; however; the NSO incorporates private land and lands downstream of the hatcheries. The stipulation could not be applied to private lands and would not be applicable downstream of the hatcheries, so the effective implementation area of the stipulation would be very similar across all alternatives. In all alternatives, the stipulation would protect vegetation upstream of the hatcheries from surface-disturbing activities.

The Proposed RMP would provide greater protection than this alternative via the combined fish, water, and riparian stipulation CRVFO-NSO-5 protecting vegetation within 325 feet of all water features. Alternative C is similar to the Proposed RMP as it would protect vegetation around all hydrologic features with an NSO but only for a 50-foot buffer. Alternative D would be similar to Alternative A. Alternative D includes CRV-CSU-16, which may protect vegetation within 100 meters of trout-bearing streams but may cause a shift in activities into other vegetation communities.

Actions to improve fisheries habitat could include installation of fish barriers, in-channel fish habitat structures, riparian plantings, and fencing. Where fish habitat projects are constructed, there may be short term losses of riparian vegetation due to surface disturbances. However in the long term, actions to improve fish habitat would be likely also to result in the maintenance or expansion of riparian vegetation.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife management actions would be largely beneficial to vegetation communities in the long term. NSO stipulations to protect state wildlife areas and other wildlife seclusion areas from surface-disturbing activities, route closures to reduce road density and habitat fragmentation, and travel restrictions on motorized and mechanized travel would benefit vegetation by reducing adverse impacts, such as vegetation removal, reduced vigor, soil erosion and compaction, and weed invasion.

Wildlife habitat improvement projects would target pinyon-juniper woodlands and other forest stands to reduce canopy cover, create greater diversity among age-classes, stimulate regrowth, increase grass and forb abundance, improve the palatability and nutrition of forage for wildlife, and improve upland watershed health. Adverse impacts on vegetation could occur if habitat improvement projects failed to improve desirable vegetation cover, leading to reduced productivity, reduced plant species diversity, increased bare ground, or introduction or expansion of invasive and noxious weeds and invasive plant species.

Construction of ponds and guzzlers to provide water for wildlife would directly impact vegetation in the immediate area and could lead to soil compaction, erosion, and weed invasion. However, under all alternatives, beneficial impacts from terrestrial wildlife management would be much greater than adverse impacts.

Impacts associated with proactive wildlife habitat treatments would be similar under all alternatives. The Proposed RMP and Alternative C would provide more substantial protection for vegetation communities by limiting ground disturbance with an NSO stipulation on more acres of priority wildlife habitat. Alternative D would provide more limited protections for wildlife and therefore less protection for vegetation than the other alternatives.

Impacts from Special Status Species Management. Under Alternative A, approximately 8,600 acres would be protected by NSO stipulations for threatened and endangered species habitat, raptor nest sites and sage-grouse leks. These stipulations would benefit vegetation resources by minimizing overall loss of vegetation, changes in species composition, and the potential for the spread of invasive and noxious weeds. Alternative A would be the least protective of vegetation because it would protect the fewest acres from surface-disturbing activities.

The Proposed RMP and Alternative C are similar and would provide NSO stipulations with wider buffers for ESA-listed and BLM sensitive plants, ferruginous hawk and peregrine falcon nest sites, and all priority habitat for greater sage-grouse, which includes much more habitat than the 0.25-mile buffer around leks in Alternative A. Alternative D would provide the least protection to special status species and hence, less protection for vegetation communities.

Implementation actions to restore degraded habitat for special status plants and to close select travel routes that are impacting special status plants would also benefit vegetation resources by removing invasive and noxious weeds and restoring native vegetation cover and diversity.

Impacts from Cultural Resource Management. The protective management of cultural resources would generally complement the maintenance of forests and woodlands and other vegetation. Current federal laws and BLM policy to protect cultural resources would have similar long-term impacts on vegetation resources and vegetation management under all alternatives. The minor changes across alternatives in NSO stipulations would cause a negligible difference in impacts on vegetation. These restrictions would directly protect vegetation within the 100-meter buffer and would indirectly protect downslope areas from off-site erosion and sedimentation. Management restrictions for cultural resource protection could preclude some vegetation treatments that involve surface disturbing activities in some areas, but any restrictions are expected to be minimal. Impacts would be similar under all alternatives.

Impacts from Visual Resource Management. Different levels of scenic values require different levels of management. In areas of high scenic values, management might be focused on preserving or retaining the existing character of the landscape, so the area would be designated VRM Class I or II. An area with less scenic value might be managed to allow for greater landscape modifications, and those areas would be designated Class III or IV. The VRM designations also have corresponding NSO and CSU stipulations that constrain surface-disturbing activities, use and occupancy; or they have the ability to relocate surface-disturbing activities which would restrict surface disturbances unless the existing degree of naturalness could be maintained. Moderate to major modifications to the character of the landscape could occur in areas designated as VRM Class III or IV.

Managing areas as VRM Class I would prohibit most vegetation treatments and other surface-disturbing activities, except for those actions that would not create a visual impact (e.g., weed treatments) or would be completely shielded from view. VRM Class II would allow for limited small-scale surface disturbances, such as vegetation treatments (e.g., sagebrush mowing, weed management, and timber harvest), as long as the project design features were adequate to protect the scenic values and blend in with the existing surroundings. Forest health could be adversely affected by VRM Class I and Class II areas, since those classifications seek to preserve and retain existing landscape character. Impacts on forest health could include reductions in allowable harvest, restrictions on prescribed burns, and restrictions or prohibitions on other treatments to manage insects and disease. Areas managed as VRM Class III and IV would allow greater landscape modifications and therefore greater surface disturbance.

Under Alternative A, existing NSO stipulations to protect VRM Class I areas within ACECs (GS-NSO-16) and to protect the Interstate-70 viewshed (GS-NSO-18) would provide protection to vegetation; however, other alternatives would protect more acres. Alternative A would have the most potential to allow projects that involve ground disturbances that could remove revegetation or allow invasive and noxious weeds or other invasive species to establish. Applying the proposed soil, water, and vegetation stipulations and BMPs for the protection and reclamation of vegetation resources would help mitigate the potential impacts.

Alternative A would protect the fewest acres with a VRM Class I or II designation. The Proposed RMP would protect the most acreage with VRM Classes I and II, followed by Alternative C and D, respectively.

Impacts from Wildland Fire Management. Under all alternatives, wildland fire management is designed to complement resource management objectives. The composition, structure, function and pattern of most forest and woodland communities were influenced by fire historically and by fire suppression more recently. Both prescribed fires and unplanned fires may be managed to improve the productivity of the vegetation community, achieve age-class diversity across the landscape, reduce susceptibility to insects and disease, or

reduce the potential for large, high-intensity wildfires. The more frequently small and medium sized fires burn on a landscape, the less prone it is to extremely large destructive fires.

The intensity and duration of impacts to vegetation from fire would depend on the size and severity of the fire, as well as the fuel type and the condition of the vegetation community prior to the burn. High-severity wildland fires remove all or a majority of vegetation and soil surface cover, which drastically increases the potential for erosion and may result in the development of hydrophobic layers that resist water infiltration and inhibit plant growth. Low to moderate severity fires are generally a goal of prescribed fires and management of unplanned fires. These fires may reduce the woody canopy cover in the short term and generate more growth of the herbaceous understory. Fires in aspen woodlands stimulate sprouting of young aspen trees and in lodgepole communities stimulate germination of seedlings, fostering rapid recovery of the original plant community.

Where fire is allowed in relatively intact ecosystems, such as WSAs, with predominantly native vegetation, the risk of weed invasion following fire would be limited because there would be few weeds to provide a seed source for invasion. In these situations, allowing for unplanned fire managed for resource benefit could result in habitat improvement and age-class diversification.

Fires in plant communities that have been invaded by cheatgrass may be permanently altered by fire. In these vegetation communities, fire is not desirable as it can result in extensive monocultures of cheatgrass that inhibit reestablishment of the native perennial plant community. This would result in a long-term adverse impact on vegetation.

Fires are suppressed when and where undesirable resource conditions may result, where fires occur in proximity to the WUI, or when weather conditions would lead to unnaturally large, hot fires. In the short term, suppressing fires may minimize high-severity fires and the associated impacts of vegetation loss and erosion. However, continued suppression of wildland fires has resulted in unnaturally high fuel buildup and increased the risk of large-scale, high-severity fire resulting in greater loss of vegetation and long-term changes in plant composition. The absence of fire or other disturbances can cause forests and woodlands to increase in canopy cover with a corresponding decrease in herbaceous cover, can increase litter associated with snags and fallen trees, can cause aspen stands to be replaced through succession by conifers, and can cause forests to be more susceptible to disease and insect infestations.

Fire suppression activities themselves can also cause a variety of impacts to vegetation. Vehicles and equipment involved in fire suppression activities can be a source of contaminants (i.e. oil, gasoline, antifreeze) which could cause plant mortality or reduced plant vigor. Use of heavy fire equipment to construct roads, fire lines, or other fire-fighting facilities would destroy vegetation and increase the risk of dust and weed invasion. Fire vehicles could introduce and spread noxious and invasive weed seeds.

Contaminants related to prescribed fire management such as fuel for fire ignition, fluids related to vehicles and equipment, such as oil, gasoline, antifreeze could have similar impacts on vegetation as in wildland fire suppression activities. Use of heavy fire equipment to construct roads, fire lines, or other fire-fighting facilities could cause soil compaction, displacement, and destruction of vegetation.

Fire management may also involve the use of manual/mechanical treatments to lessen fuel loading and reduce the negative impacts from future wildfires. Use of manual treatment such as chainsaws, and mechanical

treatment, such as hydroaxes, in most sites would reduce canopy cover and increase the cover of understory vegetation. However, use of heavy equipment could cause soil compaction and destruction of vegetation. Additionally, mechanical equipment could increase weed introduction and spread. Excess fuel is usually placed in piles and burned. Pile burning may result in localized areas of soil sterilization, reduced vegetation cover, and greater risk of weed invasion.

Mechanical equipment used in post-fire stabilization and rehabilitation efforts, could cause short-term impacts by crushing or uprooting vegetation which survived the fire. Stabilization and rehabilitation efforts (e.g., seeding and erosion control) following wildland fire would benefit vegetation over the long term by decreasing bare soil, which would reduce the risk of weed invasion, decrease soil erosion and sedimentation, and restore native perennial plant communities. Seeding grasses and/or forbs with quick germination and establishment characteristics to stabilize soils could result in an increase in perennial herbaceous cover that could outcompete invasive plant species that typically grow in ecosystems with low vegetation cover.

Proposed fire management actions are the same across all alternatives; therefore, impacts on vegetation from wildland fire management would be the same across all alternatives. Under all alternatives, beneficial impacts would generally outweigh adverse impacts, as wildland fire and fuels management would generally improve diversity of age-class structures and the cover and composition of understory vegetation.

Impacts from Forestry Management. Forestry and woodland management actions include commercial timber harvest as well as meeting the demand for firewood, posts and poles, Christmas trees, transplants, vegetation materials, pine nuts, and native plant seed. The goals of forest management are to improve forest health and vigor and to provide a variety of forest products to meet commercial and private demands on a sustained yield basis. Forest treatments would generally improve the structure, composition, health, and vigor of forest and woodland vegetation over the long term.

The annual allowable harvest is 1.8 MMBF in the CRVFO. However, since the early 1990s, harvest levels have averaged less than 10,000 board feet per year. Lodgepole pine is the primary commercial species. Pinyon-juniper woodlands are managed as forest products, with an estimated allowable harvest of 6,465 cords. Most of this harvest is firewood for individual use. However, average annual firewood harvest over the last 5 years is 650 cords. All in all, the CRVFO forestry program is very small. In addition, past decisions regarding forest and woodland product management emphasized wood products, but forest management policy on federal lands has changed, emphasizing forest health and hazardous fuel reduction.

Alternative A would actively manage the most acres of commercial forestland and woodlands. The Proposed RMP and Alternatives C and D would intensively manage fewer acres of commercial forest and woodland, and would apply limited management to the remaining forests and woodlands. At the implementation level, forest management would be performed using clearcuts, shelterwood cuts, pre-commercial and commercial thinning, seeding and planting, timber stand improvement, sanitation and mechanical treatments, or prescribed fire for stand replacement or conversion. These forest management activities, including construction of timber access roads, would result in the loss of forest and woodland vegetation cover. Removing the woody overstory would allow more light and moisture to reach the forest floor, stimulating increased production of grasses, forbs, and shrubs. Ground disturbance caused by equipment used for forest treatments would cause a short-term increase in soil erosion and sedimentation, an increased risk of weed invasion and expansion, long-term changes in species composition or vegetation community structure, and changes in the patch sizes of vegetation. Since the CRVFO has limited lodgepole woodlands (i.e., Black

Mountain and King Mountain), it is estimated that the intensive forest program would remain small under all alternatives.

Fuels reduction would be the focus of treatments in woodland stands, primarily through thinning by hand crews and using mechanized equipment for clearing and thinning. Reducing the cover of pinyon-juniper stands would lead to an increase in understory vegetation, such as grasses and forbs, providing more forage for wildlife and livestock.

Wildland fire potential would be reduced by the removal of dead and dying stands and those infected with insects and disease, as well as by thinning overstocked stands. These long-term improvements in forest health would eventually produce more forest products and products of higher quality.

Harvesting forest and woodland products, cutting Christmas trees and collecting plants would result in a small-scale loss of vegetation biomass. Seed collection would result in a short-term decrease in reproductive potential of the target vegetation at the collection site. Collectors could impact vegetation by trampling or could crush vegetation with vehicles used to access collection sites.

Future timber harvests would focus on improving forest and woodland health more than commercial timber and wood product values. The scope and intensity of impacts to forest and woodland vegetation would be similar under each alternative.

Impacts from Livestock Grazing Management. Under Alternative A, the most acres of land would be available for grazing (488,300 acres) and the most AUMs of livestock forage would be allocated (39,200 AUMs). No active allotments would be closed for resource concerns or conflicts; however, 16,900 acres of unalloted parcels would not be allocated for grazing.

Direct impacts on vegetation from livestock grazing management include vegetation removal, disturbance, and trampling. Indirect impacts from livestock grazing management may also result in soil compaction and loss of biological soil crusts from trampling and increased soil erosion from loss of plant cover. Poor grazing management can result in excessive utilization, soil compaction, or repeated defoliations that do not allow sufficient time for rest and recovery of plant species. Reduced vigor or death of plant species may result, causing changes in species composition and total vegetation cover, as well as increased potential for incursion of invasive and noxious weeds or other undesirable vegetation.

Grazing could also change the overall structure and composition of vegetation and affect diversity, as livestock tend to selectively graze the most palatable plant species. Preferred forage species would tend to decline in abundance and be replaced by less palatable species or noxious and invasive weeds. Cattle, in particular, tend to concentrate along streams and around water sources, which may cause the reduction or loss of streamside vegetation cover. Excess herbivory or trampling damage can lead to greater erosion or deposition, changes in channel geomorphology, and less soil moisture. The scope and degree of impacts would depend on grazing intensity, duration, season of use, and local climatic conditions.

Management of livestock grazing would comply with Colorado Standards for Public Land Health and Guidelines for Livestock Grazing under all alternatives (Appendix J). Where current livestock grazing is causing standards not to be met, changes would be made to make significant progress toward meeting those standards. This would help reduce adverse impacts on vegetation. Historic grazing practices have caused

some areas not to meet Land Health standards due to widespread cheatgrass infestations and poor native plant diversity and cover (BLM 2005c, 2008l). However, LHAs have found that most grazing allotments are meeting or moving toward meeting the standards for public land health. Where standards are not being met, the BLM would continue to improve grazing systems to move toward meeting the standards in all alternatives.

Well-managed grazing can create beneficial impacts on vegetation by reducing litter and fine fuel loading, which could reduce the extent and severity of fires. Grazing could also remove old or dead growth, stimulating the production of new growth and hence root strength and growth (Wyman et. al. 2006). Hoof action from livestock can plant seeds, which promotes the germination and establishment of new plants. Targeted grazing can be a useful tool to control undesirable invasive plant species or reduce fuels that contribute to severe wildfires.

Range development projects, such as construction of new stock ponds, would permanently remove vegetation within the footprint of the project. Water developments would concentrate livestock use and reduce vegetation cover in the vicinity of the pond or spring. Soil compaction and erosion would increase as well as the potential for weed invasions. New rangeland development projects would have mitigation attached, which would require livestock operators to monitor and control weeds on surfaces they disturb. Many of the range improvements for livestock would have long-term benefits to vegetation as livestock distribution is improved and excessive utilization levels are reduced, actions which would reduce vegetation disturbance, weed invasion and spread, and soil compaction in any one area.

Under all alternatives, when deemed necessary and feasible by the BLM, livestock grazing would be excluded or deferred for two growing seasons on disturbed areas (e.g., reclaimed seeded areas, except for pipelines), or until monitoring data indicated that vegetation cover, species composition, and litter accumulation were adequate to support and protect watershed values, meet vegetation objectives, and sustain grazing use. Beneficial impacts would result as vegetation on reclaimed and reseeded areas would have time to become established, and the risk of weed invasion would be reduced.

In general, the more acres and AUMs that are provided for grazing under a given alternative, the greater the scope and intensity of impacts. Since the most acres and AUMs would be available for livestock grazing under Alternative A, impacts on vegetation would be the greatest.

Impacts from Recreation and Visitor Services Management. R&VS management would include the designation of SRMAs under all alternatives. In the SRMAs, recreation would be the main emphasis and management would facilitate specific activities and meet desired recreation outcomes. In select SRMAs, emphasis activities include motorized recreation, mountain biking, and hiking. In other SRMAs, current management promotes solitude and nonmotorized activities. In SRMAs where management emphasizes increased use and development, it is likely that more routes and trailheads would be created to meet user demand and desired experiences. Increases in miles of travel routes would result in a commensurate loss in acres of vegetation and greater fragmentation of vegetation communities. Remaining lands would be managed as RMAs or ERMAs to achieve a balance between recreation and other resources and uses.

Regardless of the designation, high-use areas such as designated campgrounds, parking lots, boat launches and trailheads would concentrate uses which would also have the most impacts on vegetation. Other impacts to vegetation occur where dispersed camping is allowed within 300 feet of a designated route outside of

designated campgrounds. This type of impact is greatest during the fall big game hunting season when high numbers of visitors are using public lands for dispersed camping. Disturbed areas serve as niches where invasive weedy vegetation can take hold. Humans can also serve as dispersal mechanisms for noxious weed species and help spread weeds to new areas. Many invasive and noxious weeds are aggressive and can dominate a site to the exclusion of native plants. Weeds can thus form a monoculture, reducing vegetation diversity and overall ecosystem health.

Protective stipulations associated with these recreation designations include GS-NSO-16, which limits large surface-disturbing activities in four of the SRMAs, and GS-NSO-17, which limits large surface-disturbing activities within the RMAs. These stipulations would provide some indirect protections of vegetation resources by limiting surface disturbances not associated with recreation, but these do not preclude the creation of more recreation facilities (trails, roads, and infrastructure).

Visitor demand and use is expected to increase within the planning area under all alternatives. All of the impacts associated with recreation are expected to increase in scope and intensity. Loss of vegetation cover and fragmentation of vegetation patches are likely to be greatest in areas where road and trail density are highest. Impacts from managed recreation can be mitigated during site-specific analysis of individual actions primarily by issuing Special Recreation Use permits, which are used to control some visitor use and reduce resource conflicts and impacts.

Under all alternatives, adverse impacts from R&VS on vegetation would be greater than beneficial impacts. Alternative A would create fewer impacts than under Alternative D, which would allow for the most development and use. Alternative C would place less emphasis on development of new trails and other infrastructure for recreation, which would impact less vegetation but would also protect fewer acres with an NSO stipulation. The Proposed RMP would impact less vegetation than Alternative D, with fewer SRMAs emphasizing increased use and development and with the application of NSO stipulations to the most acres

Impacts from Comprehensive Trails and Travel Management. The construction of new roads and trails, as well as recreation impacts from off-road motorized and mechanized vehicle use, would result in adverse impacts on vegetation, such as plant mortality, reduced vegetation cover and density, invasion and spread of invasive and noxious weeds, soil compaction, erosion, sedimentation, habitat fragmentation, and increased dust. Motorized activities in undisturbed and remote areas would probably distribute weed seeds into weed-free areas. These impacts would reduce the vigor and productivity of native plant communities and alter plant community composition.

Under current management, a total of 295,900 acres of the CRVFO would be open to cross-country OHV travel. Travel management under this alternative would allow for substantial proliferation of user-created routes, which would create widespread impacts on vegetation. The degree and duration of impacts would depend on the level of use, season of use, type of soil, and vegetation community. Although many areas of the landscape would not be impacted by cross-country use due to topographic and vegetation barriers, continuing to manage large areas as open for travel would allow the greatest potential for direct loss of vegetation and fragmentation of vegetation communities.

Adverse impacts would be less in areas limited to existing or designated routes, although damage to vegetation due to erosion, dust deposition, vehicle exhaust, and weed invasion or spread would probably still occur in

these areas. Areas with a closed designation (44,000 acres in Alternative A) would have long-term benefits to vegetation because these areas would no longer receive impacts from OHV use.

Under all alternatives, trails and travel management would have adverse impacts on vegetation. Alternative A would create the greatest scope and intensity of impacts on vegetation by allowing open cross-country travel across a large portion of the CRVFO. All other alternatives would restrict travel to designated routes.

Impacts from Lands and Realty Management. Lands and realty actions, including ROWs, transportation systems, utilities, communication sites, renewable energy development, and land disposals, can have short-term or long-term negative effects on vegetation. Specifically, activities that result in ground disturbance for the construction of ROWs would result in the direct loss of vegetation, conversion to other habitat types, and increased habitat fragmentation. In addition, disturbed areas serve as niches where invasive weedy vegetation can become established. Weeds can proliferate and outcompete native vegetation, reducing plant community diversity and ecosystem function. Actions such as construction of new roads and communication sites would result in a permanent loss of vegetation. Other ground-disturbing actions, such as construction of pipelines and buried fiber-optic lines, could be reclaimed immediately following installation, which would result in a temporary loss of vegetation cover. However, even these short-term disturbances generally result in a long-term loss of shrubs and trees and change the plant community to an earlier seral stage.

In Alternative A, approximately 20,800 acres would be designated as "unsuitable" for siting of utility and communication facilities, precluding the construction of these facilities. Vegetation in these areas would be protected from these surface disturbances. Under the other alternatives, the term "unsuitable areas" is replaced with "exclusion areas," and the term is applied to all ROWs, not just utilities and communication sites. The other alternatives would designate nearly twice as many acres as ROW exclusion areas as Alternative A.

Under current management, 34,500 acres would be petitioned for withdrawal from locatable mineral exploration and development. This is far less than the other three alternatives. Current management would allow the most potential impact of locatable mineral exploration and development with the least amount of land withdrawn. Locatable mineral development can create ground disturbances that would result in the removal of vegetation and increase the risk of erosion and invasion of weeds. Alternative A would also provide no specific criteria to retain lands that contain valuable plant communities, potentially allowing for the disposal of important vegetation communities.

Under all alternatives, adverse impacts from lands and realty actions on vegetation would be greater than beneficial impacts. In Alternative A, lands and realty management actions would result in the most adverse impacts on vegetation since the fewest acres would be excluded from ROW actions. The Proposed RMP and Alternatives C and D would petition to withdraw similar numbers of acres with the Proposed RMP withdrawing the most acres.

Impacts from Coal Management. Current management identifies 28,500 acres of the federal mineral estate as open to further consideration for coal leasing. All of the identified coal resources within CRVFO are located along the Grand Hogback between Rio Blanco Hill and Glenwood Springs. Of that amount, 1,600 acres were found to be unacceptable for coal leasing based on multiple-use conflicts.

If coal mining were to occur, impacts on vegetation would be similar to those found below, under Impacts from Fluid Minerals, Alternative A. However, adverse impacts on vegetation would not be as widespread, because coal mining would target only one area in the CRVFO, whereas fluid minerals development would cover a much wider area. This alternative would have the most potential impact on vegetation resources. The Proposed RMP and Alternatives C and D identify no lands as being available for coal leasing or development.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Fluid minerals include oil and gas, oil shale, and geothermal development. Of the fluid minerals, oil and gas would create the greatest adverse impacts on vegetation. Oil shale is not expected to be commercially developed within the CRVFO for 20 years or more, and the likelihood of geothermal development is low, except for cases where it would be used for on-site electrical generation for oil and gas facilities.

Direct impacts associated with oil and gas development include short- and long-term losses of vegetation and biological soil crusts due to clearing of sites to build pads, roads, pipelines, and facilities. Indirect impacts would include soil erosion and compaction, habitat modification and fragmentation (reduced patch sizes of undisturbed vegetation), changes in plant community composition, structure, density, and canopy cover. Disturbed areas serve as niches where invasive weedy vegetation can establish and proliferate. Noxious and invasive weeds may outcompete native vegetation, reducing plant community diversity and ecosystem function. Where noxious weeds such as cheatgrass dominate, this could lead to changes in the fire regime by contributing to more frequent and extensive wildfires, which would further reduce the cover and abundance of those native plant species that do not readily resprout following fire. Vehicular traffic associated with oil and gas development may create fugitive dust and chemical exhaust which could lead to reduced plant vigor by disrupting plant respiratory and photosynthetic functions. Oil and gas activities can also disrupt livestock grazing management (e.g., herding, riding, access to water sources) which can result in poor livestock distribution and indirect adverse effects on vegetation where livestock use becomes concentrated.

Long-term adverse impacts would result from disturbances like roads, portions of pads, and other facilities that would not be reclaimed for the life of the project. Short-term impacts would result from pipelines, which would be reclaimed immediately after installation, and unused portions of pads and roads, which have interim reclamation applied. Past interim reclamation has focused on establishing native grasses to protect soil resources and prevent weed erosion. Recovery of forbs and shrubs from adjacent undisturbed areas may take many years, particularly if the grasses inhibit germination and establishment of other vegetation. Establishment of trees would take even longer. Reclamation efforts often have poor success rates, especially in areas of poor soil and minimal precipitation, resulting in loss of species diversity, increase in annuals, decrease in forbs and woody plants, and an increase in weed species.

Closing areas to fluid minerals leasing and the application of NSO stipulations to open areas would limit adverse impacts on vegetation. However, federal oil and gas regulations prevent the BLM from applying new or additional lease stipulations that would be developed through this planning effort to existing leases. The BLM could add more stringent stipulations to new leases under the RMP revision.

Federal regulations do allow the BLM to apply other protection measures in conjunction with planning and approving oil and gas projects. When making a decision regarding discrete surface-disturbing activities following site-specific environmental review, BLM has the authority to impose reasonable measures to minimize impacts on other resource values, including restricting the siting or timing of lease activities (43 CFR 3100; 43 CFR 3160; IBLA 2006-213, 2006-226; IBLA 2008-197, 2008-200).

Site-specific mitigation measures supported by NEPA analysis are added during the implementation phase as conditions of approvals to the project. Under all alternatives, the BLM would utilize COAs attached to all APDs to reduce impacts on vegetation. COAs for reclamation would include requirements for seeding timelines, topsoil salvage, seedbed preparation, native seed mixes, mulching, fencing, and reclamation monitoring. Operators would be required to monitor their reclaimed areas on BLM land, and submit an annual status report to the CRVFO. Follow-up work (e.g., reseeding and weed control) would be required on those areas where reclamation did not meet BLM objectives. COAs would increase the likelihood of successful reclamation and would benefit vegetation.

Under Alternative A, a total of 672,500 acres of federal mineral estate would be open to oil and gas development. This alternative would potentially allow for the most oil and gas activity and the most acres of disturbance. Approximately 28,700 acres would be closed to fluid minerals leasing, and NSO stipulations would be applied to 173,600 acres. Stipulations that exclude oil and gas development and other surface-disturbing activities would provide a long-term benefit for vegetation.

Alternative A would close the fewest acres to oil and gas development of any alternative, and would provide the least protection for vegetation through NSO stipulations, followed by Alternative D. Alternative C would close the most acres. The Proposed RMP would open more acres than Alternative C, but would protect more of these areas with NSO stipulations.

An important consideration in the future development of gas resources is the acres (147,500) identified as having high potential for the occurrence of oil and gas on BLM surface lands and federal mineral estate. It is estimated that 99 percent of future drilling will occur in the areas identified as having a high potential for the occurrence of oil and gas resources which lie west of the Grand Hogback. Of the 147,500 acres of BLM mineral estate in this high potential area, 129,900 acres have been leased and are currently being developed under existing stipulations. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling is likely to occur in areas of medium or low potential, and no drilling is predicted in the areas identified as no-known potential.

Within the high potential area, 17,600 acres are presently unleased. In Alternatives A and D, all of these unleased acres would be available for leasing. The Proposed RMP would close the unleased portions of Garfield Creek State Wildlife Area (2,500 acres) to fluid minerals leasing. Alternative C proposes to close the Grand Hogback Unit managed to protect wilderness characteristics, as well as the unleased portions of Garfield Creek State Wildlife Area (6,000 acres total). Alternative C, followed by the Proposed RMP, would be slightly more beneficial in reducing energy development on vegetation resources than Alternatives A and D.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts on vegetation from locatable, salable, and non-energy leasable minerals would be similar to those discussed above for fluid minerals. However, the potential for development of locatable minerals, mineral materials, and non-energy leasable minerals is much less than for fluid minerals. Impacts would likely be localized and result in fewer total disturbed acres than oil and gas development. Therefore, impacts on vegetation would be less than impacts from fluid minerals activities.

Locatable minerals include gypsum, gold, copper, and limestone. Locatable minerals exploration up to 5 acres in size would be exempt from BLM stipulations and from regulations to protect vegetation and prevent ground disturbance. Such exploration could create the greatest adverse impacts on vegetation if widespread mining were to occur. Plan of operations level development (greater than 5 acres) would be addressed in site-specific environmental analyses to protect vegetation and other resources. Within the CRVFO, the only current mining activity for locatable minerals is for gypsum and limestone. There is an active gypsum mine just north of the town of Gypsum and a limestone quarry above Glenwood Springs. However, it is anticipated that the demand for these resources would increase in the future. All lands within the CRVFO would be open to mining claims, except for 34,500 acres that would be recommended to the Secretary of Interior for withdrawal.

Mineral materials (or salables) include sand and gravel, topsoil, moss rock, cinders, decorative rock, and others. Activity for salables is primarily limited to local commercial and residential uses; hence, disturbances associated with obtaining salables would be smaller in scale than for locatable minerals. Salables are subject to any stipulations and COAs that the BLM would apply to protect vegetation and prevent ground disturbance.

Non-energy leasable minerals, such as sylvite and halite, are not expected to be developed commercially over the next 20 years. Currently, no leases or development activities exist for non-energy leasable minerals in the CRVFO. However, if development were to occur, non-energy leasable minerals would be subject to stipulations and COAs, similar to the process for oil and gas development, because they are both governed by the Mineral Leasing Act of 1920.

Withdrawing areas from mineral development or applying NSO stipulations would be beneficial to vegetation, preventing impacts within those areas. Alternative A would pose the greatest risk of adverse impacts to vegetation, as this alternative would petition to withdraw substantially fewer acres (34,500 acres) from consideration for these activities than any other alternative.

Impacts from Areas of Critical Environmental Concern Management. Alternative A would designate six ACECs, encompassing 27,000 acres. Existing stipulations to protect the relevant and important physical and biological values from surface disturbances would also indirectly protect vegetation resources. In most ACECs, vegetation treatments designed to improve ecological health or reduce hazardous fuel loading of vegetation communities would be allowed if they maintained or enhanced the relevant and important values of the ACEC. In certain situations, this could create a challenge to implementation of treatments to achieve ecological objectives and desired conditions for forest and woodland communities.

Alternative A would designate more acres of ACECs than under Alternative D but would designate many fewer acres than under the Proposed RMP and Alternative C. Alternative C would designate nearly three times the acreage of ACECs as Alternative A. Alternative A would protect more vegetation from surface-disturbing activities than under Alternative D, but less than under the Proposed RMP and Alternative C.

Impacts from Wilderness Study Area Management. The CRVFO currently has four designated WSAs, totaling 27,700 acres. WSAs are managed to preserve their wilderness characteristics and to prevent activities that would impair wilderness values. Permitted activities in WSAs must be temporary uses that create no new surface disturbance or permanent placement of structures.

Under all alternatives, the WSAs would be closed to fluid minerals leasing. Although not officially covered by an NSO under the current plan, the nonimpairment criteria for WSAs would preclude all or most surface-disturbing activities in the area. WSAs would protect vegetation by minimizing disturbances from recreation and travel management, mineral development, and lands and realty actions, which would have a long-term beneficial impact on vegetation.

WSAs would allow for small-scale vegetation treatments (e.g., weed treatments) that would enhance wilderness characteristics but would rely mainly on natural processes (e.g., fire) to meet ecological objectives and desired conditions.

WSA management is generally the same under all alternatives and would have similar beneficial impacts on vegetation. The exception is that the Proposed RMP and Alternatives C and D have additional prescriptive management should Congress release any of the existing WSAs from wilderness consideration.

Impacts from Wild and Scenic Rivers Management. To be eligible for Wild and Scenic River designation, a river or stream segment must possess one or more ORVs, must have sufficient water quality to support those values, and must be free flowing. ORVs could be scenic, recreational, geological, fish related, wildlife related, historic, cultural, botanical, hydrological, paleontological, or scientific. Under Alternative A, all stream segments would be identified as eligible for inclusion in the NWSRS, and the CRVFO would apply interim protections to preserve their free-flowing condition, water quality, and the ORVs for which they were deemed eligible. The interim protections would benefit forest and woodland riparian vegetation by restricting surface-disturbing activities within 0.25 mile of the river. Alternatives A and C would provide protections for 13 stream segments, which is more than Alternative D or the Proposed RMP.

However, in many cases, the protections afforded riparian and adjacent upland vegetation under WSR interim management would be redundant or additive to existing protective measures for major river corridors and other riparian resources identified in Table 2-2. BLM policy guidance also directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Impacts from Transportation and Facilities Management. Road maintenance activities, such as blading or dozing, would adversely affect vegetation by uprooting, burying, or undercutting vegetation, increasing dust and increasing erosion from surface runoff. Impacts would be confined to the road corridor and associated drainage ditches and runoff features. Impacts would be similar in all alternatives.

Alternative B (Proposed RMP)

Impacts to forest and woodland vegetation from cultural resource management, wildland fire management, coal management, WSA management, and transportation and facilities management would be the same as or similar to those under Alternative A. Impacts from management of all other resources and uses would be as described below.

Impacts from General Vegetation Management. Under the Proposed RMP, vegetation management objectives and actions in forests and woodlands would include those listed under Alternative A, plus the following: managing for a healthy diversity of native plant communities in a variety of successional stages across the landscape; maintaining a mix of age-classes in forests and woodlands, including old-growth forest

and woodlands, within the natural range of variability; stimulating sprouting and sapling establishment in aspen stands; and applying various treatments to reduce the risk and spread of disease vectors.

Creating more diverse age-class structures in forests and woodlands would help limit the spread of disease and insect outbreaks, because old or decadent trees are typically more susceptible to these invasions than younger ones. Younger aspen stands could help modify fire behavior due to the high live-fuel moisture content of the herbaceous understory cover acting as a fire break. A variety of age-class structures for wildlife would benefit more species by providing different niches for use.

Maintaining and promoting old-growth habitat would benefit wildlife by providing a unique habitat for species that prefer older forests. Snags would provide nesting, foraging, and denning sites; fallen tree trunks and large branches would provide shelter and foraging grounds. Old-growth forests can serve as a source of biological restoration, serving as genetic reservoirs. Because they have survived under changing conditions, old-growth trees may contain genes that would enable them to survive global climate change and new diseases better than their neighbors. These stands could be invaluable for the restoration of commercial forests, agricultural lands, and urban forests (MDNR 2010).

The Proposed RMP and Alternatives C and D would provide more benefit to forest and woodland vegetation than under Alternative A by emphasizing weed treatments, timber management, thinning of dense stands of pinyon-juniper and other conifers, prescribed fire and unplanned fire managed for resource benefit, and restoration. These alternatives also would propose specific direction with clearly defined objectives for old-growth maintenance and restoration, would create more diverse age-class structure in lodgepole pine and aspen, and would manage conifer species to mimic natural stand conditions and regeneration processes.

Impacts from Soils Management. Soil protections that exclude surface-disturbing activities, such as proposed CRVFO-NSO-1 for steep slopes greater than 50 percent and CRVFO-NSO-2 for debris flow zones, would have a beneficial impact on vegetation by minimizing direct loss of vegetation, reducing soil erosion, and reducing the risk of weed invasion.

The Proposed RMP and Alternatives C and D would provide more protection to vegetation than under Alternative A because CRVFO-NSO-1 would be applied to all surface-disturbing activities, including pipelines and facilities not associated with oil and gas.

Impacts from Water Resource Management. Under the Proposed RMP and Alternatives C and D, the current NSO stipulation that excludes surface-disturbing activities within 0.5 mile of major river corridors would be maintained. The NSO stipulation protecting the domestic watersheds of Rifle and New Castle would be expanded to include all public water supplies. These would have a beneficial impact on vegetation by preventing direct impacts and reducing indirect impacts. In addition, under the Proposed RMP, an NSO with a 100-meter buffer (325 feet) around all perennial streams, water bodies, and riparian vegetation would provide additional direct and indirect benefits to forest and woodland vegetation within the buffer zone.

Under this alternative, water resource stipulations would provide more protection to vegetation than any other alternative, because the NSO stipulations would apply to more acres. Alternative C would provide a smaller 50-foot buffer for streamside vegetation which would protect less vegetation from disturbance, and Alternative D would not apply any NSO stipulations to protect perennial streams, water bodies, or riparian vegetation, potentially resulting in the most impacts to vegetation.

Impacts from Fisheries and Aquatic Wildlife Management. Under the Proposed RMP, stipulations to protect fisheries and aquatic wildlife would be similar to those under water resource management in the Proposed RMP. In addition, an NSO would protect the watershed upstream of fish hatcheries. NSO stipulations would provide a beneficial impact on vegetation by restricting surface disturbances that would result in a loss of vegetation cover or changes in species composition.

Under the Proposed RMP and Alternatives C and D, select priority species habitat would be improved by closing and reclaiming selected routes. This would provide a long-term beneficial impact by increasing vegetation cover in previously cleared areas.

Fisheries and aquatic wildlife management in the Proposed RMP would protect substantially more vegetation from surface disturbance than under Alternatives A and D, and slightly more than under Alternative C.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife management actions under the Proposed RMP would cover many more acres with NSO stipulations than under Alternatives A and D, providing more protection to vegetation by limiting surface-disturbing activities. NSO stipulation CRVFO-NSO-7 would protect 58,500 acres of priority wildlife habitat and all state wildlife areas. The protection of priority wildlife habitat, which contains healthy, productive plant communities, would be a long-term beneficial impact on vegetation.

Habitat improvement projects for forests and woodlands would target aspen stands to stimulate sprouting and regrowth in decadent patches, and pinyon-juniper woodlands and other forest stands to reduce canopy cover and promote variation in age-classes. Adverse impacts on vegetation could occur if habitat improvement projects failed to improve vegetation and resulted in weed invasion or expansion.

The Proposed RMP would provide more benefit to vegetation than under Alternatives A and D because NSO stipulations to protect terrestrial wildlife habitat would exclude surface disturbance from more acres. Alternative C would identify and protect several more core wildlife areas, resulting in somewhat greater protection for vegetation than the Proposed RMP.

Impacts from Special Status Species Management. Numerous NSO stipulations for special status species habitat would protect vegetation from surface-disturbing activities, resulting in a beneficial long-term impact. Under the Proposed RMP, NSO stipulations for special status species would protect more acres than under Alternatives A and D, and slightly fewer than under Alternative C, providing long-term benefits to vegetation resources.

In addition, the Proposed RMP and Alternative C would implement management objectives for the restoration of special status species habitat. This would have a beneficial impact by reducing undesirable vegetation and restoring native species diversity in these areas.

Impacts from Visual Resource Management. The impacts from VRM decisions are primarily associated with limitations on surface-disturbing activities intended to maintain the scenic values of public lands.

VRM Class I and Class II designations do not preclude land use activities, but the level of change to the landscape would be low. However the stipulations (e.g., CRVFO-NSO-22, CRVFO-CSU-9) applied to the VRM classes do constrain surface-disturbing activities. Based on the acres of NSO and CSU stipulations to

protect visual resources, the Proposed RMP is estimated to benefit vegetation the most, followed closely by Alternative C.

At the implementation level, forest and woodland treatments in VRM Class I and Class II areas may be precluded or would require special design features to mitigate for scenic values and achieve VRM Class objectives. Forest health could be adversely affected by VRM Class I and Class II areas if those classifications prevent implementation of forest and woodland treatments to restore forest health or productivity.

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP, approximately 34,400 acres of BLM land would be managed for the protection of wilderness characteristics. These lands were chosen because they exhibited a high degree of naturalness, provided outstanding opportunities for solitude and primitive and unconfined types of recreation, and contained unique ecological, geological, or other features. Most actions proposed for these lands would provide long-term benefits to vegetation.

Decisions would include closing the areas to fluid minerals leasing, limiting motorized and mechanized travel to existing routes, and applying an NSO stipulation CRV-NSO-43 to constrain surface-disturbing activities. Management of these lands would allow for small-scale vegetation treatments (e.g., weed treatments) that would enhance wilderness characteristics, but would mainly rely on natural processes (e.g., fire) to meet ecological objectives and desired conditions. Proposed management stipulations would provide greater protection for vegetation than Alternatives A and D, which do not manage any lands for wilderness characteristics, and slightly less protection than Alternative C, which would manage 45,900 acres for the protection of wilderness characteristics.

Impacts from Forestry Management. Proposed forestry management would have similar impacts as discussed in Alternative A. Alternative A identifies more acres for intensive management of commercial forest and woodlands, but in practice, current management of commercial timber has been limited and is anticipated to continue at approximately the same degree and scope in the Proposed RMP as well as in Alternatives C and D.

The Proposed RMP would apply limited management to 352,800 acres of forests and woodlands. These actions could include thinning or selective cutting, among others, to improve forest productivity and reduce the potential or scope of insect and disease infestations and large, high-intensity wildfires. Impacts would be similar to Alternative A, but would affect more acres. The Proposed RMP would also prohibit commercial timber harvest on 123,300 acres of forest and woodland to protect values within ACECs, WSAs, WSRs, lands managed for wilderness characteristics and recreation opportunities. The Proposed RMP and Alternatives C and D would actively manage similar numbers of acres. However, Alternative C would prohibit harvest of more acres of forest and woodlands, and Alternative D would prohibit harvest of fewer acres than the Proposed RMP. The Proposed RMP would likely result in the greatest long-term benefit to forests and woodlands by allowing some forest management to maintain or improve forest health while protecting important values within areas of special designations.

Impacts from Livestock Grazing Management. Livestock grazing management actions would open 441,600 acres to grazing and close 63,600 acres. One active allotment (County Line) would be closed due to noncompliance with land health standards from livestock grazing. Closing this allotment would benefit vegetation, allowing it to rest and return to a more native plant community; however, cheatgrass would

continue to be the dominant vegetation cover on this allotment unless vegetation treatments were able to successfully reduce weed cover and restore the native plant community.

Direct and indirect impacts from grazing would be similar to Alternative A except for the degree of impact. Since fewer acres would be available to livestock under this alternative compared with Alternative A, adverse impacts on vegetation would be less.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP, five SRMAs (62,800 acres) and six ERMAs (40,900 acres) would be designated. Each area would have specific recreation objectives and provide select user experiences. The SRMAs would have an NSO stipulation applied to limit ground-disturbing activities in these areas to maintain recreational settings and achieve desired recreational opportunities and outcomes. However, in those SRMAs that emphasize accommodating or attracting higher numbers of visitors, or require an expansion of recreation trails and facilities, these activities would result in a greater loss of vegetation as well as increased erosion and sedimentation, increased potential for noxious weed invasion or expansion, and increased habitat fragmentation. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMA areas is commensurate with the management of other resources and resource uses. New routes or other infrastructure would be considered in an interdisciplinary context in concert with other resource values and uses.

Under all alternatives, adverse impacts from recreation management on vegetation would be greater than beneficial impacts. Proposed management actions under the Proposed RMP would result in fewer impacts on vegetation than under Alternatives A and D, but more than under Alternative C.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP and Alternatives C and D, there would be no lands open to cross-country OHV travel, and motorized and mechanized travel would be allowed only on designated routes. Limiting vehicles to designated routes would confine impacts on areas that are already disturbed and hardened, and would confine impacts on vegetation over a smaller area. The Proposed RMP and Alternative D close a similar number of acres to motorized or mechanized travel, resulting in similar impacts. Alternative C would close slightly more acres to motorized or mechanized travel.

In addition, the Proposed RMP would decommission or obliterate 53 miles of routes, which would provide a long-term beneficial impact by increasing vegetation cover, reducing erosion, and reducing miles of motorized and mechanized vehicle use, which is a primary vector for the spread of weeds. Alternative C would decommission or obliterate more routes than any other alternative, resulting in the most beneficial impacts to vegetation. Under all alternatives, trails and travel management would have adverse impacts on vegetation. The Proposed RMP would have fewer impacts on vegetation than Alternatives A or D, but more than C.

Impacts from Lands and Realty Management. Impacts from the lands and realty program on vegetation would be less under the Proposed RMP than under Alternative A. The Proposed RMP would exclude 39,400 acres from ROW development, nearly double what current management (Alternative A) provides and similar acreage to that in Alternatives C and D.

The Proposed RMP would retain high-quality BLM lands for long-term management such as WSAs; ACECs; proposed, candidate, and listed species habitat; priority wildlife habitat; and perennial streams. These lands

contain high quality plant communities, so retention of these areas would result in a beneficial long-term impact on vegetation. Disposal of federal lands could create adverse impacts if vegetation were cleared from the land and if it were paved or permanently altered by development. Retaining lands under federal ownership would typically benefit vegetation because the BLM would aim to protect the ecological health of vegetation communities. Under the Proposed RMP, 162,900 acres would be petitioned for withdrawal from mineral entry for locatable exploration or development. This alternative is more protective than Alternatives A or D but slightly less than Alternative C, and would limit the scope and intensity of identified impacts on forest and woodland vegetation.

Under all alternatives, adverse impacts from lands and realty actions on vegetation would be greater than beneficial impacts. The Proposed RMP would result in the fewest adverse impacts by retaining the most acres in federal management and by excluding from ROW development nearly as many acres as Alternative C. Alternative C would have the most acres of ROW exclusion areas, but would identify fewer acres for retention, potentially resulting in more impacts than the Proposed RMP. Alternative D would exclude nearly as many acres from ROW development as the Proposed RMP and Alternative C, but would identify the fewest acres for retention.

Impacts from Coal Management. Under the Proposed RMP and Alternatives C and D, no lands are identified as suitable for coal leasing or development. There would be no impacts to vegetation from development of coal leases. Alternative A identifies 28,500 acres as open to consideration and would have the greatest potential for impacts to vegetation.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The types of impacts associated with oil and gas development would be the same under all alternatives. The Proposed RMP would close approximately 98,100 acres to fluid minerals leasing and protect another 355,700 acres with NSO stipulations. This is less beneficial to vegetation than Alternative C, which would close 179,700 acres to leasing and apply an NSO stipulation to an additional 356,700 acres. Alternative D would close more acres to leasing and protect more acres with NSO stipulations than Alternative A, but fewer than the Proposed RMP or Alternative C.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under the Proposed RMP, a total of 181,200 acres of locatable minerals would be recommended for withdrawal, including ACECs and WSAs. Approximately 162,500 acres of salables and non-energy leasable minerals would be closed to minerals development.

The types of impacts would be the same as those described under Alternative A, would be adverse, and would affect both the short term and long term. The Proposed RMP would withdraw more acres from minerals development than under Alternatives A and D, but less than under Alternative C. Therefore, the Proposed RMP would result in fewer impacts on vegetation than under Alternatives A and D, but more than under Alternative C.

Impacts from Areas of Critical Environmental Concern Management. The Proposed RMP would designate 11 ACECs (46,400 acres). Management prescriptions and stipulations to protect the ACEC values would also protect vegetation resources in these areas from disturbance. Most ACECs would allow vegetation treatments or prescribed fire as long as the ACEC values would be maintained or enhanced. Some ACECs designated for scenic or cultural values may preclude vegetation treatments that cause surface disturbances or

change the scenic character of the landscape. This could limit treatment options and present a challenge for reaching desired vegetation objectives.

The Proposed RMP would designate more acres of ACECs than under Alternatives A and D, but would designate many fewer acres than under Alternative C (approximately 33,400 fewer acres). The Proposed RMP would protect more vegetation from surface-disturbing activities than under Alternatives A and D, but substantially less than under Alternative C.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, Deep Creek segment 2 ("wild") and Deep Creek segment 3 ("recreational") would be determined as suitable. An NSO stipulation would be applied to suitable stream segments classified as "wild," a CSU stipulation would be applied to suitable stream segments classified as "scenic" or "recreational." These stipulations would constrain surface-disturbing activities that could result in loss of vegetation or changes in vegetation composition including noxious weed invasion. The Deep Creek segments would also be closed to leasing for fluid minerals. The Proposed RMP would defer a suitability determination on the Colorado River Segments 6 and 7 and rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River segments.

Under the Proposed RMP, the other stream segments would be determined as "not suitable" for designation under the NWSRS, and the interim protections would no longer apply. However, other management actions and stipulations in the Proposed RMP, such as the NSO stipulation for perennial streams, water bodies, fisheries, and riparian areas and NSO stipulations for ACECs, would adequately protect the ORVs.

The Proposed RMP would provide similar protection for vegetation as Alternatives A and C. The Proposed RMP would provide more protection for vegetation than under Alternative D, which would not recommend any eligible segments as suitable for designation and would remove all stream segments from further protection under the Wild and Scenic Rivers Act.

Alternative C

Impacts to forest and woodland vegetation from wildland fire management, cultural resources management, WSA management, and transportation and facilities management would be the same as or similar to those under Alternative A. Impacts to forest and woodland vegetation from soils management, vegetation management, visual resource management, forestry management, and coal management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources and uses would be as described below.

Impacts from Water Resources Management. Management protections for water resources would be similar in Alternative C as in the Proposed RMP, except that the NSO for 100 meters (325 feet) from all perennial streams, water bodies, and riparian areas, would be changed to an NSO with a 50-foot buffer for all hydrologic features. This would protect fewer acres of vegetation than in the Proposed RMP, but more than Alternatives A or D.

Impacts from Fisheries and Aquatic Wildlife Management. Under Alternative C, management protections for fisheries and aquatic wildlife management would be similar to the Proposed RMP except that the NSO for 100 meters (325 feet) from all perennial streams, water bodies, and riparian areas, would be

changed to an NSO within 100 meters only for perennial waters. This would protect fewer acres of vegetation than in the Proposed RMP, but more than Alternatives A or D.

In addition, the Proposed RMP and Alternatives C and D would improve select priority species habitat by closing and reclaiming selected routes, which would provide a long-term beneficial impact on vegetation.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife management actions under Alternative C would provide beneficial effects on vegetation. Impacts would be similar to the Proposed RMP, except that several more areas would be identified as core wildlife habitats and would be protected with NSO stipulations. Protecting core wildlife areas, which contain healthy, productive plant communities, would provide a long-term beneficial impact on vegetation. Alternative C would have the most beneficial impact on vegetation of all the alternatives by limiting surface-disturbing activities on the most acres.

Impacts from Special Status Species Management. Under Alternative C, NSO stipulations for special status species would protect the most acres of any alternative, providing the greatest benefit to vegetation. Additionally, under the Proposed RMP and Alternative C, management goals for special status species would include restoring potential habitat to suitable habitat. This would have a beneficial impact by reducing non-native vegetation in these areas and improving the diversity and condition of native vegetation.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, approximately 45,800 acres of land would be managed for wilderness characteristics. These lands would be protected with an NSO stipulation and would be closed to fluid minerals leasing. Management for wilderness characteristics would benefit vegetation by restricting surface-disturbing activities that could result in a direct loss of vegetation, reduction of vegetation cover, or increase in noxious weeds and invasive plants. Alternative C would protect wilderness characteristics in six areas (45,800 acres) and would directly provide the most protection to vegetation. The Proposed RMP would protect five areas (34,500 acres) and would result in less benefit than Alternative C. Alternatives A and D do not manage any lands for wilderness characteristics.

Impacts from Forestry Management. Under this alternative, identified impacts and long-term benefits associated with forestry management would be the same as those addressed under Alternative A, and the scope and intensity of forestry management is similar to the Proposed RMP. However, under this alternative, fewer acres would receive limited management and more acres would be excluded from commercial timber harvest, resulting in fewer short-term impacts, but potentially resulting in a long-term decline in forest health where insects and disease outbreaks are not treated and where fuel buildups increase the potential for large-scale wildfires.

Impacts from Livestock Grazing Management. Livestock grazing management actions would close 77,400 acres to livestock grazing within 58 allotments, the most of any alternative. Three active allotments would be closed under this alternative: County Line, Smith Gulch, and Alkali Gulch. These allotments would be closed for noncompliance with land health standards and County Line and Smith Gulch would also be closed to protect threatened and endangered species. Closing these allotments would have a beneficial impact on vegetation, allowing them to rest and improving the diversity and cover of the native vegetation.

Adverse impacts on vegetation would be the least compared with other alternatives, due to more acres closed to grazing under Alternative C.

Impacts from Recreation and Visitor Services Management. Alternative C would designate only two SRMAs (23,800 acres), the least of all alternatives. The same NSO stipulations under the Proposed RMP would apply to SRMAs in Alternative C. These SRMAs —Red Hill and Upper Colorado River—would be managed for nonmotorized recreation and for a minimal increase in miles of routes or other infrastructure, which would reduce impacts on vegetation.

Alternative C would designate nine ERMAs, the most of any alternative. Some of these ERMAs would be managed for an increase in the number of miles of routes or other infrastructure, which would result in loss of vegetation. However, riparian areas would be protected by an NSO stipulation and BMPs would be applied to mitigate impacts to upland vegetation.

In general, adverse impacts from R&VS on vegetation would be greater than beneficial impacts in all alternatives. Recreation management in Alternative C would emphasize less intensive use and development of fewer miles of new roads and trails than any other alternative, resulting in fewer impacts on vegetation.

Impacts from Comprehensive Trails and Travel Management. Alternative C would create fewer impacts on vegetation than under the Proposed RMP and Alternative D by closing the most acres to OHV use and by closing or obliterating more routes than the other alternatives. Alternative C would create far fewer adverse impacts on vegetation than under Alternative A because OHVs would be limited to designated routes only.

Impacts from Lands and Realty Management. Impacts on vegetation from the lands and realty program would be similar to those under the Proposed RMP.

Alternative C would identify fewer acres for retention under BLM management than the Proposed RMP, but more acres than Alternatives A or D. As with the Proposed RMP, Alternative C would seek to retain occupied special status species habitat, wetlands and riparian areas, and lands managed for wilderness characteristics outside existing WSAs. Retaining lands under federal ownership would typically benefit vegetation, because the BLM would manage these lands to protect the ecological health of vegetation communities. These areas contain high-quality plant communities, so retention of these lands would result in a beneficial long-term impact on vegetation.

Alternative C would designate the most acres of ROW exclusion areas (39,900 acres), potentially allowing the least acres of surface disturbances. Alternative C would have similar adverse impacts on vegetation as the Proposed RMP, but fewer adverse impacts than Alternatives A and D.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Alternative C would close 179,700 acres of federal mineral estate to oil and gas development (over six times as much as Alternative A). Additionally, 365,700 acres that are open to fluid minerals leasing and development would be protected with an NSO. As a result, this alternative would protect more acres of vegetation from surface disturbances associated with development than any other alternative.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative C, a total of 179,400 acres of locatable minerals would be recommended for withdrawal, including ACECs, WSAs, and areas managed for wilderness characteristics outside existing WSAs. Approximately 323,100 acres of salables and non-energy leasable minerals would be open to mineral development.

The types of impacts would be similar to those found under Fluid Minerals, Alternative A. Impacts would be adverse and both short-term and long-term. Alternative C would withdraw the most acres of any alternative, providing the greatest benefit to vegetation.

Impacts from Areas of Critical Environmental Concern Management. Alternative C would designate the most acres of ACECs: approximately 79,800 acres in 16 ACECs. Management prescriptions to limit surface disturbances would provide direct, long-term benefits to vegetation.

Alternative C would protect the most vegetation of any alternative by designating the most acres of ACECs.

Impacts from Wild and Scenic Rivers Management. Alternative C would close two suitable stream segments to fluid minerals leasing and apply constraints in the form of NSO and CSU stipulations on surface-disturbing activities. The stipulations would extend 0.25 mile on both sides of the stream centerline, which would provide protection to vegetation by excluding oil and gas development and other surface-disturbing activities. This would limit most surface-disturbing activities and protect riparian vegetation along these streams.

Alternatives A and C would provide the most protection for vegetation by constraining surface-disturbing activities within 0.25 mile of eligible or suitable stream segments. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Alternative D

Impacts to forest and woodland vegetation from fisheries and aquatic wildlife management, cultural resource management, wildland fire management, visual resource management, coal management, WSA management, and transportation and facilities management would be the same as or similar to those under Alternative A. Impacts to forest and woodland vegetation from soils management, vegetation management, and coal management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources and uses would be as described below.

Impacts from Water Resources Management. Alternative D would implement CRV-NSO-3 for major river corridors and CRV-NSO-4 for designated municipal watersheds, which would have a beneficial impact on vegetation by reducing direct and indirect impacts from surface-disturbing activities.

Alternative D would provide more protection to vegetation than under Alternative A because CRV-NSO-4 would apply to all designated municipal watersheds, as opposed to applying only to the Rifle and New Castle watersheds. Alternative D would provide much less protection than under the Proposed RMP and Alternative C, because Alternative D would not implement CRVFO-NSO-5, which provides specific protection for other riparian and wetland areas.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife management under Alternative D would implement the fewest NSO stipulations of any alternative. Alternative D would provide the least benefit to vegetation of all alternatives, preventing the least amount of surface disturbance and potential loss of vegetation.

Impacts from Special Status Species Management. Alternative D would protect the least amount of vegetation with NSO stipulations, providing the least benefit to vegetation of any alternative.

Impacts from Forestry Management. Alternative D would apply intensive management to 32,200 acres of forest and woodlands to improve forest health and vigor, and to provide wood products. This number of acres constitutes fewer than Alternative A but more than the Proposed RMP or Alternative C. Limited management (thinning and other forest health treatments and techniques) would occur on 396,400 acres, the most of any alternative. Under Alternative D, impacts on forest health and vigor would be the most beneficial over the long term, substantially greater than under Alternative A, and slightly greater than the Proposed RMP and Alternative C.

Commercial timber harvest would be prohibited on 76,600 acres of forest and woodlands under Alternative D, which is less than under the Proposed RMP and Alternative C. Prohibitions on commercial harvesting, would protect vegetation and soils in the short-term but may create an adverse long-term impact on forest health and vigor. Harvesting acts as a treatment for insects and disease and for managing species composition and age distribution, while providing wood products. The long-term impacts on forest health from prohibiting timber harvest in areas of special designations would be substantially greater than under Alternative A, but less than the impacts under the Proposed RMP and Alternative C.

Immediate salvage or accelerated harvests would occur following adverse events under Alternative D, the same as under the Proposed RMP. Alternative A would not provide for either of these actions, and Alternative C would allow for salvage operations but not for accelerated harvests. Consequently, the Proposed RMP and Alternative D would have the greatest beneficial long-term impact on forest health and vigor and supply of wood products.

Conversely, the alternative that allows the most harvest and other forest treatments would create the most short-term surface disturbance and would increase the risk of weed invasion.

Impacts from Livestock Grazing Management. Livestock grazing management actions would open 442,200 acres to grazing (closing 63,000 acres) under Alternative D. Most of the allotments to be closed are currently vacant, but four active allotments—Alkali Creek, Alkali Gulch, County Line, and Dry Creek/Pete and Bill—would be closed. Alkali Creek, Alkali Gulch, and County Line allotments would be closed for noncompliance with land health standards. Closing these allotments would have a beneficial impact on vegetation.

Alternative A would have the most adverse impacts on vegetation since the most acres would be open for grazing, followed by Alternative D, the Proposed RMP, and Alternative C, respectively.

Impacts from Recreation and Visitor Services Management. Alternative D would provide for the most visitor use and development by designating 63,500 acres of SRMAs. More trails and campgrounds would be constructed under this alternative. The same NSO stipulations as under the Proposed RMP and Alternative C would apply.

Under all alternatives, adverse impacts from R&VS on vegetation would be greater than beneficial impacts. Impacts on vegetation would be similar to those under Alternative A, except for the degree. Alternative D would create the most adverse impacts on vegetation of any alternative.

Impacts from Comprehensive Trails and Travel Management. Similar to the Proposed RMP and Alternative C, Alternative D would have no land open to cross-country travel. However, fewer acres under Alternative D would be closed to OHV use than under the other alternatives.

Alternative D would create more impacts on vegetation than under the Proposed RMP and Alternative C by closing the least acres to OHV use, and by decommissioning or obliterating fewer miles of routes than under the Proposed RMP and Alternative C. Alternative D would result in far fewer adverse impacts on vegetation than under Alternative A because OHVs would be limited to designated routes.

Impacts from Lands and Realty Management. Alternative D would designate 39,100 acres of ROW exclusion areas, 18,300 acres more than Alternative A, 300 acres less than under the Proposed RMP, and 800 acres less than under Alternative C. Beneficial impacts on vegetation would be greater than Alternative A but slightly less than the Proposed RMP and Alternative C. ROW developments would have adverse, direct and indirect, long-term impacts on vegetation.

Alternative D would designate the fewest acres for retention of any alternative, potentially resulting in the most adverse impacts on vegetation.

Alternative D would result in fewer adverse impacts on vegetation than under Alternative A because it would exclude more acres from ground disturbances associated with ROW development. The Proposed RMP and Alternative C would result in slightly fewer adverse impacts than under Alternative D, because they would exclude more acres from ROW actions.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under Alternative D, approximately 52,800 acres would be closed to fluid minerals leasing, and another 245,300 acres would be subject to NSO stipulations. Restrictions that exclude oil and gas development and other surface-disturbing activities would provide a beneficial long-term impact on vegetation.

Impacts from oil and gas development would be similar to Alternative A, and greater than the Proposed RMP and Alternative C.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative D, 132,700 acres would be recommended for withdrawal from locatable mineral development, including some ACECs. A total of 27,700 acres would be closed to mineral material disposal.

Impacts would be adverse and both short-term and long-term. Alternative D would withdraw more acres than under Alternative A, but fewer than under the Proposed RMP, and substantially fewer acres than under Alternative C. Therefore, Alternative D would create fewer impacts on vegetation than Alternative A but more than the Proposed RMP and Alternative C.

Impacts from Areas of Critical Environmental Concern Management. Alternative D would designate three ACECs (20,200 acres), the fewest number and acres of any alternative. Management prescriptions to limit surface disturbances would provide direct, long-term benefits to vegetation. Alternative D would provide the least protection for vegetation of any alternative by designating the least amount of acres as ACECs.

Impacts from Wild and Scenic Rivers Management. All eligible stream segments would be determined to be unsuitable for designation under Alternative D. No stipulations to exclude or limit surface disturbances would be implemented so there would be no benefit to vegetation.

Cumulative Impacts

Potential cumulative impacts on forest and woodland vegetation would occur from a combination of BLM and non-BLM activities and land uses occurring both within the planning area boundary and on public and private lands immediately adjacent to the boundary. Surface disturbance within the CRVFO from non-BLM actions, such as from permittees (e.g., oil and gas companies), was anticipated to be substantially greater than surface disturbance from BLM actions (e.g., recreation development). For the most part, soil disturbances would be revegetated or reclaimed, which would reduce bare ground and decrease the risk of weed invasion and spread; however, restoration efforts can have poor success rates, with loss of species diversity, increase in annuals, decrease in perennials and woody plants, and an increase in weed species.

Some impacts would be direct, while others would be indirect and affect vegetation through a change in another resource. Direct impacts on upland vegetation are considered to include disruption or removal of rooted vegetation, resulting in a reduction in areas of native vegetation, reduction of total numbers of plant species (species richness) within an area, and reduction or loss of total area, diversity, structure, or function of wildlife habitat.

Because most direct impacts on vegetation are the result of physical ground disturbance, these impacts are usually analyzed in terms of relative area of disturbance. Direct impacts on vegetation would result primarily from oil, gas, and other minerals development; vegetation treatments and forestry management; ROW development; grazing by livestock and wildlife species; wildland and prescribed fire; construction of roads, trails, and recreation facilities; and cross-country OHV use. The combination of past, present, and future surface-disturbing activities would result in cumulative impacts on vegetation throughout the CRVFO. Each disturbance increases the risk of weed invasion and disrupts the spatial continuity of vegetation communities, thereby fragmenting habitat.

A number of indirect impacts on vegetation resources could result from proposed management actions. Potential indirect impacts include disruption or reduction of pollinator populations, loss of habitat suitable for colonization due to surface disturbance, introduction of invasive and noxious weeds by various vectors or conditions that enhance the spread of weeds, and general loss of habitat due to surface occupancy, surface compaction, or trampling. Failed reclamation or mitigation may also cause indirect impacts on these resources.

Past fire suppression has contributed to increasing pinyon-juniper encroachment and to a concurrent decrease in the extent of sagebrush communities. Lack of fire has also contributed to invasion of aspen stands by conifers, contributing to the declining health of aspen stands. Using natural fire managed for resource benefit and vegetation treatments under the proposed alternatives would generally maintain or improve vegetation communities by removing undesired species, increasing species diversity and age-class, and improving vegetation composition and structure. In addition, vegetation treatments and range improvements on lands adjacent to the CRVFO would increase available forage for wildlife populations and livestock in these areas. This would improve the distribution of livestock and wildlife, improving vegetation health by decreasing concentrated impacts from grazing.

As larger tracts of land adjacent to public lands are subdivided, the urban interface and its associated issues (e.g., fragmentation, fire suppression, and spread of weeds) are also expected to grow. The increasing urban interface also constrains BLM's ability to utilize planned and unplanned fire to maintain a healthy vegetation community and a mix of seral stages across the landscape. With additional private land development, some tracts of BLM land may become disconnected or isolated from other native habitats, and ultimately adversely affect the continuity and diversity of vegetation, thereby impacting wildlife. Pressure to use and expand recreation areas is expected to continue as these communities grow. Associated development of roads, trails, and infrastructure to accommodate growing use contributes to habitat fragmentation.

Impacts from oil and gas development would occur both within the CRVFO and on private and public lands adjacent to the planning area. Failure to perform adequate reclamation or avoid riparian/wetland vegetation during development could, in turn, result in indirect impacts on BLM lands through the increased incidence of invasive and noxious weeds and other undesirable plants or transport of eroded soils and sediments. Degradation of these areas would also cause a decrease in the areal extent of natural vegetation communities throughout the larger area.

Although management of livestock grazing within the CRVFO is expected to result in improvements to vegetation resources, the same management on private lands cannot be assumed. Therefore, any potential negative impacts from livestock use in off-site areas—including erosion, siltation, and other impacts on streams, as well as general vegetation degradation and invasive and noxious weed infestations—could negatively affect lands within the planning area.

Cumulative impacts on vegetation would also result from travel on public lands within and surrounding the planning area. In general, public lands receive much greater use than private lands. Therefore, the beneficial road closures and cross-country travel restrictions for motorized and mechanized uses would help offset the anticipated increase in use of both public and private lands and the indirect and direct negative impacts these activities have on vegetation resources.

Invasive and noxious weeds and other undesirable vegetation are assumed to occur at approximately the same densities within and outside the planning area. If unmanaged, the presence of these populations off-site would serve as a constant infestation source for the planning area, especially in areas where human traffic and livestock or wildlife movement can serve to spread weed seeds into new sites, counteracting active and coordinated management within the CRVFO.

Regardless of management actions, direct and indirect, adverse impacts on vegetation resources would result from ongoing human development throughout the general region, which would bring new roads, housing projects, commercial development, and increased recreational use. These impacts would continue on a regional scale and would be in addition to impacts expected from land uses and resource management activities in the planning area. If negative impacts on vegetation continue to increase as expected, the condition of vegetation communities on public lands would become even more important because of their intrinsic value, the biodiversity they represent, and the continuation of the ecological values they support.

Actions on BLM land would implement BMPs to reduce cumulative adverse impacts on vegetation. Any entity causing a permitted ground-disturbing activity would comply with specified reclamation and revegetation practices, as well as annual monitoring and adaptive management of these sites, until the BLM deems success criteria have been achieved.

The potential for adverse cumulative impacts on vegetation would be greatest under Alternative A, which would allow for the most surface disturbance and would protect the fewest acres with protective stipulations. Alternative C would result in the most beneficial cumulative impacts by implementing protective stipulations over the most acres, allowing for the least amount of development, and designating the most acres of ACECs, WSAs, and wilderness outside existing WSAs. The Proposed RMP would provide an intermediate level of protection. Alternative D would create fewer adverse cumulative impacts on vegetation than under Alternative A, due to more acres protected by stipulations, but would allow for the most oil and gas, and recreation development of any alternative.

Vegetation—Rangelands

Alternative A

Impacts to rangeland vegetation from management of other resources under Alternative A would be the same as or similar to those described above for management of forest and woodland vegetation under Alternative A, except as described below.

Impacts from General Vegetation Management. Under Alternative A, weed treatment actions for rangelands would have similar impacts on rangelands as for forests and woodlands.

Prescribed Fire and Unplanned Fire Managed for Resource Benefit. Prescribed fire would be used in sagebrush and mountain shrublands to reduce canopy cover and fuel loads, to create a more diverse age-class, and to reduce pinyon-juniper encroachment into sagebrush stands. This would increase the cover of understory species (i.e., grasses and forbs), and would create more vegetation diversity, which would benefit wildlife and livestock. Fuels reduction in shrublands would reduce the potential for a catastrophic fire that could kill or injure large expanses of vegetation, decreasing forage for wildlife and livestock over the short term.

Unplanned fire managed for resource benefit would benefit vegetation in WSAs and areas managed for wilderness characteristics by allowing natural processes (e.g., fire) to modify vegetation to meet ecological objectives and desired conditions.

Impacts on vegetation from fire under all alternatives would be the same as or similar to those described under wildland fire management in forests and woodlands, Alternative A.

Vegetation Treatments. Vegetation treatments in rangelands would include mechanical, chemical, fire managed for resource benefit, or prescribed fire. (See above for impacts from prescribed fire.) Mechanical methods could include mowing, hydroaxing, or roller chopping sagebrush and mountain shrublands and hydroaxing or cutting pinyon-junipers woodlands to reduce encroachment into sagebrush stands. Levels of disturbance to soil and vegetation would depend on the method used; more surface disturbance would occur from a tracked vehicle versus a rubber-tired vehicle. Mowing and roller chopping would probably impact more vegetation than hydroaxing, which is more selective.

Chemical treatments involve the use of herbicides on sagebrush and mountain shrublands to decrease shrub cover and enhance understory vegetation. Impacts from mechanical and chemical treatments on vegetation would be the same as or similar to those listed above under vegetation management in forests and woodlands, Alternative A.

The objectives for sagebrush treatments would be to transition from homogenous stands of old (or decadent) sagebrush to create a more diverse age-class structure across the landscape and to improve the diversity and cover of understory species, which would reduce soil erosion and would benefit wildlife and livestock by increasing the quality and quantity of forage. Mountain shrublands would be managed for similar objectives: to improve composition and structure, which would increase the palatability of these shrubs for wildlife by stimulating new growth.

Salt desert shrublands would be managed to improve the vigor and composition of shrubs and the diversity and cover of understory species and biological soil crusts. Improving salt desert shrublands would benefit general vegetation, as well as the special-status plant species that grow there, and would provide increased cover and forage for wildlife.

Impacts from vegetation treatments would be the same as or similar to those listed above under vegetation management - forests and woodlands, Alternative A.

Restoration. Impacts from restoration on vegetation would be the same as or similar to those listed above under vegetation management - forests and woodlands, Alternative A.

Under all alternatives, vegetation treatments of rangelands would create a long-term benefit to vegetation.

Impacts to rangeland vegetation under the Proposed RMP would be similar to those under Alternative A for all resource management actions not described below.

Impacts from Terrestrial Wildlife Management. Impacts from terrestrial wildlife management on rangelands would be similar to those under forests and woodlands, Alternative A, with the following difference:

- Habitat improvement projects would target mountain shrub and sagebrush communities, seeking to reduce pinyon-juniper encroachment, create diversity among age-classes, reduce canopy cover, increase forb and grass diversity and abundance, and improve the palatability and nutrition of forage for wildlife.

Impacts from Wildland Fire Management. Impacts from wildland fire management would be similar to those under forests and woodlands, Alternative A, with the following differences for rangelands:

- Prescribed burning, fire managed for resource benefit, and mechanical treatments would be used to rejuvenate and enhance decadent stands of sagebrush and mixed mountain shrublands.
- Wildland fire management in fire-adapted plant communities such as mesic mountain shrublands would return the area to an earlier seral stage in the short term, increasing the herbaceous cover. Since mesic mountain shrubs readily sprout following fire, the shrubs would regenerate and reoccupy the site rapidly.
- In the lower elevation sagebrush shrublands (Wyoming big sagebrush stands), encroachment of pinyon-juniper woodlands in the absence of fire has decreased understory diversity and productivity. Fire in this community type would consume the sagebrush and kill most of the pinyon-juniper trees, returning the community to an earlier seral stage and increasing the herbaceous cover. Since

sagebrush and pinyon-junipers do not sprout following fire, the change in plant community composition and structure would persist for a longer period of time.

- The risk of cheatgrass invasion following fire would be considerably higher in the lower elevation rangelands and pinyon-juniper woodlands, since cheatgrass is predominantly found in these vegetation types in the CRVFO.
- The designation of certain salt desert shrublands as fire exclusion areas would protect these communities from disturbance caused by fire. Salt desert shrublands are not adapted to fire and are highly susceptible to cheatgrass invasion following fire.

Impacts from Forestry Management. While no timber would be harvested in rangelands, access roads could be constructed through rangelands to access forest and woodlands where harvesting would take place. Construction of access roads would result in direct and indirect adverse impacts on vegetation. Vegetation cover and density would be reduced, and soil compaction, erosion, sedimentation, and increased dust would occur. Soil disturbance and motorized vehicle use may introduce and spread noxious and invasive weeds. These impacts would likely decrease plant vigor and productivity and alter the composition of plant communities.

Alternative B (Proposed RMP)

Impacts to rangeland vegetation from wildland fire management, coal management, WSA management, and transportation and facilities management would be the same as or similar to those described above for forests and woodlands under Alternative A. Impacts to rangeland vegetation from forestry management and terrestrial wildlife management would be the same as or similar to those described for rangelands under Alternative A. Impacts to rangeland vegetation from management of all other resources and uses would be the same as or similar to those described previously for forests and woodlands under the Proposed RMP, except as described below.

Impacts from General Vegetation Management. Impacts on rangelands from vegetation management would be the same as or similar to those listed above under Alternative A. However, the Proposed RMP and Alternatives C and D would propose specific direction with clearly defined objectives for the management of sagebrush, salt desert shrublands, and mountain shrublands, whereas Alternative A would not. These objectives would guide future management which would likely result in achieving the desired plant communities for these vegetation types.

Alternative C

Impacts to rangeland vegetation from vegetation management--forests and woodlands, terrestrial wildlife management, wildland fire management, WSA management, and transportation and facilities management would be the same as or similar to those under forests and woodlands and rangeland vegetation under Alternative A. Impacts to rangeland vegetation from soils management, water resources management, and cultural resource management would be the same as or similar to those described above for forests and woodlands under the Proposed RMP. Impacts to rangeland vegetation from management of other resources and uses would be the same as or similar to those described above for forests and woodlands under Alternative same as or similar to same as or similar to C.

Alternative D

Impacts to rangeland vegetation from vegetation management--forests and woodlands--would be the same as or similar to those described above for rangeland vegetation under Alternative A. Impacts to rangeland vegetation from wildland fire management, coal management, WSA management, and transportation and facilities management would be the same as or similar to those described above for forests and woodlands under Alternative A. Impacts to rangeland vegetation from soils management and terrestrial wildlife management, would be the same as or similar to those described above for forest and woodlands under the Proposed RMP. Impacts to rangeland vegetation from management of other resources and uses would be the same as or similar to those described above for forest and woodlands under Alternative D, except as described below.

Cumulative Impacts (Rangelands)

Cumulative impacts on rangeland vegetation would be the same as described above in the section Cumulative Impacts (Forests and Woodlands).

Vegetation—Riparian

Impacts to riparian vegetation are similar to those described for forests, woodlands and rangelands, except as discussed below.

Alternative A

Impacts from Riparian Management. Impacts to riparian vegetation from management of other resources under Alternative A would be the same as those described for forests and woodland vegetation under Alternative A, except as described below. This alternative includes NSO stipulations to protect riparian vegetation from direct disturbance and a CSU stipulation that would limit surface disturbances associated with other resources and uses within 500 feet of the riparian-wetland resource. These stipulations are intended to maintain or achieve Public Land Health Standard 2 for functioning riparian systems.

Alternatives A and C both include NSO stipulations to protect approximately 3,000 acres of riparian vegetation and a CSU stipulation within 500 feet of the riparian resource, but unlike the Proposed RMP, they do not include the additional stipulation (CRVFO-NSO-5) for protecting all perennial streams, water bodies and fisheries resources with a 325-foot buffer. This stipulation would apply to approximately 35,900 acres of streams and riparian systems. Alternative D would replace the NSO stipulation for riparian vegetation with a CSU stipulation within the riparian zone and within 500 feet of the riparian area. Alternatives A and C provide more protection for riparian resources then Alternative D, but much less than the Proposed RMP.

Impacts from Water Resource Management. The objective under all alternatives is to achieve Public Land Health Standard 5 for water quality. A previous objective from the 1984 land use plan was to increase water yield throughout the resource area through forest management practices and vegetation manipulation for livestock and big game forage. Objectives and associated actions to increase water yield would generally be beneficial to riparian areas by providing additional water necessary to maintain or enhance riparian vegetation. Conversely, actions associated with increased water yield that increase sediment yield (e.g., any action that results in long-term decrease of vegetation cover) may offset the beneficial impacts.

This alternative includes an NSO stipulation that would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of five major rivers: Colorado, Roaring Fork,

Crystal, Frying Pan, and Eagle. This stipulation would complement the NSO and CSU for protection of riparian resources and would exclude surface-disturbing activities within a much wider buffer.

Impacts from Forest and Woodland Vegetation Management. Impacts from forestry management are also addressed in this section since its objectives and actions are interrelated with those listed for forests and woodlands. Forest and woodland management includes hand thinning, mechanical treatments and prescribed fire.

The commercial harvest of forest and woodland products and associated surface disturbances (e.g., road construction and vehicle use) would remove mature trees and may crush or remove understory vegetation where harvest occurs. Forest and woodland vegetation management is currently limited in scope and application. Where management activities would occur, impacts on select riparian systems could result. Riparian areas would be protected from direct impacts by the NSO prohibiting surface-disturbing activities in the riparian zone itself. Indirect impacts include increased soil erosion and sedimentation, and an increase in risk of weed invasion.

Over the long term, the harvest of forest and woodland products would increase penetration of light to understory vegetation (i.e., grasses and forbs) and could increase diversity, composition, and ground cover (both litter and vegetation). Increased ground cover may result in less surface runoff and sediment load into riparian areas. Increases in vegetation cover over a relatively large area may also reduce surface runoff, increase water infiltration into soils, and recharge floodplains. This may increase the duration of flow in drainages. Increased duration of flow would be beneficial to riparian systems (i.e., additional water would maintain or enhance riparian vegetation or create these systems). Forest and woodland management practices would also reduce fuel loads, thereby reducing the likelihood of catastrophic wildfires and subsequent loss of riparian vegetation. Impacts would be similar in all alternatives.

Impacts from Rangeland Vegetation Management. Rangeland management actions could include a variety of treatments such as mechanical, chemical, biological, and prescribed fire and unplanned fire managed for resource benefit. These treatments would initially reduce vegetation cover on upland sites and would increase bare ground, potentially resulting in more surface runoff and increased sediment load into riparian areas. These impacts would generally be short-term, until additional cover of herbaceous vegetation becomes established. Herbaceous vegetation would increase compared with current conditions, resulting in less surface runoff and sediment load into riparian areas. The reduction of surface runoff and sediment load would diminish over time as succession gradually moves to a more woody-dominated vegetation type, similar to current conditions, within 10 to 20 years after treatment. Increases in vegetation cover, over a relatively large area, may also reduce surface runoff, increase water infiltration into soils, and recharge floodplains, which may increase the duration of flow in drainages. Increased duration of flow would be beneficial to riparian systems (i.e., additional water would maintain, enhance riparian vegetation, or create these systems).

Rangeland vegetation management actions would be similar across all alternatives and, likewise, impacts to riparian systems would be similar.

Impacts from Fisheries and Aquatic Wildlife Management. Most of the management actions and restrictions for fisheries and aquatic wildlife would also benefit riparian vegetation. These actions include riparian plantings, tamarisk removal, changing livestock season of use, and pursuing minimum instream flow protections where opportunities arise. All of these actions would benefit riparian-wetland resources.

Alternative A would include an NSO stipulation prohibiting surface occupancy and surface-disturbing activities within a 2-mile radius of the hatcheries to protect the quality and quantity of surface water and underground aquifers supplying the Rifle Falls and Glenwood Springs state fish hatcheries. This stipulation would protect riparian and upland vegetation by excluding surface-disturbing activities near these two fish hatcheries.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Objectives and actions that impact riparian resources appear under the Proposed RMP; therefore, the discussion of impacts is deferred to the Proposed RMP.

Impacts from Wildland Fire Management. In addition to the impacts from wildfire management on forests and woodlands described above, wildland fire management may have some additional impacts on riparian resources. As woody vegetation increasingly dominates the landscape, the flow in some streams may be further reduced, which would reduce the vigor and amount of associated riparian vegetation. Prescribed fire, unplanned fire managed for resource benefit, and fuels reduction treatments can maintain or improve the health of riparian areas by increasing water infiltration and streamflows.

Riparian areas are unlikely to burn as a result of natural ignition, because of their position on the landscape and the high live-fuel moisture content that riparian vegetation typically has. For the same reasons, when fires do occur in riparian habitat, they are unlikely to burn extensive acreages. Riparian areas are typically resilient systems and would be expected to recover rapidly after a fire. The return to the vegetation condition that existed before disturbance would vary considerably, depending on the riparian vegetation type. For example, riparian vegetation that consisted of mature cottonwood trees could take hundreds of years before conditions returned to pre-existing conditions. Willow communities could take 5 to 10 years, and riparian grass and forb communities would generally take 1 to 2 years.

Fires in upland vegetation could lead to short-term localized increases in runoff and sedimentation into the stream channels and riparian zones. In the long term, positive impacts on riparian areas should result. In most burn areas, the percentage of ground cover of vegetation would be greater than what existed before the burn. This would result in an increase in water infiltration, a corresponding reduction in erosive runoff within watersheds, and a reduction of in-channel erosion. In addition, as the woody vegetation in many areas is reduced, there would likely be an increase in the duration and the amount of streamflow and the quantity of associated riparian vegetation, particularly in intermittent and ephemeral streams. Finally, as fuel continuity is reduced overall from wildland fire management, it would reduce the likelihood of catastrophic wildland fires, which could damage riparian systems by destroying the vegetation and causing sedimentation in channels.

Impacts from wildland fire management would be the same for all alternatives, since objectives and actions do not vary by alternative.

Impacts from Forestry Management. These impacts are addressed above in the Impacts from Vegetation—Forest and Woodland Management section.

Impacts from Livestock Grazing Management. The types of impacts on riparian vegetation would be similar to those described above in the Impacts from Livestock Grazing Management in the Vegetation-Forests and Woodlands section, except that impacts on riparian zones may be greater because livestock tend to concentrate in riparian and wetland areas in the summer for water and shade. Under all alternatives,

livestock grazing would be managed to meet the Land Health Standards. Where Standard 2 for riparian systems is not being met, changes in grazing management or range developments would be implemented to achieve progress towards meeting the standard.

Impacts from Recreation and Visitor Services Management. Recreational use is often concentrated on or near riparian areas for a variety of reasons (e.g., water source, scenic quality, shade, and proximity to water-based recreational opportunities). Impacts on riparian areas can result from recreation, such as camping, hiking, picnicking, mountain biking, horseback riding, boating, and OHV use. Concentrated human activity near or within riparian areas can result in reduced vigor or loss of riparian vegetation, soil compaction, lower water infiltration rates, and increased surface runoff and sediment load into riparian areas. Disturbed areas serve as niches in which invasive weedy vegetation can become established. Humans can serve as dispersal mechanisms for weed seeds and help spread weeds to new areas.

Similar damage patterns can also occur at dispersed-use areas. Many of these dispersed-use areas are so popular that visitors repeatedly return to the same spots, developing "improvements" and creating, in essence, developed sites. Some recreationists often share the same riparian areas used by such other activities as livestock grazing, which compounds the impacts on riparian ecosystems. Both activities can lead to trampled vegetation, soil compaction, and destabilized streambanks and shorelines (Eubanks 2004). OHV use in riparian areas can result in destruction of vegetation, soil compaction, an increase in bare soil, eroding streambanks, increased sediment load in streams, and introduction and spread of invasive plant species. All of the above could adversely affect riparian functioning condition.

Of the streams within the CRVFO that were rated as FAR or NF during the most recent riparian PFC assessments, only three streams had issues (factors significant enough to affect functioning condition) associated with recreational use. These areas were Prince Creek (campsites), Government Creek (OHV use) and McHatten Creek (mountain bike trails). Each of these areas had issues identified with livestock grazing as well. As recreation increases within the planning area, additional impacts may occur that could adversely affect the functional condition and land health standard for riparian systems. Increased recreational use can also disrupt livestock grazing management (e.g., herding and riding), resulting in indirect adverse effects on riparian resources. Prince Creek is one example where recreation interferes with grazing distribution, and causes more livestock concentration along the creek bottom.

Actions under Alternative A would administratively recognize eight SRMAs and eight RMAs. There were no ERMAs proposed under this alternative. Generally, there would be increased intensity and level of recreation associated with the targeted activity (e.g., OHV, mountain biking, boating) established for an SRMA. This would be especially true for SRMAs that are near communities (e.g., Thompson Creek near Carbondale and the Upper Colorado River near Gypsum). Due to the increased recreation in these areas, there would be greater potential for adverse impacts on riparian resources. The Upper Colorado River SRMA would be managed to improve access along the river through boat ramps and parking areas. However, there would be more focus on the management of recreation in these areas to avoid or minimize impacts on riparian areas. For SRMAs located in more remote areas (e.g., Hack Lake and Bull Gulch), the intensity of recreation would not be expected to increase substantially. Adverse impacts on riparian resources in these areas would be less likely. Likewise, under current management, RMAs are areas managed for nonmotorized recreation that would tend to create fewer adverse impacts on riparian resources.

Across all alternatives, recreation would be managed to conform to Colorado Public Land Health Standard 2 for riparian systems which would minimize impacts on riparian resources.

Alternative A also includes NSO stipulations in SRMAs and RMAs designed to limit ground-disturbing activities from other resource uses. In most cases, riparian CSU and NSO stipulations would provide adequate protection for riparian-wetland resources; however, the NSO stipulations for SRMAs and RMAs may offer additional benefits (e.g., reduced erosion/sedimentation) to riparian areas by further restricting disturbances near riparian areas.

Impacts from Comprehensive Trails and Travel Management. OHV use in riparian areas can result in a variety of adverse impacts, such as the following:

- Destruction and loss of vegetation
- Soil compaction
- Reduced soil infiltration
- An increase in the amount of bare soil
- Eroding streambanks
- Increased sediment load in streams
- Introduction/spread of invasive plant species

All of the above could adversely affect riparian functioning condition. Generally, the more area that is open to OHV use, the greater the potential for adverse impacts mentioned above. Although there have been few issues identified with damage to riparian-wetland resources from OHV use within the planning area, the potential for adverse impacts may increase in the future given the expected increase in OHV use. In addition, technological improvements in OHVs have allowed easier access to more remote areas, increasing the potential for damage to riparian-wetland resources. Limiting travel to designated routes would confine the impacts on areas already hardened or otherwise disturbed for vehicle use.

Currently, under Alternative A, the planning area would have large tracts of land open for cross-country motorized travel; therefore, adverse impacts on riparian-wetland resources would be greatest under this alternative. The Proposed RMP and Alternatives C and D would confine motorized and mechanized travel to designated routes, which would minimize damage to riparian-wetland resources. Alternative D would have more miles designated for motorized travel followed by the Proposed RMP and Alternative C, with the latter alternative having the fewest miles designated for motorized travel. Consequently, the potential for adverse impacts on riparian-wetland resources may decrease respectively, although the difference in impacts under each of these alternatives depends more on the proximity of the motorized routes to riparian areas than on the total miles of routes. The main factor potentially affecting riparian areas is the number of acres open for cross-country motorized travel.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Mineral and energy development would cause direct and indirect impacts, such as loss of riparian vegetation, increased exposure to dust and other contaminants, soil erosion, and weed introduction or spread. Oil and gas activities can also disrupt livestock grazing management (e.g., herding, riding, grazing distribution), resulting in

indirect adverse effects on riparian resources. Applying NSO or CSU stipulations to leases should help protect riparian areas, provided they have been identified before lease issuance. However, these stipulations would apply to new or more recent leases only. For existing leases that do not have NSO and CSU stipulations, compliance with these stipulations would be voluntary. Riparian areas may be protected to a lesser degree with the use of the Standard Terms and Conditions and by adding certain COAs to APDs, as developed in the permitting NEPA analysis. These COAs may include: (1) minimizing the number of stream crossings and locating those crossings where riparian values are the lowest; (2) replanting native riparian vegetation to restore site function; (3) installing sediment traps to reduce erosion; and (4) relocating proposed operations up to 200 meters to avoid impacts on riparian areas. Even if riparian areas are not directly impacted by surface disturbances associated with oil and gas development, the cumulative loss of upland vegetation may cause livestock to increase the amount of time they spend grazing in riparian areas.

Alternative A would have the most acres open for fluid minerals leasing, followed by Alternative D, the Proposed RMP, and Alternative C (the last with the fewest acres open for fluid minerals leasing). Therefore, adverse impacts on riparian-wetland resources would be greatest under Alternative A, followed by Alternative D, the Proposed RMP, and Alternative C.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts on riparian-wetland resources from locatable mineral materials and non-energy leasable minerals would be similar to those described under the section above, Vegetation-Forests and Woodlands. The greatest potential for impacts on riparian resources would be from mineral materials (salable minerals) such as gravel mining, since this alluvial material is usually found in and adjacent to streams and rivers. Closing areas from mineral materials disposal would prevent impacts on vegetation within those areas. Application of riparian NSO or CSU stipulations should protect riparian areas in most cases.

Impacts from Wild and Scenic River Management. Under Alternative A, there would be 13 river segments identified as eligible and afforded interim protective management until a suitability study is completed. It is BLM's policy to manage and protect the free-flowing character, tentative classification, and identified ORVs of eligible rivers according to the decisions in the associated RMP. These interim protection measures would offer direct supporting benefits to riparian areas. Alternatives A and C would provide the most protection for riparian areas, as all eligible stream segments would be protected. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Alternative B (Proposed RMP)

Impacts to riparian vegetation from weed management, wildland fire management, and WSA management would be the same as or similar to those described under Alternative A for vegetation-riparian or vegetation-forests and woodlands. Impacts to riparian vegetation from livestock grazing management, comprehensive trails and travel management, fluid minerals management (oil and gas, oil shale, and geothermal resources) management, locatable minerals, mineral materials, and non-energy leasable minerals management would be the same as or similar to those described under the Proposed RMP for forests and woodlands, except as described below.

Impacts from Vegetation—Riparian Management. Management actions to protect or improve riparian vegetation under the Proposed RMP include implementing grazing management actions (e.g., adjusting

livestock numbers, distribution, season of use, and duration of use), plantings, recreation restrictions, structures (e.g., fencing), and upland water developments. All of these actions would benefit riparian-wetland resources and contribute toward attaining proper functioning condition of riparian areas and desired future conditions of riparian vegetation.

Under the Proposed RMP, riparian areas (as well as perennial streams, water bodies, and fisheries) would be protected through an NSO stipulation within 100 meters (325 feet) from the outer edge of the riparian zone. This would provide a wider buffer than any other alternative and greater direct and indirect protection of the riparian resource. The Proposed RMP also includes a CSU stipulation from 325 to 500 feet from the riparian zone that would provide protection for riparian-wetland resources from impacts associated with other resources or uses.

Impacts from Water Resource Management. This alternative includes an objective to ensure streams on BLM lands are in geomorphic balance (e.g., stream channel size, sinuosity, and substrate are appropriate for its landscape position and geology), with the water and sediment being supplied by the watershed (e.g., no accelerated erosion, deposition, or head-cutting). This supports the objective for riparian systems, as the water management objective above is required to maintain or achieve PFC. Associated with this objective would be actions to monitor channel stability and morphology and to improve dysfunctional streams caused by unnatural factors. These actions would also help ensure maintenance or achievement of PFC of riparian systems. Another objective of this alternative would be to provide sufficient water quantity on BLM lands for multiple-use management and functioning, healthy riparian, wetland, aquatic, and upland systems. The objective and associated management actions would be beneficial to riparian systems (i.e., sufficient water is necessary to create, maintain, or enhance riparian vegetation).

The NSO stipulation to restrict surface-disturbing activities within 0.5 mile of major river corridors would be carried forward in all alternatives. In addition, an NSO stipulation with a 100-meter buffer (325 feet) would protect all perennial streams, riparian areas, and fisheries. Water management would complement riparian management, and provide even greater protection from indirect impacts such as sedimentation into stream channels.

Impacts from Rangeland Vegetation Management. Impacts to riparian vegetation would be essentially the same as impacts described under Vegetation-Forests and Woodlands, except that increases in vegetation cover over a relatively large area may also reduce surface runoff, increase water infiltration into soils, and recharge floodplains, which may increase the duration of flow in drainages. Increased duration of flow would be beneficial to riparian systems (i.e., additional water would create, maintain, or enhance riparian vegetation).

Impacts from Fisheries and Aquatic Wildlife Management. Proposed fisheries and aquatic wildlife management would be largely beneficial to riparian and wetland vegetation. Management actions may include riparian plantings, tamarisk removal, changing management of other program activities (e.g., changing livestock grazing season use) to achieve desired future condition, and actively seeking minimum instream flow protections and minimum pool depths where opportunities arise. These management actions and treatments could cause short-term and site-specific loss or reduction of streamside vegetation cover, increases in sedimentation, and soil compaction. In the long term these actions would benefit riparian-wetland resources as they would facilitate achieving riparian proper functioning condition.

The Proposed RMP also includes the combined resource CRVFO-NSO-5 stipulation that prohibits surface occupancy and surface-disturbing activities within 100 meters of all perennial streams, water bodies, and riparian areas, and CRVFO-NSO-6, which protects select state fish hatcheries. The Proposed RMP would provide the most benefit for riparian vegetation, followed closely by Alternatives C, A, and D.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts would be the same as described for Water Resource Management and Fisheries and Aquatic Wildlife Management.

Impacts from Wild and Scenic River Management. Under the Proposed RMP, two Deep Creek stream segments would be determined suitable for inclusion in the NWSRS and would be managed to protect their classification and ORVs. Two Colorado River stream segments would be deferred from suitability determinations, but would continue to be managed under the Stakeholder Group Management Plan to protect their tentative classification, free-flowing condition, water quality, and ORVs. The Proposed RMP would close these four stream segments to fluid minerals leasing, and would protect the Deep Creek "wild" segment with an NSO stipulation. The boundary of the Deep Creek "wild" segment would be expanded to include all the public lands within the watershed to coincide with the USFS boundary. The other Deep Creek stream segment would be protected with a CSU stipulation. The protections applied to these stream segments would directly benefit vegetation by constraining surface-disturbing activities.

Alternatives A and C would provide the most protection to vegetation by constraining surface-disturbing activities within 0.25 mile of eligible or suitable stream segments. The Proposed RMP would constrain surface-disturbing activities within 0.5 mile of the Colorado River and within the Deep Creek canyon watershed. Alternative D would not provide any protection to riparian vegetation because all stream segments would be determined unsuitable.

Alternative C

Impacts to riparian vegetation from forest and woodland management, riparian management, wildland fire management, and WSA management would be the same as or similar to those described under Alternative A. Unless specifically analyzed below, impacts to riparian vegetation from all other resources and resource uses would be the same as or similar to those described under Alternative C for forest and woodland vegetation.

Impacts from Water Resources Management. Under Alternative C, the NSO stipulation that protects all perennial streams, water bodies, riparian areas, and fisheries with a 100-meter (325 foot) buffer would be replaced by an NSO stipulation for streamside management zones. This NSO would extend only 50 feet from the ordinary high water mark so would provide less protection for riparian vegetation from direct and indirect impacts than the Proposed RMP. BLM would not actively seek to secure instream flow water rights under Alternative C. If instream flow rights are not secured, streams crossing public lands could be diverted for other uses, thereby drying up the stream channel. Without adequate water, riparian vegetation would not be maintained. Alternative C would have more impacts on riparian vegetation than the Proposed RMP, but less than Alternative A.

Impacts from Fisheries and Aquatic Wildlife Management. Alternative C includes an NSO stipulation prohibiting surface occupancy and surface-disturbing activities within 100 meters of all perennial waters. Impacts from this alternative would be similar to those discussed under the Proposed RMP; however, the Proposed RMP would apply the NSO within 100 meters of all perennial streams, water bodies, and riparian

areas. The NSO stipulation in Alternative C would provide fewer benefits (e.g., reduced erosion/sedimentation) to riparian areas than the Proposed RMP.

Impacts from Wild and Scenic River Management. All eligible stream segments would be determined to be suitable for inclusion in the NWSRS under Alternative C and interim protective management would be applied. Alternative C would close suitable stream segments to fluid minerals leasing and apply constraints in the form of NSO and CSU stipulations on surface-disturbing activities. The stipulations would extend 0.25 mile on both sides of the stream centerline, which would provide protection to vegetation by excluding oil and gas development and other surface-disturbing activities. This would limit most surface-disturbing activities and protect riparian vegetation along these streams.

Alternatives A and C would provide the most protection for vegetation by constraining surface-disturbing activities within 0.25 mile of eligible or suitable stream segments. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Alternative D

Impacts to riparian vegetation from forest and woodland management, wildland fire management, and WSA management under Alternative D would be the same as or similar to those described for forests and woodlands under Alternative A. Impacts to riparian vegetation from all other resources and uses would be the same as or similar to those described under Alternative D, forests and woodlands, except as described below.

Impacts from Water Resource Management. Impacts from this alternative would be similar to those discussed under Alternative C, except that Alternative D does not provide an NSO stipulation within 50 feet of all hydrologic features. Alternative D would provide more beneficial impact on riparian vegetation than Alternative A, but less than Alternative C and substantially less than the Proposed RMP.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts from this alternative would be similar to those discussed under Alternative C; however, Alternative D differs somewhat in that it replaces the 100-foot NSO stipulation on perennial streams with a 100-foot CSU stipulation only on trout-bearing streams. The Proposed RMP applies an NSO to all perennial streams, water bodies, and riparian areas, and extends to 100 meters (325 feet) rather than 100 feet. Protection of riparian-wetland resources by the riparian CSU stipulation in Alternative D would already provide this protection, and there would be no added benefits from the CSU stipulation for trout-bearing streams.

Impacts from Wild and Scenic River Management. Under Alternative D, all eligible rivers would be determined as not suitable and would be released from interim management protections afforded eligible segments. Consequently, there would be no direct benefits to riparian areas from these interim protection measures.

Cumulative Impacts

A review of the most current riparian PFC data (Table 3.2.5-4 and Table 3.2.5-5) indicated that adverse impacts from past or present actions affecting the functional condition of riparian systems on public lands have been relatively minor within the CRVFO planning area. Corrective management actions (e.g., improved livestock grazing management) may have also taken place in the past to improve the functional condition of

riparian areas. Given the above, cumulative impacts on wetland-riparian resources focused on the effects from reasonably foreseeable actions and Proposed RMP actions. The geographic scope of this cumulative effects analysis included all lands within the planning area and surrounding watersheds that flow into the planning area.

Impacts on wetland-riparian resources result from activities that have direct or indirect effects on the attributes and processes (hydrogeomorphic, vegetation, erosion/deposition, soils, and water quality) that occur in the riparian-wetland area. Activities that alter vegetation, soils and hydrology are most likely to affect wetland-riparian areas.

Cumulative effects on riparian-wetland resources from reasonably foreseeable actions (including those from other federal and non-federal actions) include increased fluid minerals development, increased recreational use, water diversions, and removal of riparian vegetation for agricultural, residential, or commercial development. Noxious and invasive weed species are expected to continue to spread on all lands. Climate change may increase the recurrence and severity of drought conditions, resulting in a decrease in water flows and a resulting decline in riparian vegetation. Drought conditions may also increase the occurrence and severity of wildfires. All of the above could adversely affect attributes and processes of riparian areas, resulting in a decline in the functioning condition or species composition of these systems.

Cumulative effects on riparian-wetland resources can result from the combination of Proposed RMP actions such as fluid minerals development, forage use by livestock and wildlife species, prescribed burning, wildfires, vegetation treatments, recreation, travel management, forestry, and realty. Adverse effects on attributes and processes of riparian areas are most likely to occur from activities that result in surface disturbance in or near wetland-riparian areas. However, stipulations, BMPs and other protective measures would minimize or avoid adverse impacts on riparian areas on BLM-managed lands. Alternative A may have the most adverse impacts since it would allow for the most acres open for fluid minerals leasing, as well as the most areas open for motorized travel, followed by Alternative D, the Proposed RMP, and Alternative C.

Cumulative effects also result from the combination of stipulations or other protective measures (e.g. interim protection for tentative WSR classifications) proposed for resources and uses. Many of these stipulations and protective measures would have direct or indirect benefits to riparian-wetland resources by prohibiting surface-disturbing activities on or near riparian areas. Supporting benefits to riparian-wetland resources from NSO stipulations and protective measures would be greatest in the Proposed RMP, followed by Alternatives C, D, and A.

Resources and uses that have NSO stipulations or protective measures include soils, water management, vegetation, fisheries, terrestrial wildlife, special status species, cultural resources, visual resources, lands with wilderness characteristics outside existing WSAs, SRMAs, ACECs, and WSRs. Most stipulations include exceptions for beneficial management actions such as prescribed fire, weed treatments, riparian plantings, or other structures to improve the condition of riparian zones or upland ecological sites. However, a few of these stipulations may prohibit or restrict riparian area management actions (e.g., the construction or maintenance of improvements) designed to maintain or improve riparian conditions. Because these stipulations and protective measures provide protection for riparian resources from direct and indirect impacts of surface-disturbing activities, the beneficial impacts would outweigh adverse impacts.

Vegetation—Significant Plant Communities

Direct and indirect impacts on significant plant communities from management actions would be similar to those described above for vegetation. However, because significant plant communities are relatively rare and localized, (many occupy less than one acre), impacts would be magnified. Loss of plants would reduce genetic diversity within these communities. Reproductive success would decrease in smaller populations, and inbreeding and loss of genetic variation would increase. Fragmentation would result in lower population viability and would increase local population extinction risk (Kolb 2008).

Surface-disturbing activities would have adverse, direct, and long-term impacts. Due to the small and often pristine nature of these communities, adverse impacts would occur if surface-disturbing activities resulted in plant losses, weed invasion, or a change in species composition or diversity, which would degrade the integrity and functionality of the plant community.

For all alternatives, a CSU stipulation would be implemented to protect significant plant communities. This stipulation would allow for relocation of proposed surface-disturbing activities by more than 200 meters to avoid occupied habitat and habitat necessary for the maintenance or recovery of the communities.

In addition to the CSU stipulation, most significant plant communities would indirectly benefit from the implementation of NSO stipulations for other resources. Nine significant plant communities would fall entirely or partially within the major river corridors NSO implemented under all alternatives. A *Juniperus scopulorum/Cornus sericea* significant plant community is located within the Bull Gulch ACEC, and the entire ACEC would be protected by an NSO under all alternatives.

Two significant plant communities (*Betula occidentalis/*mesic graminoids shrubland and *Artemisia tridentata* ssp. *tridentata/Leymus cinereus* shrubland) would fall within the Colorado River Seeps ACEC under Alternative C, and the entire ACEC would be protected by an NSO. However, these two communities would only be partly protected by the major river corridors NSO under other alternatives.

One community near Bear Creek (*Populus tremuloides/Acer glabrum* forest) would be protected in part by the NSO stipulation for perennial streams, under the Proposed RMP and Alternative C. The remaining two significant plant communities would not have the additional protection of an NSO under any alternative: a *Populus balsamifera* woodland located north of Eagle and a *Juniperus scopulorum/Cercocarpus montanus* woodland near Bocco Mountain. These two communities would be protected only by the CSU stipulation for significant plant communities.

Six significant plant communities would fall or fall partly within the Upper Colorado River SRMA, which would be managed for fishing, boating, and swimming. Vehicles would be restricted to existing county and private roads, thereby reducing potential adverse impacts. The SRMA would be closed to fluid minerals leasing, and would be recommended for withdrawal from locatable mineral development and exploration. An NSO stipulation for SRMAs would be implemented under the Proposed RMP and Alternatives C and D to prevent any surface-disturbing activities incompatible with recreation objectives. All of these actions would benefit the significant plant communities within the SRMA by limiting surface disturbance.

Impacts from visitor use and recreation development in the Upper Colorado River SRMA would be minimal under the Proposed RMP and Alternatives A and C; however, Alternative D would allow for increased use

and recreation development. Since significant plant communities within the SRMA would be covered by CSU stipulations, potential development would be shifted away from these communities.

Under the current management plan, unless otherwise designated as "closed" or "limited to existing or designated routes," the CRVFO is considered "open to motorized vehicle use on and off roads." Cross-country OHV use could adversely affect significant plant communities. Under the Proposed RMP and Alternatives C and D, OHVs would be limited to designated routes, reducing potential impacts on these communities. The CSU stipulation for significant plant communities would provide protection from construction of new roads and trails by relocating the development to areas outside significant plant community habitat.

Two significant woodland plant communities (*Juniperus scopulorum/Cornus sericea* and *Populus angustifolia/Juniperus scopulorum*) occur within the Pisgah Mountain area, which would be managed for wilderness characteristics under the Proposed RMP and Alternative C. Management restrictions to protect wilderness character would minimize surface disturbances, which would protect these communities from direct impacts. Actions to maintain wilderness characteristics on lands outside existing WSAs are not proposed under Alternatives A or D, so there would be no additional protection to significant plant communities.

All but two of the known significant plant communities are within the boundaries of active grazing allotments under all alternatives. Grazing or browsing by livestock could cause direct loss or trampling of individuals or populations, especially those plants that are palatable to animals. However, due to the position of these communities within the allotments (i.e. below steep cliffs, next to the Colorado River, or unfenced from adjacent private lands not within the allotment), grazing management has resulted in very little livestock grazing use in these significant plant communities, thus preventing impacts from grazing to those communities.

Locatable mineral development is not subject to NSO or CSU stipulation constraints, so significant plant communities in areas not withdrawn from mineral development would be vulnerable to surface-disturbing actions. The degree of impacts would vary depending on the location of proposed mineral development in relation to the significant plant community. In the Proposed RMP and Alternatives C and D, Bull Gulch ACEC would be petitioned for withdrawal from locatable mineral development, affording protection to two significant plant communities. In the Proposed RMP and Alternative C, the Upper Colorado River SRMA and the Pisgah Mountain Unit would be closed for mineral material disposal and petitioned for withdrawal from locatables. These actions would help protect seven communities that overlap with the SRMA or the Pisgah Mountain Unit.

Wildland fire management could adversely affect significant plant communities if firefighters were to trample individuals or habitat. Fire suppression, such as the construction of fire lines using hand tools and heavy machinery, could also affect these communities by crushing or uprooting individual plants, increasing erosion and sedimentation, and providing a vector for the invasion or expansion of invasive and noxious weeds. The fire itself could result in the death of individual plants or the alteration of habitat.

Several significant plant communities span public and private lands, making BLM management actions even more critical, since occurrences on private land would not necessarily be protected. Land tenure adjustments (i.e., acquiring or disposing of lands) could result in plant communities entering or leaving federal ownership.

Alternatives A and D would have the most adverse impacts on significant plant communities. These alternatives would implement the fewest resource protections and stipulations, and would allow the most surface disturbance. The Proposed RMP would result in slightly more impacts on significant plant communities than under Alternative C. More NSO stipulations and other protective management actions would be implemented under Alternative C, as opposed to other alternatives, resulting in indirect benefits to significant plant communities. In addition, Alternative C would implement the Colorado River Seeps ACEC, which would fully protect two significant plant communities.

4.2.6 Fish and Wildlife

4.2.6.1 Fisheries and Aquatic Wildlife

Impacts on fisheries and aquatic wildlife would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on fisheries and aquatic wildlife under any of the four alternatives.

Issues

The following primary impacts for aquatic species and their habitats were the focus of the impact analysis:

- Sediment and Turbidity—Increased sediment loading, reduced recruitment, stress, reduced habitat complexity, habitat alteration, and habitat loss.
- Habitat Alteration—Changes in habitat that reduce functionality for select species or make the habitat more conducive to competitive species.
- Loss or Reduction of Streamside Vegetation/Cover—Increased temperatures, stress, reduced productivity, increased erosion and sedimentation, and impacts on food webs.
- Water Quality Alteration—Actions, activities, or accidents (spills, leaks) that could alter important water quality parameters, including pH, dissolved oxygen, temperature, hardness, alkalinity/salinity, and turbidity, and affect aquatic species either lethally or sub-lethally.
- Water Depletions—Loss of physical habitat, changes in water quality, sediment accumulation, habitat alteration, loss of habitat complexity, food source reduction, disease, and stress.
- Introduction and/or spread of aquatic nuisance species and disease vectors–Competition for resources, displacement, predation, and reduced recruitment.
- Potential direct mortalities to amphibians from motorized travel.

Assumptions

The following assumptions were used in the impact analysis for aquatic species:

- Impacts on fish and other aquatic species populations and habitat are not discrete since some actions may benefit one species while having a negative or beneficial impact on another.
- Maintaining high-quality habitat conditions would have some influence on reducing the severity of outbreaks and subsequent losses from diseases, but the prevalence in the environment of various diseases cannot be fully controlled, particularly at chronic levels of occurrence.
- The health of fish and other aquatic wildlife populations is directly related to overall health and functional capabilities of aquatic, riparian, and wetland resources, which in turn are a reflection of overall watershed health.
- Fish populations fluctuate, sometimes widely, in response to natural factors, such as the abundance of prey or extremes in weather, such as flooding or drought.
- The analysis of roads and road density in a given area (watershed) can provide approximations of the potential for impacts on fish and other aquatic species. It is a measure of lands available for accelerated water transport, potential erosion, and offsite sediment transport. However, the actual impacts and degree of impacts of roads depend on additional variables, including road class (dirt,

gravel, or paved), road condition (rutted, bar ditched, and proper and adequate drainage features), topography, upland and riparian vegetation condition, soil characteristics, climate, and proximity of roads to fish-bearing streams.

- Impacts on fish and other aquatic wildlife are based on the cause and effect premise of exposure/stressor/response :
    - Exposure—The likelihood that a given stressor will affect a given species
    - Stressor—The portions of an action that may cause some sort of a reaction by the species
    - Response—The response (negative, positive, neutral) of the species to the stressor
- Common impacts are disclosed in detail once and then are referenced as appropriate in each alternative, discussing any notable differences in risk, magnitude, duration, and scope specific to that alternative's program or resource prescriptions. Where impacts are new or unique to an alternative, detailed analysis was done on that alternative and referenced as appropriate in other alternatives.
- Variation of identified impacts by alternative are determined based on the following:
    - Risk—likelihood or probability of an action resulting in the identified effect
    - Magnitude—intensity and severity of the identified impact
    - Duration—length of time the identified impact would occur (short term or long term)
    - Scope—spatial extent or size over which the identified impact would occur, as related to the proximity of the action to the species or habitat
- Unless otherwise noted, short-term impacts are defined here as impacts expected to have a duration of 2 years or less.
- Unless otherwise noted, long-term impacts are defined here as impacts expected to have a duration greater than 2 years.
- Generally, all NSO protective stipulations that limit ground-disturbing activities would help to protect and minimize impacts on fish and other aquatic species. Various protective measures are components of each alternative, and if implemented in a timely and correct manner, would reduce negative effects on aquatic species. This assumption is true whether the measures are existing (Alternative A), if they are newly proposed under other alternatives, if they are fisheries and aquatic wildlife-specific, or if they are those primarily directed at other resource programs that indirectly protect or minimize effects on fish and other aquatic wildlife.
- The following programs would have negligible impacts, be they beneficial or negative to fish and other aquatic wildlife: air, watchable wildlife, cadastral, cultural, visual, interpretation and environmental education, transportation facilities, health and safety, paleontology, and cave and karst resources. These programs are not analyzed for impacts in the Fisheries and Aquatic Wildlife section.
- Under Alternative A, detailed impacts may be disclosed once and then are referenced in subsequent alternatives to avoid repetition.

Methods of Analysis

All NSO stipulations that would limit ground-disturbing activities would minimize potential risk of impacts on aquatic species and their habitats. At the beginning of each alternative is a table listing those primary protective measures that would either directly or indirectly minimize or eliminate negative effects on aquatic

species and their habitats. Impact analysis then focused on those residual impacts ("those effects remaining after mitigation has been applied to the proposed action or alternative" [BLM 2008l]) anticipated or reasonably likely to occur by resource or program on the priority species and habitats identified for that specific alternative. Under Alternative A, impacts by impact type are addressed once in detail under the resource where they first surface. Subsequent analysis is then referenced back to this detailed analysis, noting any differences in risk, magnitude, duration, and scope specific to that alternative's program or resource prescriptions.

Environmental Consequences

Impacts on aquatic species and their habitats would result from some of the actions included under other resources and uses, including implementation-level actions or activities. Programs not addressed below were deemed to have no or only negligible impacts on aquatic species or their habitats under any of the four alternatives.

Alternative A

Current CRVFO planning documents that guide the management of public lands provide a variety of protective measures and stipulations that either directly or indirectly protect or minimize impacts on aquatic species and their habitats from other program activities and actions. Table 4.2.6-1 shows the primary protective measures found in current planning documents.

Table 4.2.6-1
Primary Protective Measures Found in Current Planning Documents

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	Federal Mineral Estate
GS-NSO-2 riparian and wetland zones	1999 Oil and Gas Leasing ROD	3,000 acres	700 acres
GS-NSO-3 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
GS-NSO-5 Rifle Falls and Glenwood Springs Fish Hatcheries	1999 Oil and Gas Leasing ROD	9,100 acres	2,600 acres
GS-NSO-15 steep slopes	1999 Oil and Gas Leasing ROD	76,200 acres	9,900 acres
GS-CSU-2 riparian and wetland zones	1999 Oil and Gas Leasing ROD	32,900 acres	15,400 acres
GS-CSU-4 erosive soils and slopes greater than 30 percent	1999 Oil and Gas Leasing ROD	147,000 acres	25,600 acres
GS-All other NSOs combined	1999 Oil and Gas Leasing ROD	76,100 acres	17,700 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy or surface-disturbing activities
ROD record of decision

Impacts from Fisheries and Aquatic Wildlife Management. Continued fisheries and aquatic wildlife management would be largely beneficial to aquatic species and their habitats. Actions to improve habitat could include such things as barrier placements and removals, in-channel habitat enhancement structures (e.g., rocks and logs), riparian plantings, and fencing. In select areas where active fish habitat management in the form of projects would occur, there is potential for site-specific, short-term impacts, including sedimentation and turbidity and loss or reduction of streamside vegetation cover. These impacts are discussed in detail below.

Sediment and Turbidity. Actions including ground disturbance, vegetation removal (native or non-native), and roads and trails are the primary causes of erosion that can result in increased sedimentation and turbidity in streams. Natural events such as flood, fire, and drought can also result in increased erosion potential. Increased sedimentation and turbidity can affect aquatic species and their habitats in many ways. Increased sediments in the stream environment reduce dissolved oxygen, raise stream temperature, and can cover spawning and rearing areas, thereby reducing the survival of fish embryos and juveniles (US Forest Service 2000). Excessive sedimentation can also fill in important pool habitats, reducing their depth and making them less usable by fish and other aquatic organisms. Knopp (1993), in a study of 60 northwestern California streams, found that intensive land use management was correlated to loss of pool volume. High sediment transport can fill pools and cause reduction or loss of essential salmonid juvenile rearing habitat (Frissell 1992). Pool habitats are important as over-summer and over-winter thermal refuge areas and, when coupled with stream flows, are often a limiting factor in many small mountain streams.

A number of sub-lethal effects on trout may also occur as a result of sedimentation, including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). Over the long term, increased sediment loading reduces primary production in streams (US Forest Service 2000). Reduced macroinvertebrate productivity and diversity results when excessive sediment fills in the interstitial spaces between stream substrates needed by these aquatic invertebrates. Food webs can be altered as sediment-intolerant macroinvertebrates are replaced by sediment-tolerant species. Reduction in stream productivity can disrupt the food chain and result in reduced food sources for resident fish species. Suspended sediment causes turbidity within streams, which can impact species that feed visually and need clear water where they can successfully capture prey, such as trout. Results from a study on turbidity (Barrett et al. 1992) clearly indicated that wild rainbow trout exposed to increasing levels of suspended sediment are subject to reductions in their ability to detect prey. This reduction in turn may lead to reduced prey capture rates and foraging success, lowering the growth and fitness of individual fish and populations. The longer the duration of high turbidity, the more damage is likely to fish and other aquatic organisms (Newcombe and MacDonald 1991). Increased fine sediments can also create habitat more conducive to the presence of tubifex worms and, if whirling disease is present, can increase disease prevalence in resident salmonid populations.

Where actions or activities include roads, there is high risk of sediment impacts. Roads increase surface runoff and sedimentation and, where they cross waterways, often require in-channel structures, such as culverts, and bridges that remove aquatic habitat and may be barriers to fish passage (Bryant 1981; Barrett et al. 1992). Studies show that roads can contribute 50 percent to 80 percent of the sediment that enters streams (Hagans et al. 1986). Cedarholm et al. (1980) found that fine sediment in salmon spawning gravels increased by 2.6 to 4.3 times in watersheds with more than 4.1 miles of roads per square mile of land area. As sediment delivery into streams increases, the standing stock of trout decreases.

Amphibians that require clear ponds where they can breed can be impacted by increased sediment and turbidity. Egg masses can be covered by sediment, which impairs productivity, and tadpoles can have reduced feeding efficiency caused by prolonged turbidity. Road use can increase the risk of mortality to amphibians.

While some aquatic species are more sediment tolerant, sediment loading that is out of balance with flows caused by altered flow regimes can still result in impacts. Sediment loads beyond what water volumes can effectively and efficiently move can restrict channel width, reduce side-channel formation and maintenance, and result in reduced numbers and depth of important microhabitats such as backwaters. In general, sediment

loads out of balance with flow regimes can result in reduced habitat complexity and diversity and reduce habitat quality.

Loss or Reduction of Streamside Vegetation Cover. Actions including riparian weed treatments, construction of bridges, roads, pipelines, campgrounds, boat ramps, livestock grazing, and recreation activities are the primary causes of loss or reduction of streamside vegetation. Natural events such as flood, fire, and drought can also result in streamside vegetation loss or reduction. Loss or reduction of streamside riparian vegetation can alter the nutrient dynamics of the aquatic ecosystem. In areas where riparian vegetation has been depleted or lost, a shift in energy inputs from riparian organic matter to primary production by algae and vascular plants has been predicted (Minshall et al. 1989) and observed (Spencer et al. 2003). The increased solar radiation that results from the loss of streamside (or poolside) vegetation causes temperatures, light levels, and autotrophic production (i.e., plants and algae) to increase. This change in the food web of a stream can alter the composition of food and thus energy sources that are available to resident fishes and aquatic invertebrates. Terrestrial insect diversity and productivity also decreases with reductions in streamside vegetation, which also affects food availability for resident fish. Increased stream temperatures affect trout by reducing their growth efficiency and increasing their likelihood of succumbing to disease.

Prolonged and excessive utilization of streamside/riparian vegetation can also result in increased peak flows if vegetation is not sufficient in root mass, size, or abundance to sufficiently slow stream velocities. The loss of streamside vegetation reduces water percolation and infiltration, leading to unnaturally high and frequent runoff. This high runoff can result in accelerated bank erosion and sloughing, increased siltation, elevated stream temperatures, widened and braided stream channels, and loss of overhanging banks, all of which are important factors affecting trout productivity in a given stream (Gardner 1950, Armour 1977, Behnke 1979, Claire and Storch 1977, Glinski 1977, and Kaufman et al. 1983). A study by Gunderson (1968) indicated that the weight per acre of brown trout was 31 percent higher in unaltered stream sections. It was noted that this higher level was attributed to there being a narrower, deeper channel system, more favorable composition and distribution of water types, and more cover in the unaltered section because the riparian vegetation had been preserved. For sediment-tolerant species, loss of streamside vegetation can result in reduced bank stability and increased potential for erosion and loss or reduced quality of microhabitats (e.g., backwaters and flooded bottomlands).

Loss of shoreline vegetation at amphibian breeding sites can reduce shade and increase water temperatures. Reduced food sources can also result with the loss or reduction of riparian vegetation. Reduced vegetation can allow for more sediment to enter breeding sites as the filtering properties are reduced. Reduced cover can also increase predation because amphibians generally occupy habitats with less hiding cover and thus are more vulnerable to predation.

Depending on the type of fisheries project or action, and stipulation exception criteria, some of the protective measures identified in Table 4.2.6-1 would eliminate or reduce impacts associated with active aquatic habitat management. In addition, aquatic species habitat management is subject to Land Health Standards 2, 3, 4, and 5 (BLM 1997a), which help guide habitat management on public lands. In areas where these standards are being met, there is reduced potential impact on fish and other aquatic wildlife from loss or reduction of streamside vegetation and offsite erosion and increased sedimentation and turbidity associated with select projects/actions.

This alternative would provide little protection specific to aquatic species. The Proposed RMP (Alternative B) would provide greater protection via the combined fish, water, and riparian NSO. Alternative C is similar to the Proposed RMP and would provide NSO protection on all perennial waters. Alternative D would be similar to this alternative and would provide no specific protective measures for general aquatic species and their habitats.

Impacts from Soils Management. Continued soils management would benefit aquatic species and their habitats by protective stipulations implemented to protect fragile, sensitive, or steep soil areas. Specific stipulations include GS-NSO-14 and GS-NSO-15, and GS-CSU-4. These stipulations collectively minimize the risk for erosion and reduce the scope of sedimentation and turbidity impacts in occupied habitats. In addition, soils are subject to Land Health Standard 1 (BLM 1997a), which helps guide soil management on public lands. In areas where this standard is being met, there is minimal potential impact on aquatic species or their habitat from offsite erosion and increased sedimentation. In the very limited areas where this standard is not being met, the risk for sedimentation and turbidity impacts are increased. Soils management benefits aquatic species the same under all alternatives, as protective measures are carried forward in all alternatives.

The actions of monitoring sites that are not meeting land health standards and identifying corrective projects, actions, or management to improve soil conditions would benefit aquatic species and their habitats in the long term by helping to reduce erosion and sedimentation and turbidity at select sites. Some of the corrective actions could result in some site–specific, short-term effects, but these effects would be mitigated at the time of project identification and planning.

Impacts from Water Resource Management. Current water resource management benefits all aquatic species by protective stipulations implemented specifically to protect water quality. These stipulations include GS-NSO-3, which limits ground-disturbing activities within 0.5 mile of six major rivers. Other stipulations identified in Table 4.2.6-1 directly or indirectly help to protect aquatic species and their habitats from other resource uses. In addition to stipulations, water management is subject to Land Health Standard 5 (BLM 1997a) and Colorado State Water Quality Standards, which help guide water management on public lands. Areas where this standard and state standards are being met have minimal potential for adverse impacts on aquatic species or their habitats from impacts associated with alteration of water quality parameters. Water management activities are beneficial to aquatic species and their habitats under all alternatives.

This alternative would be less protective than the Proposed RMP, which would protect all water bodies and riparian areas via an NSO and all hydrological features via a CSU. Alternative C is similar with proposed NSOs for all perennial streams and streamside management zones. Alternative D would provide similar protective measures and levels of protection as this alternative.

Impacts from Forest and Woodland Vegetation Management. Continued management of forest and woodland vegetation would have limited impacts to aquatic species and their habitats. The primary objective is to manage for a healthy mix of age classes with an emphasis on areas with old growth trees or potential for old growth. Intensive management of this vegetation type and potential impacts are discussed in detail under the Impacts from Forestry Management section.

Treatments for forest and woodland include hand thinning, mechanical treatments, and prescribed fire to meat management goals and objectives. None of the protective stipulations identified in Table 4.2.6-1 applies specifically to management of forest and woodland vegetation and forest and woodland vegetation

management is not necessary constrained under existing NSOs, as some prescriptive treatments can be conducted with little or no ground disturbance in some areas. All vegetation management is subject to Land Health Standards 3 and 4 (BLM 1997a), which help guide vegetation management on public lands. Where these standards are being met, active management of forest and woodland vegetation is having minimal impact on aquatic species or their habitats. Impacts can be and are mitigated during site-specific analysis of individual treatment actions. The primary potential impacts on these species are increased sediment and turbidity and habitat alteration. The effects resulting from sedimentation and turbidity are described in detail in the Impacts from Fisheries and Aquatic Wildlife Management section.

Forest and woodland vegetation management is limited in scope and application. Where management activities would occur, impacts on select streams could result. However, these impacts would generally be short term and of limited scope and intensity. Treatments are designed with long-term watershed improvement and meeting Public Land Health Standards 3 and 4 as the primary goals. In the absence of new permanent road construction for treatments, forest and woodland vegetation management has long-term benefits to aquatic species by improving upland watershed health and maintaining productive habitats that allow for natural water infiltration and absorption rates and limited erosion potential over time. Where permanent or long-term road construction is needed to facilitate select treatments, impacts associated with erosion and increased sedimentation and turbidity can be chronic and long term at specific areas and can result in increased risk of identified impacts. Impacts would be similar under all alternatives.

Impacts from Vegetation Management—Rangelands. Under current management, there is limited prescriptive guidance on desired condition. Vegetation management for rangelands (sagebrush and mountain shrublands) is generally guided by Land Health Standards No. 3 and 4 (BLM 1997a), which calls for managing for diverse age-class structure and native productive understory grasses and forbs proper for the soil type and range site. Where these standards are being met, management of rangeland vegetation is having minimal impact on aquatic species or their habitats. None of the protective stipulations identified in Table 4.2.6-1 applies specifically to management of rangeland vegetation, and rangeland vegetation management is not necessarily constrained under NSO, as some prescriptive treatments to improve habitat condition can be conducted with little or no ground disturbance.

The primary impacts associated with rangeland vegetation management would result from vegetation treatments. It is possible that some treatments could have short-term sedimentation and turbidity effects that are described in detail in the Impacts from Fisheries and Aquatic Wildlife Management section. Effects would occur only until such time as desirable vegetation reestablishes to adequately stabilize soils and reduce erosion potential.

The action of prohibiting grazing on areas that are reseeded for two growing seasons would benefit aquatic species and their habitats by providing for recovery of disturbed rangeland sites and allowing vegetated ground cover to adequately stabilize soils and reduce erosion risk and sedimentation and turbidity impacts.

Impacts from Vegetation Management—Riparian. Current riparian vegetation management would continue to be largely beneficial to all aquatic species and their habitats. Protective stipulations that specifically protect riparian habitats include GS-NSO-2, which prohibits surface occupancy within all riparian vegetation, and GS-NSO-3, which further protects six major rivers. GS-CSU-2 further protects riparian vegetation by controlling surface uses within 500 feet of the outer edge of riparian areas to maintain functionality and accessibility by species that rely on this limited habitat type. In addition, riparian vegetation management is

subject to Land Health Standard 2 (BLM 1997a), which helps guide riparian management on public lands. Areas where this standard is being met have a reduced potential for adverse impacts on these species and their habitats from offsite erosion and increased sedimentation and turbidity as a result of the buffer provided by healthy, robust riparian areas along streams, rivers, and lakes—a buffer that filters out sediments as well as any undesirable constituents adsorbed onto the particles. Vegetated buffers also help protect surface waters from inflow of adverse dissolved constituents by capturing or slowing overland runoff, increasing the amount that infiltrates into the soil where it is filtered before it reaches the water through interstitial percolation.

Vegetation treatments in riparian areas could include the use of herbicides, fire, or mechanical removal of exotic plant species such as tamarisk or Russian olive. Several actions may be initiated to improve riparian areas including vegetation planting, exclosure fencing, and upland water developments. In select areas where active management or restoration of riparian areas would occur, there is potential for short-term negative impacts on aquatic species and their habitats, including habitat alteration, increased sediment loading and turbidity, and reduction or loss of streamside vegetation cover. The effects resulting from sedimentation and turbidity and loss or reduction of streamside vegetation cover are described in detail under the Impacts from Fisheries and Aquatic Wildlife Management section. The impacts from habitat alteration are addressed in detail below.

Habitat Alteration. Actions including riparian weed treatments, large ground-disturbing activities, construction of bridges, roads, pipelines, culverts, campgrounds, boat ramps, livestock grazing, large-scale vegetation treatments, and recreation activities are the primary causes of habitat alteration. Natural events such as flood, fire, and drought can also result in habitat alteration. Stream channel and streambank alterations can affect aquatic species in many ways. Mechanisms for impact on stream channels include channel relocation, channel constriction, channel braiding, diking, riprapping, and fine sediment input at levels greater than the stream can efficiently or effectively convey. Actions that affect streambanks can result in soil compaction, increased erosion, and widening or constriction of stream channels. Both stream widening and constriction can result in losses of habitat complexity and diversity and reduced water depths, which can reduce available habitat and cause increased stream temperatures. Increased temperatures can affect fish by increasing physiological stress, reducing feeding, and increasing susceptibility to disease. Streambank alteration also exposes bare soils, which provide for points of invasion by weedy species, and increases the risk of further erosion of weakened streambanks. Actions that increase the amount of soil exposed to the erosive effects of water will increase sediment loading and turbidity. This increase can alter feeding by fish that require water clarity to forage and capture prey. Actions that cause soil compaction result in decreased vegetation cover, less vigorous root systems, and more exposure of the soil surface to erosion (Burton et al. 2008). Habitat alteration coupled with reduced flows can result in buildup of sediment and alter channels by narrowing them and reducing habitat complexity for some species.

Amphibians can be affected by alteration of limited breeding pond habitats and overwinter habitats. Many species aestivate (burrow into streambank, pond, or soil substrates). Activities that disturb ground have the potential to disrupt amphibians and result in direct mortality. Breeding ponds can be drained or lowered in volume or have shorelines altered, which can impact breeding sites and limit productivity. Many amphibians require clear water ponds where they can breed and lay egg masses. Shoreline vegetation helps to buffer sediment impacts and moderate water temperatures. Activities such as livestock grazing and road construction and use in and near occupied habitats can alter habitats by reduction or loss of vegetation cover and increased sediment and turbidity. Roads and road use can disrupt spring migrations of these species from overwintering sites to breeding ponds.

This alternative would protect riparian areas with an NSO stipulation and a complementary CSU protection 500 feet beyond the edge of riparian. The Proposed RMP and Alternative C would provide similar protective measures. Alternative D is less protective and would provide only a CSU versus NSO level protection. The impacts of active riparian management would be generally the same under all alternatives.

Impacts from Vegetation Management—Weeds. Continued weed management would be largely beneficial for aquatic species and their habitats. Weed management is conducted under the recently completed CRVFO integrated weed management plan and EA (BLM 2009e), which is tiered to the programmatic EIS for use of herbicides on BLM Lands in 17 western states (BLM 2007i). Analysis of aquatic species and their habitats was addressed in both documents and each set the sideboards on treatment of weeds within and near aquatic habitats. Depending on the type of weed treatment and exception criteria, some of the NSOs identified in Table 4.2.6-1 would help protect aquatic species from identified impacts. Weed management is subject to Land Health Standards 2, 3, and 4 (BLM 1997a), which help guide vegetation management on public lands. In areas where these standards are being met, there is reduced potential impact on aquatic species from offsite erosion and increased sedimentation and turbidity associated with degraded weed infested habitats. Weed management is the same under each alternative.

Actions including promoting weed awareness, prioritizing treatment areas, and using integrated treatment methods to treat weed infestations would all have limited impact on aquatic species and their habitats. Management for noxious and invasive weeds includes herbicide use, biological controls, and mechanical or manual treatments in weed-infested areas. In areas where active weed management in the form of treatments would occur, there is potential for short-term impacts to aquatic species, including loss or reduction of streamside vegetation cover (where tamarisk, Russian olive, or other weedy riparian treatments occur) and increased sedimentation and turbidity from loss of vegetation before reestablishment of desirable species. These impacts are addressed in detail in the Impacts from Fisheries and Aquatic Wildlife Management section. All weed treatments would have long-term benefits to aquatic species and their habitats, as native vegetation would be restored, improving watershed health. In addition, weed treatments would improve streambank stability, water quantity, and habitat diversity. Effects of selective weed treatments would be mitigated at the time of project identification and planning.

Impacts from Terrestrial Wildlife Management. Continued wildlife habitat management would be largely beneficial to aquatic species and their habitats in the long term. Several species-specific wildlife NSOs collectively limit ground-disturbing activities from primarily upland habitat, which indirectly helps to minimize impacts on aquatic species and their habitats from other resource uses. In addition, wildlife habitat management is subject to Land Health Standards 2, 3, and 4 (BLM 1997a), which help guide habitat management on public lands. In areas where these standards are being met, there is reduced potential impact on aquatic species.

Habitat manipulations, such as prescribed burns, mechanical vegetation treatments, and chemical controls, are typically used to improve habitat for wildlife. These projects often result in some vegetation reduction or removal intended to stimulate regrowth, change species composition or diversity, and improve upland watershed health. In some cases, ground disturbance is minimal; in others, more substantial. In the short term, increased sedimentation and turbidity could result until such time as desired vegetation is established in treated areas. Over the long term, improved watershed health would benefit aquatic species as vegetation cover is improved, soil stability is increased, erosion potential is reduced, and water absorption and infiltration

rates are improved. The detailed effects are addressed in the Impacts from Fisheries and Aquatic Wildlife Management section.

Impacts associated with active wildlife habitat treatments would be generally the same under all alternatives. The Proposed RMP and Alternative C would provide more substantial indirect protection to aquatic species and their habitats by limiting ground disturbance by an NSO on more acres from other resource uses. Alternative D would provide more limited protection for wildlife and therefore less indirect protection to aquatic species.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Continued management of special status fish and other aquatic wildlife species and their habitats would have long-term benefits to aquatic species. Limited protections exist. GS-NSO-3 provides protections for aquatic species and their habitats in the Colorado River. Other protective measures in Table 4.2.6-1 would directly or indirectly help minimize impacts on aquatic species and their habitats from other resource uses.

Actions to improve habitats for these species include but are not limited to barrier placements and removals, in-channel habitat enhancement structures (e.g., rock placement and backwater creation), riparian plantings, weed removal, and fencing. In select areas where active habitat management in the form of projects would occur, there is potential for site-specific short-term impacts including loss or reduction of streamside vegetation cover and increased sedimentation and turbidity. These effects are discussed in in the Impacts from Fisheries and Aquatic Wildlife Management section. All projects would be designed to provide long-term benefits to these species and their habitats.

In select areas where competitive or non-native fish or other aquatic species are impacting native special status species, there is potential for actions that result in the reduction or removal of select target species, which would have direct negative effects on local populations of these species (e.g., brook trout and bullfrogs).

Impacts from Special Status Plants and Terrestrial Wildlife Management. Continued management of special status plants and terrestrial wildlife species and their habitats would largely benefit aquatic species. This alternative contains several NSOs for specific special status plants and terrestrial wildlife that would help to indirectly protect aquatic species and their habitats from other resource uses. The Proposed RMP and Alternative C are similar and contain more protective measures covering greater acreages, which would indirectly help protect a greater amount of aquatic species habitat. Alternative D would provide less protection to special status plant and terrestrial species and hence less indirect protection to aquatic species.

The action of implementing applicable conservation and restoration measures identified in the *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000), would have limited impact on aquatic species or their habitats. Limited lynx habitat exists in the planning area, and select treatments would be small and site specific with long-term benefits associated with improved watershed conditions. Select vegetation and forestry treatments could result in some short-term, site-specific impacts, including sedimentation and turbidity, which are addressed in detail in the Impacts from Fisheries and Aquatic Wildlife Management section. Impacts identified would be mitigated at the time of project identification and planning.

Impacts from Wildland Fire Management. The GSFO FMP manages fire as outlined in the current RMP. The FMP contains in-depth analysis of potential impacts to aquatic species as well as minimization and

mitigation measures required to conduct fire management activities to reduce potential impacts. This analysis and associated mitigations were incorporated by reference as addressed in the FMP and are the same for all alternatives. Fire suppression actions could result in loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, water quality alteration, and water depletions. The detailed effects of loss or reduction of streamside vegetation cover and sedimentation and turbidity are addressed in the Impacts from Fisheries and Aquatic Wildlife Management section. Detailed effects of habitat alteration are addressed in the Impacts from Vegetation Management – Riparian section. The detailed effects of water quality alteration and water depletions are addressed below.

Water Depletions. Stream and river flows and reservoir and pond volumes are generally climate dependent, but water diversions and impoundments play a substantial role with regard to localized flow regimes and water volumes of streams, rivers, and ponds. The primary actions and activities that result in water depletions include construction of water developments (stock ponds, reservoirs, and spring developments), water diversions for agricultural and domestic uses, water use associated with energy development, rights-of-ways, and wildland fire suppression. Reduced water flow or volume directly correlates to a loss of wetted habitat for aquatic species.

Reduced water volumes can result in increased water temperatures, reduced food supplies, reduced habitat complexity and diversity, and a loss of species carrying capacity. When coupled with stable or increasing sediment loading, some systems can be overwhelmed with more sediment than can effectively be moved because of the reduced flow volumes. This reduction can result in reduced habitat complexity and loss of habitat diversity, including important microhabitats such us spawning bars, backwaters, pools, eddies, side channels, and flooded bottomlands. Reduced flows, and especially peak spring flows, can affect riparian vegetation maintenance and recruitment of young plants. Reduced flows can result in habitat fragmentation and limit movement of trout species between preferred habitats. Holding habitats (pools) can be reduced in size and become less useable by fish or amphibians. Fish that congregate in limited pool habitats for long periods can incur increased stress and susceptibility to disease.

Breeding ponds that lose water volume can become unusable by amphibian species. Increased predation can result, as less wetted habitat exists where they can hide from predators. Reduced pond volumes can cause increased risk of anoxia frogs. Bradford (1983) observed that anoxia was more severe in shallow lakes or ponds (i.e., less than 4 meters deep), and nearly all adult frogs died in these bodies of water in some winters.

Water Quality Alteration. The primary activities that have the potential to result in water quality alteration include select fire suppression actions, post-fire run-off events, livestock grazing, spills or leaks of hazardous substances, select agricultural practices, hard rock mining, and energy development. The effects of changes in water quality are well documented on trout species. Trout species prefer cold water, neutral pH, and high dissolved oxygen levels to thrive.

Grazing by livestock can result increased nutrient loading. Eutrophication can result in small streams with limited flow. In this condition, the increase of mineral and organic nutrients has reduced the dissolved oxygen levels within the stream, producing an environment that favors plant life over animal life. In other words, the mineral and organic nutrient levels being inputted into these streams are greater than the stream's flows can dilute or carry through the system. The symptoms of this condition are often seen as large algae blooms that form dense patches within a stream. These blooms further deplete oxygen levels and reduce habitat quality for resident fish. Studies have reported the effects of livestock grazing on water quality (Buckhouse and Gifford

1976), water chemistry (Jefferies and Klopatek 1987), and water temperature (Van Velson 1979). The changes are subtle over time (Elmore and Beschta 1987) but tend to have a profound effect on aquatic ecosystems (Kauffman and Krueger 1984). Proper livestock grazing would reduce the risk of these impacts.

Activities such as energy development, road use, active pipeline rights-of-ways, and other construction activities can alter water quality by way of spills, leaks, or vehicular accidents. Impacts to aquatic species can range from sub-lethal (stress, reduced feeding behavior, and reduced breeding success and recruitment), to direct mortality of individuals or populations of aquatic species. These impacts are of particular concern regarding select trout populations or known breeding sites for amphibians. Given the nature of energy development, numerous vehicles carrying varying substances traverse roads located near and often adjacent to perennial streams on a daily basis. In addition, numerous pipelines exist and transport various chemicals. Spills, leaks, and other accidents, while never planned, do occur and there is potential for negative effects to aquatic species. In select areas, entire populations of trout could be at risk, depending on the location and timing of the spill and the substances involved. Specific BMPs including spill prevention and contingency plans, closed loop drilling, collocated facilities and pipelines, automatic shut-off valves, and notification protocols all help to reduce the risk of accidental spills.

Use of chemicals for weed treatments, fire suppression, or other vegetation management could impact aquatic species and their habitats by overspray and drift to non-target areas and habitats. These chemicals can result in effects ranging from sub-lethal (reduced feeding, loss or reductions of prey species, and habitat avoidance) to direct mortality. Following protocols for fire suppression and weed treatments would substantially reduce the risk of these impacts.

The actions of utilizing the full range of wildland fire management options and suppression tactics and of minimizing costs and loss of property and natural resources while maximizing resource benefits from fire would have limited impact on aquatic species or their habitats. Fire is a natural component of the ecosystem and when managed for resource benefit is an important restoration tool that improves watershed health. Given current fuel loads and the potential for larger, more catastrophic fires, there is some potential for impacts to select aquatic species and their habitats, including sedimentation and turbidity and water quality alteration in the event some fires are managed and allowed to grow large. Potential impacts would be mitigated in coordination with the Fire Resource Advisor at the time of a particular fire event.

Impacts from Forestry Management. Continued forestry management would have limited impact on aquatic species and their habitats. The CRVFO contains limited commercial forestland habitat. Commercial forestry (e.g., timber harvests and sales) provides for a variety of prescriptive silvicultural applications. These activities could include the use of heavy equipment, helicopters, chemical applications, road construction, and tree removal. Depending on the type of treatment and the need for road construction, many of the protective stipulations in Table 4.2.6-1 would help to reduce impacts aquatic species and their habitats. However, some forest management practices result in minimal ground disturbance and would not necessarily be encumbered by identified NSOs. All vegetation management is subject to Land Health Standards 3 and 4 (BLM 1997a), which help guide vegetation management on public lands. Where these standards are being met, active forestry management would have minimal impact on aquatic species.

Forest management is limited in scope and application, and a limited number of timber treatments have occurred to date. With the ever-increasing pine beetle issue, it is likely that select treatments will increase. Where timber management would occur, there is the potential for impacts including habitat alteration and

increased sediment loading and turbidity. These effects are addressed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, and Impacts from Vegetation Management – Riparian sections. In the absence of new road construction, these impacts would be generally short term and of limited scope and intensity. Where new road construction would be associated with select treatments, impacts associated with erosion and sedimentation and turbidity would be chronic and long term at specific areas and would result in increased risk of identified impacts to aquatic species.

Treatments would be designed with the goal of improving long-term watershed health and meeting of Land Health Standards 3 and 4 (Appendix J). Prescriptive treatments would have long-term benefits to aquatic species by improving upland watershed health and maintaining productive habitats that allow for natural water infiltration and absorption rates, improved vegetation ground cover, and limited erosion potential.

Alternative A would actively manage the most acres of forestland and woodlands. The Proposed RMP and Alternatives C and D would apply intensive management to fewer acres of commercial forestland and limited management to remaining forests and woodland vegetation. Impacts would be similar under each alternative.

Periodic stand exams and regeneration surveys and select forest stand treatments and prescriptions could result in some short- and long-term potential effects including sediment loading and turbidity and habitat alteration. However, proper forestry management would result in improved watershed conditions in the long term. Treatments would help to reduce catastrophic fire risk and improve water infiltration rates. Potential impacts associated with select treatments would be mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. Under current management, none of the protective stipulations identified in Table 4.2.6-1 applies specifically to livestock grazing. Under this alternative, a combined 488,300 acres of BLM land are open and available for livestock grazing, providing for 39,200 AUMs. Livestock grazing is subject to land health standards (BLM 1997a), which help guide grazing management on public lands. Where the guidelines are being followed and the standards are being met, livestock grazing is having minimal impact on aquatic species or their habitats. Where improper grazing occurs, potential impacts include habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, and increased sediment loading and turbidity. These impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections. In areas where range improvements associated with livestock management are constructed — such as fencing, cattle guards, and upland water developments — there is potential for short-term negative impacts on aquatic species, including habitat alteration, increased sedimentation and turbidity, and water depletions. Where new road construction is needed to access range improvements, these new roads can create chronic long-term point sources for increased sedimentation and turbidity. Stock ponds are often designed to capture water that would otherwise feed streams, which results in water depletion impacts. Upland water developments also tend to concentrate livestock use, which can result in soil compaction and site specific vegetation utilization above desired levels. However, many of the these range improvements would have benefits to aquatic species as livestock distribution would be improved, utilization would be reduced along streams, and in some cases aquatic habitat would be created by water development construction.

Impacts under this alternative would be increased in scope and intensity compared with the Proposed RMP and Alternatives C and D, given the higher number of acres and AUM's provided.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to aquatic species and their habitats. Proper management and monitoring would help to ensure the land health standards would be met across the planning area. Meeting these standards would help to improve watershed conditions in the long term. Some vegetation treatments to improve forage condition and productivity could result in some short-term, site-specific impacts associated with increased sedimentation and turbidity. These effects would be mitigated at the time of project identification and planning.

Impacts from Recreation and Visitor Services Management. Under current management, recreation impacts aquatic species and their habitats in many ways. In the eight SRMAs, recreation is the primary management emphasis of these lands. Areas are managed to provide specific recreation activities. In select SRMAs emphasis activities include mountain biking, hiking, and motorized recreation among others. In other SRMAs, current management promotes solitude and nonmotorized activities. In SRMAs where management emphasizes increased use and development, it is likely that more routes would be created to meet user demand and desired experiences. Increases in miles of travel routes would result in increased and long-term sedimentation and turbidity and habitat alteration. All the remaining lands are managed the Glenwood Springs ERMA or RMAs. Stipulations associated with these areas include GS-NSO-16, which limits large surface-disturbing activities in five of the SRMAs, and GS-NSO-17, which limits large surface-disturbing activities within eight RMAs. These provide some indirect protections to aquatic species, however; these protections don't preclude the creation of more recreation facilities (e.g., trails, roads, and infrastructure). In addition, the protective measures in Table 4.2.6-1 either directly or indirectly protect aquatic species by limiting ground-disturbing activities from other resource uses.

Recreation is often associated with and occurs within or near water sources such as rivers, streams, lakes, and reservoirs. Human activity near and within these habitats can result in habitat alteration, reduced or loss of riparian vegetation cover, increased sedimentation and turbidity, spread of aquatic nuisance species and disease vectors, and water quality alteration. Disturbed areas serve as niches where invasive weedy vegetation can take hold. Humans can serve as dispersal mechanisms for some weed species and help spread weeds to new areas. Spread of weeds reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption. The potential spread of aquatic nuisance species and disease vectors is discussed in detail below. The remaining impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections.

Aquatic Nuisance Species and Disease. Water-based recreation activities including fishing, and float and motor boating provide the primary means to spread aquatic nuisance species and disease vectors among aquatic habitats. Primary nuisance species of concern include quagga mussels, New Zealand mud snails, zebra mussels, and rusty crayfish. All of these non-native species compete with native species for habitat, food, and other vital resources and tend to displace native species over time. Spread of disease vectors is also of concern and includes chytrid fungus and whirling disease. Chytrid fungus effects amphibian species and can reduce population size and long-term persistence. Whirling disease affects trout species and limits recruitment and long-term population persistence. To minimize impacts associated with managed recreational activities, BMPs included in Appendix G are in place to help reduce or eliminate the spread. Select activities may have stipulations requiring adherence to specific protocols to limit the risk of spread.

User-created trails, road and OHV use, camping, fishing, hunting, mountain biking, hiking, wildlife watching, and boating, among many other activities, can result in some or all of the identified impacts. The majority of

the SRMAs are not located in close proximity to many aquatic species habitats. Many of the impacts would be indirect and occur later downstream from the areas or primary activity. In addition to managed recreation, BLM lands are open to numerous dispersed recreation activities that are not actively managed but result in the same impacts as identified.

Visitor demand and use is expected to increase within the planning area under all alternatives. All of the identified impacts associated with recreation are expected to increase in scope and intensity. Under current management, more intensively managed recreation opportunity is provided within the SRMAs where specific recreational pursuits are identified and managed for. However, these areas are not managed to the exclusion of other recreational uses. ERMAs are the more traditional dispersed recreational areas where no one use is necessarily favored or targeted over another and BLM management is largely custodial with no specific recreation prescriptions identified. In areas where motorized use is emphasized or would increase, impacts including sediment and turbidity, habitat alteration, loss or reduction of riparian vegetation cover, and water quality alteration would be long term and chronic. Impacts from managed recreation can be mitigated during site-specific analysis of individual actions primarily by issuing Special Recreation Use permits, which are used to control some visitor use and reduce resource conflicts and impacts.

Current management protects a similar amount of acreage from large ground-disturbing activities via NSO as the Proposed RMP and Alternative D. Alternative C protects less than half as much acreage via two SRMAs.

Implementation actions identified for recreation and visitor services management would result in minimal impacts regarding potential fees and issuing SRPs for select activities. These actions would help to more effectively manage recreation activities by potentially providing a funding source and managing select activities. These actions would help to reduce the recreational impacts identified above.

Impacts from Comprehensive Trails and Travel Management. Under current management, a total of 295,900 acres is open to year-round off-road travel. In total, 44,000 acres are closed to motorized use and the remaining acres are limited to existing routes or designated routes. Travel management under this alternative allows for substantial proliferation of user created routes and increased risk, scope, and intensity of impacts, including habitat alteration, loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, and water quality alteration. These impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections. The protective stipulations in Table 4.2.6-1 either directly or indirectly protect aquatic species and their habitats from some road and trail related impacts, but these stipulations have limited utility as they apply to managed travel activities and not dispersed activities.

Roads increase surface runoff and sedimentation and, where they cross waterways, often require in-channel structures, such as culverts and bridges that remove aquatic habitat and may create barriers to fish passage (Bryant 1981; Barrett et al. 1992). Studies show that roads can contribute 50 to 80 percent of the sediment that enters streams (Hagans et al. 1986). Cedarholm et al. (1980) found that fine sediment in salmon spawning gravels increased by 2.6 to 4.3 times in watersheds with more than 4.1 miles of roads per square mile of land area. Matthews (1999) linked increased road densities to increased sediment yield in the Noyo River.

Roads and trails provide means of water conveyance, which accelerates flow velocities and increases erosion and offsite soil movement and ultimately sedimentation and turbidity. They also compact soils, which reduces water absorption and infiltration rates and increases peak flows. In addition, disturbed areas associated with

OHV use serve as niches where invasive weedy vegetation can take hold. Vehicles can move weed seeds and aid in dispersal and establishment of new populations. These influences reduce watershed health and result in poor soil retention, increased runoff, and poor water infiltration and absorption. Where motorized and in some cases mechanized use are high or increasing, erosion potential is increased. These impacts are amplified where user-created routes and OHV use is occurring or increasing.

Visitor use and demand are expected to increase within the planning area under all alternatives. Under this alternative, it is likely that increases in miles of new user created routes would result. All of the identified impacts associated with trail and road management would be expected to increase in scope and intensity as well. In areas where OHV use is occurring or would increase, impacts, including increases in sediment and turbidity, soil compaction, loss of riparian vegetation and cover, habitat alteration, and water quality changes, would be long-term and chronic.

As compared with the Proposed RMP and Alternatives C and D, which would restrict travel to designated routes, this alternative would pose the greatest risk, magnitude, and intensity of identified impacts to aquatic species and their habitats. These impacts are the result primarily of allowing off-road vehicular use and closure of only limited numbers of select roads and routes.

Impacts from Lands and Realty Management. The current plan identifies parcels of public land as not suitable for disposal, and any disposal or acquisition of lands could result in a loss or gain of aquatic habitat and would be determined at the time of a proposed action. These effects could result in either benefits or potential impacts to aquatic species and their habitats. Under the current plan, there are 494,400 surface acres of lands identified as not suitable for disposal. Under current management, 34,500 acres would be petitioned for withdrawal from locatable mineral exploration and development. This amount is far less than the other three alternatives and would allow the most potential impact from locatable mineral exploration and development.

This larger acreage would increase the risk of habitat alteration, alteration of water quality, and increased sediment loading and turbidity impacts, as well as the scope and intensity of these impacts.

Construction and maintenance associated with ROWs or other land use authorizations (such as permits, leases, and easements) can result in impacts to aquatic species and their habitats, including habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, increased sediment loading and turbidity, and water depletions. These impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections. Specifically, activities that result in ground disturbance and removal of native vegetation for construction of ROWs can have short-term or long-term negative effects. Collectively, all of these activities have the potential to provide for the offsite movement of soils and increase sediment loading and turbidity in nearby water bodies. In addition, disturbed areas serve as niches where invasive weedy vegetation can take hold. Weeds reduce watershed health and result in poor soil retention, increased runoff, and poor water infiltration and absorption. Increased miles and densities of roads are a concern, because they are a long-term chronic source of erosion and sedimentation, serving as water collection and conveyance corridors to live streams and ephemeral drainages that ultimately feed live streams.

This alternative contains 101,300 acres of avoidance areas and 20,800 acres of exclusion areas for communication facilities and utilities. These occur primarily in the existing WSAs. Identified impacts under

this alternative would be greater in scope and intensity compared with the Proposed RMP or Alternative C, which have increased acres of avoidance and exclusion. Alternative D would result in similar scope and intensity of identified impacts as this alternative.

Impacts from Coal Management. Current management identifies 28,500 acres of the federal mineral estate as open to further consideration for coal leasing. All of the identified coal resources within CRVFO are located along the Grand Hogback between Rio Blanco Hill and Glenwood Springs. Of that amount, 1,600 acres were found to be unacceptable for coal leasing based on multiple use conflicts. This alternative contains one protective stipulation, GS-NSO-1, on surface coal mining areas that would exclude surface occupancy associated with other resources uses within the area of an approved surface coal mine.

Development of coal resources could impact aquatic species and their habitats in many ways. Coal mining would likely result in habitat alteration, increased sedimentation and turbidity, water quality alteration, and water depletions. Disturbed areas could serve as niches in which invasive weedy vegetation can take hold. This vegetation reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption. These impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections. Large-scale coal mining is not currently being conducted. If activity were to increase under current management, the impacts discussed above would occur at site-specific locations. Site-specific planning would help to mitigate and reduce negative impacts on aquatic species and their habitats. This alternative would have the most impact to aquatic species and their habitats. The Proposed RMP, and Alternatives C and D identify no lands as having potential for developable coal resources and no identified lands available for lease.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Current management of fluid minerals is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is located. It is estimated that 99 percent of future drilling activity will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the federal mineral estate in this high potential area, approximately 88 percent has been leased and currently is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling activity is predicted in the areas identified as no-known potential.

Each phase of oil and gas development—from exploration and construction through operation and abandonment—has a specific combination of impact type, intensity, and duration.

- Exploration and Construction—The initial phase of development typically lasts for 25 to 40 days, depending on depth, and is very equipment intensive. Associated activities include blading an access road and pad (with an average combined area of 3.4 acres per well) and nearly continuous operation of a drill rig and other specialized heavy equipment. On average, 580 round trips by heavy trucks and pickups are associated with each new well.
- Operation and Production—This phase typically involves minimal personnel in the field except at compressor stations and water disposal facilities, with periodic traffic to each well for monitoring and

maintenance. Reclamation of temporarily disturbed areas begins when construction is complete. Successful reclamation for weed and erosion control is expected to occur within 3 to 5 years after disturbance.

- Abandonment—The final phase of an oil or gas well occurs at the end of its productive life, typically ranging from 20 to 40 years. During abandonment, surface facilities are removed, wells are plugged, and access roads are reclaimed unless deemed necessary for resource management or if requested by the landowner. These activities involve a short-term increase in workers and vehicles in the project areas. Abandonment and reclamation require approximately 3 days per well and 4 days per mile of access road, for a crew of four people.
- Reclamation—Restoration of temporarily disturbed areas at the well pad and along the access road begins when construction is complete, attaining reclamation standards in 3 to 5 years after planting. Areas of long-term disturbance, which are occupied by surface facilities and ongoing human activity throughout the life of the well, are reclaimed after abandonment.

Throughout this and all alternatives, 88 percent of the high-potential area has already been leased for natural gas development. Depending on the time of lease, any number of protective stipulations may apply to specific lease parcels. Where lands have been leased since completion of the Supplemental 1999 Oil and Gas Leasing EIS, the stipulations in Table 4.2.6-1 would apply and help to reduce impacts to aquatic species. The primary impacts on aquatic species and their habitats include water quality alteration, habitat alteration, water depletions, and increased sedimentation and turbidity. These impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections. Of primary concern are activities that result in ground disturbance and removal of native vegetation for construction of well pads, roads, pipelines, compressor and relay stations, settling ponds, geophysical seismic exploration, and various other assorted infrastructure. Collectively, all of these activities have the potential to provide for the offsite movement of soils and increase sedimentation and turbidity into aquatic habitats. In addition, disturbed areas serve as niches where invasive weedy vegetation can take hold. Weedy vegetation reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption. Increased numbers and densities of roads are a concern, as they are long-term chronic point sources of sediment input. Impacts are amplified and more acute in areas where natural gas development is occurring in small discrete watersheds containing trout species.

Generally, where proper and timely reclamation is occurring at well pad and pipeline sites and where proper road and drainage structure construction and maintenance are occurring, risks of erosion and impacts from sedimentation and turbidity are reduced. Where reclamation and road maintenance practices have been poor or neglected, sedimentation and turbidity impacts are greater in intensity.

Under this alternative, a total of 672,500 acres would be open for leasing and development. This alternative would allow for the most activity and most acres of disturbance. The Proposed RMP and Alternative C would reduce acreages open to leasing and development, and Alternative D would allow development at similar levels as this alternative. Given the protective measures in place on a given lease, the impacts identified may be reduced at specific locations. In addition BMPs identified in Appendix G help to reduce negative effects.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under current management, the protective stipulations in Table 4.2.6-1 apply to all of these activities, except locatable minerals activities that are subject to federal laws and regulations under the General

Mining Law of 1872. Under this alternative, a total of 34,500 acres would be petitioned for withdrawal to these activities. The remaining acres would be open subject to site-specific analysis. Locatable and salable mineral management could impact aquatic species and their habitats in many ways, including habitat alteration, increases in sediment load and turbidity, loss of riparian vegetation cover, and water quality alteration. These impacts are discussed in detail in the Impacts from Fisheries and Aquatic Wildlife Management, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management sections. In particular, gravel pits near occupied habitats would pose a higher risk to aquatic species and their habitats. Water quality is a major concern with certain mineral materials mining practices and, depending on location and scope, could have site-specific direct negative impacts over the long term.

This alternative and Alternative D would have the greatest risk to aquatic species and their habitats, as the fewest acres would be withdrawn from consideration of these activities compared with the Proposed RMP and Alternative C.

Implementation actions associated with disposal of salable minerals and mineral materials would have limited impact on aquatic species and their habitats. Disposal of mineral materials would be limited and site specific, and any potential impacts would be mitigated at the time of project identification and planning.

Impacts from Renewable Energy Management. According to the US Department of Energy, National Renewable Energy Laboratory, the planning area has a low potential for wind and solar energy. Aquatic species were addressed in the *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005b). In summary, these impacts fit into the categories of habitat alteration and increased sedimentation and turbidity. Under this alternative, applications for solar and wind energy exploration and development would be considered on a case-by-case basis. Any impacts on aquatic species would depend on the location and type of project proposed. Protective measures included in Table 4.2.6-1 would help reduce potential impacts. Impacts would be the same across all alternatives.

Impacts from Areas of Critical Environmental Concern Management. Under current management, six ACECs exist. The existing stipulations associated with the management of these areas generally benefits aquatic species and their habitats, especially where these designations overlap or are within watersheds occupied by aquatic species. Although managed with an emphasis on select resource values, the existing ACECs limit ground disturbances from other resource uses and activities, reducing impacts from erosion, sedimentation, and turbidity. The Glenwood Springs Debris Hazard Zone ACEC helps to indirectly protect cutthroat trout in Mitchell Creek, and the Lower Colorado River ACEC helps indirectly protect small BLM parcels along the Colorado River. Current management provides fewer ACECs and reduced acreage amounts compared with the Proposed RMP and Alternative C and is similar to Alternative D.

Impacts from Wilderness Study Area Management. The current management of four WSAs benefits aquatic species and their habitats, especially where occupied habitat is located in these designated areas. These existing WSAs, with their management prescriptions under BLM Manual 6330 – *Management of BLM Wilderness Study Areas*, limit human uses and exclude ground disturbance to the indirect benefit of aquatic species and their habitats.

Direction for managing aquatic wildlife in WSAs is prescribed by BLM Manual 6330. This manual allows stocking of native fish species within their historical ranges or exotics that were being stocked before October

21, 1976, and introductions of threatened, endangered, or other special status species native to North America within their historical ranges. Permanent installations could be permitted to maintain or improve conditions for fish, if the benefiting native species enhance wilderness values. All proposed actions must be scrutinized to determine if the action is necessary to protect the physical, biological, and cultural resources, as well as the quality of the wilderness experience.

WSA management would be the same under all alternatives and would benefit aquatic species the same. The exception is that the Proposed RMP and Alternatives C and D include additional prescriptive management should Congress release any of the existing WSAs from wilderness consideration.

Impacts from Wild and Scenic Rivers Management. Under current management, all stream segments determined as eligible would be managed under interim protection to preserve the free-flowing condition, water quality, ORVs, and tentative classifications. Aquatic species would benefit from continuing these protections because surface-disturbing activities from other resource uses would be limited along these streams. However, in many cases, the protections afforded aquatic species under WSR interim management would be additive to existing protective measures identified in Table 4.2.6-1. WSR eligibility status would be in effect until such time as new planning efforts were initiated or Congress would officially act on these eligible stream segments.

This alternative would be the most protective, similar to Alternative C, except that this alternative would provide protections for a lesser duration. However, policy guidance directs the BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the outstandingly remarkable values while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Under the Proposed RMP, BLM would recommend Deep Creek Segments 2 and 3 as suitable for designation. The BLM would defer a suitability determination on Colorado River segments and would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River segments. The Proposed RMP would provide less protection than Alternatives A and C but more than Alternative D, which does not recommend any of the eligible segments as suitable for designation so they would all be released from further protection under the Wild and Scenic Rivers Act.

Alternative B (Proposed RMP)

This alternative is BLM's Proposed RMP and includes a variety of protective stipulations that either directly or indirectly protect or benefit aquatic species and their habitats. The plan contains fisheries-specific stipulations and multiple resource stipulations as well as other resource stipulations that either directly or indirectly help to protect aquatic species and their habitats. In general, any NSO stipulation that limits ground-disturbing activity is beneficial to aquatic species. However, not all ground-disturbing activities are bad or result in negative effects, as mitigation measures and BMPs can be used to effectively mitigate site-specific impacts at the time of project identification and planning.

Table 4.2.6-2 shows the primary protective measures and stipulations under this alternative that would provide protections and reduce or minimize negative effects on aquatic species and their habitats.

Table 4.2.6-2
Primary Protective Measures/Stipulations under Alternative B (Proposed RMP)

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	Federal Mineral Estate
CRVFO-NSO-2 steep slopes greater than 50 percent	Newly proposed	76,200 acres	9,900 acres
CRVFO-NSO-4 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
CRVFO-NSO-5 perennial streams, water bodies, riparian areas, and aquatic dependent species	Newly proposed	35,900 acres	13,400 acres
CRVFO-NSO-6 fish hatcheries	Newly proposed	4,500 acres	3,300 acres
CRVFO-CSU-1 slopes greater than 30 percent and Fragile/Saline Soils	Newly proposed	338,100 acres	119,700 acres
CRVFO-CSU-3 intermittent and ephemeral streams	Newly proposed	44,900 acres	4,300 acres
CRVFO-TL-1 salmonid and native, non-salmonid fishes	Newly proposed	165 miles	65 miles
CRVFO-All Other NSOs combined	Existing and proposed	163,100 acres	42,000 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy or surface disturbing activities
ROD record of decision
TL timing limitation (seasonal restriction)

Impacts to fisheries and aquatic wildlife from soils management, vegetation management, wildland fire management, WSA management, and renewable energy management would be the same as or similar to Alternative A. Impacts from management of all other resources and uses would be as described below.

Impacts from Fisheries and Aquatic Wildlife Management. Proposed fisheries and aquatic wildlife management would be largely beneficial to aquatic species and their habitats. The combined resource stipulation CRVFO-NSO-5 protects all water bodies and riparian areas. Stipulation CRVFO-NSO-6 protects state fish hatcheries, stipulation CRVFO-CSU-3 protects ephemeral and intermittent drainages that can be used seasonally by aquatic species, and stipulation CRVFO-TL-1 protects spawning fish. Depending on the type of fisheries project or action and stipulation exception criteria, the remaining protective measures identified in Table 4.2.6-2 would help to limit impacts on these aquatic species from select activities.

In areas where active fish habitat management in the form of projects or treatments would occur, impacts could include site-specific and short-term habitat alteration, loss or reduction of streamside vegetation cover, and short-term increases in sedimentation and turbidity. These impacts are addressed in detail in Alternative A. The proposed management actions would provide more protection than Alternatives A and D and is similar to Alternative C.

Implementation actions associated with management of fish and aquatic wildlife habitats would be beneficial to aquatic species in the long term. It is possible that some treatments and projects would result in site–specific, short-term impacts, including habitat alteration, loss or reduction of streamside vegetation cover, and sedimentation and turbidity. These potential effects would be mitigated at the time of project identification and planning.

Impacts from Water Resource Management. Proposed water management would benefit aquatic species and their habitats similarly as addressed under Alternative A, except that this this alternative includes additional stipulations specifically to protect water quality, including stipulation CRVFO-NSO-3 for municipal watersheds and the combined resources CRVFO-NSO-5 for all water bodies and riparian areas. Stipulation CRVFO-CSU-3 provides protections to intermittent and ephemeral streams that may be used seasonally by aquatic species. In addition, other stipulations identified in Table 4.2.6-2 directly or indirectly protect aquatic species and their habitats from other resource uses.

The proposed management actions would provide similar protection as Alternative C. Alternative A is less protective and could allow for more water quality alteration, particularly in ephemeral and intermittent drainages. Alternative D is similar to Alternative A and provides limited protective measures.

Implementation actions associated with the proposed management of water resources would benefit aquatic species and their habitats. Monitoring and subsequent improvements would provide long-term benefits to aquatic species that require high-quality water to thrive. Select improvement measures could result in some site–specific, short-term impacts, primarily sedimentation and turbidity, which are discussed in detail in Alternative A, but would be mitigated at the time of project identification and planning.

Impacts from Riparian Vegetation Management. Riparian vegetation management under the Proposed RMP would be largely beneficial to aquatic species and their habitats. Riparian vegetation is protected by the combined resource stipulation CRVFO-NSO-5 for all water bodies and riparian areas. In addition, CRVFO-CSU-4 further protects riparian vegetation up to 500 feet beyond the outer edge. This level of protection is similar to Alternatives A and C. Alternative D would provide less protection with a CSU stipulation versus the NSO stipulation.

In select areas where active restoration of riparian areas would occur, impacts would include alteration of water quality, habitat alteration, increased sediment loading and turbidity, and reduction or loss of streamside vegetation and cover. These impacts would generally be short term and site specific and are discussed in detail in Alternative A. Active management or restoration of riparian areas would be designed for long-term benefits to riparian vegetation and species that depend on this vegetation.

Impacts from Terrestrial Wildlife Management. Proposed wildlife habitat management would be largely beneficial to aquatic species and their habitats. The plan contains several wildlife species specific NSOs that collectively protect large tracts of important terrestrial habitat from surface-disturbing activities. These NSOs would indirectly help protect aquatic habitats from offsite sedimentation and turbidity from other resource uses.

In areas where active wildlife habitat management in the form of vegetation treatments or projects would occur, impacts would include site specific short-term increases in sedimentation and turbidity. These impacts are addressed in detail under Alternative A. Proposed wildlife habitat management provides more protective measures than Alternatives A and D and is similar to Alternative C.

The implementation action associated with proper power line construction to eliminate electrocution risk to raptors would have no impact to aquatic species or their habitats.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under the Proposed RMP, management of special status aquatic species and their habitats would benefit aquatic species. Protective stipulations include CRVFO-NSO-4, which limits surface occupancy along six major rivers. Stipulation CRVFO-NSO-5 provides protection to all water bodies and riparian areas. Stipulation CRVFO-NSO-9 provides additional protections for federally listed species, and stipulation CRVFO-CSU-8 provides additional protection to BLM sensitive aquatic species. Stipulation CRVFO-CSU-5 is specific to special status amphibians and protects identified breeding sites. Stipulation CRVFO-TL-1 protects select fish species during spawning periods. Impacts associated with active project work would result in short-term negative effects, including habitat alteration, loss or reduction of streamside vegetation cover, and increased sediment and turbidity. These impacts are discussed in detail in Alternative A.

Management of special status aquatic species and their habitats under the Proposed RMP would provide greater protection and reduce the risk and scope of identified impacts compared with Alternatives A and D, but less protection to amphibians than Alternative C, which includes an NSO stipulation instead of a CSU stipulation at known or identified breeding sites.

Implementation actions associated with active management of special status aquatic species and their habitats would all be intended to provide long-term benefits to aquatic species. It is possible that some short-term impacts associated with some activities and projects could result, including site specific sedimentation and turbidity, loss or reduction of streamside vegetation cover, and habitat alteration. These impacts are discussed in detail in Alternative A. These impacts would be site specific, short term, and mitigated at the time of project identification and planning.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Proposed management actions for special status plants and terrestrial wildlife species and their habitats would be largely beneficial to aquatic species and their habitats. The plan contains several species-specific plant and animal NSOs that collectively protect select upland habitats. Active management in the form of vegetation projects or treatments could result in some short-term, site-specific impacts, including sedimentation and turbidity as addressed in Alternative A. Alternatives A and D provide less indirect protection to aquatic species and their habitats, and Alternative C is similar to the Proposed RMP.

Actions to stockpile topsoil in special status plant areas, close select transportation routes in special status species habitats, and implement select projects, treatments, and actions for Canada lynx would have limited impact on aquatic species or their habitats. Select route closures would benefit aquatic species by reducing erosion and sedimentation and turbidity effects. It is possible that some vegetation treatments for lynx could result in some site–specific, short-term impacts associated with sedimentation and turbidity, but in the long-term watershed conditions would be improved. Potential impacts to aquatic species would be site specific, short term, and mitigated at the time of project identification and planning.

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP, five areas totaling 34,500 acres would be managed for wilderness characteristics. These land units would be protected with an NSO stipulation and would be closed to fluid minerals leasing. Management of these lands would benefit aquatic species and their habitats indirectly downstream. Proposed management stipulations would provide a greater acreage of protection than Alternatives A and D, which do not manage any lands for wilderness characteristics, and slightly less protection than Alternative C that includes an additional unit adding 11,400 acres.

The protection of wilderness character via select actions identified in Appendix F would largely benefit aquatic species and their habitats. Preservation of ecosystems and habitats would limit ground-disturbing activities and eliminate effects associated with those types of actions and activities. Active management of select aquatic species habitat could be limited, depending on the type of action or project identified. Limited management could result in reduced ability to improve some habitats but would be minimal in scope.

Impacts from Forestry Management. Proposed forestry management would impact aquatic species and their habitats generally the same as is discussed in Alternative A, except that Alternative A has the most acreage identified for management and the short-term impacts would be reduced in scope, as the proposed management actions call for less intensively and actively managed forest and woodland resources compared with Alternative A. Alternatives C and D would manage forestry resources similarly to the Proposed RMP.

Impacts associated with management actions for forestry resources and select forest stand treatments and prescriptions would include potential for sediment loading and turbidity and habitat alteration. Some of these effects could be longer term. However, proper forestry management would result in improved watershed conditions in the long term. Treatments would help to reduce catastrophic fire risk and improve water infiltration. Potential impacts associated with select treatments would be site specific and mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. None of the protective stipulations identified in Table 4.2.6-2 applies specifically to livestock grazing. Under proposed management actions, a total of 441,600 acres of BLM land would be open and available for livestock grazing, providing for approximately 35,500 AUMs. This amount is more acres than Alternative C, similar to Alternative D, and less than Alternative A, but similar AUMs as the other alternatives. Impacts include sedimentation and turbidity, habitat alteration, water quality alteration, water depletions, and loss or reduction of streamside vegetation cover. These impacts are addressed in detail in Alternative A. Impacts would be similar in scope and intensity as Alternative D, given the relatively small differences in acre and AUM between the two alternatives. Alternatives A would increase the scope and intensity of identified impacts with increased acreage and AUMs, while Alternative C would reduce the scope of impacts with reduced acreage open to grazing but slightly increase the intensity of impacts, as similar AUMs would be provided on less acreage.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to aquatic species and their habitats. Proper management and monitoring would help to ensure the land health standards are met across the planning area. This alternative would help to improve watershed conditions in the long-term. Some vegetation treatments to improve forage condition and productivity could result in some short-term, site-specific impacts associated with increased sedimentation and turbidity. These effects would be mitigated at the time of project identification and planning.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP, five SRMAs and six ERMAs would be designated. In SRMAs, where the predominant land use focus is recreation and visitor services, aquatic species would be at greater risk for negative impacts such as sedimentation and turbidity. Generally, the greatest impact to aquatic species and their habitats would occur in SRMAs that (1) emphasize accommodating or attracting higher numbers of visitors increasing the risk, and intensity of identified impacts, or (2) require an expansion of recreation trails and facilities that would increase erosion potential and increased sedimentation and turbidity, and habitat alteration in aquatic habitats. Each area would have specific recreation objectives and provide select user experiences. Stipulation CRVFO-NSO-25 limits ground-

disturbing activities in these SRMAs to maintain recreational settings and achieve desired recreational opportunities and outcomes. However, where travel routes provide the primary recreation activities, it is likely that during the life of the plan new routes would be constructed, including single-track and two-track routes. ERMAs are protected by stipulation CRVFO-CSU-11 to help minimize other impacts on recreation. These protective stipulations and those identified in Table 4.2.6-2 would help to indirectly limit impacts on aquatic species and their habitats from other uses.

The impacts on aquatic species and their habitats include habitat alteration, reduction or loss of streamside vegetation cover, water quality alteration, spread of aquatic nuisance species and disease vectors, and increased sedimentation and turbidity. These impacts are addressed in detail under Alternative A. Proposed management actions would provide similar protection as Alternatives A and D but more than Alternative C.

Proposed implementation actions identified for recreation and visitor services management would result in minimal impacts to aquatic species and their habitats. The potential collection of fees and discretionary issuance of SRPs for select activities would help to more effectively manage recreation activities. These actions would help to reduce recreational impacts identified above.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, trail and travel management would impact aquatic species and their habitats via habitat alteration, water quality alteration, and increased sedimentation and turbidity. These impacts are addressed in detail in Alternative A. In the plan, the intensity and scope of impacts would be substantially reduced compared with Alternative A, as no off-route use would be allowed and travel would be restricted to designated routes. These restrictions would help to curtail development of user-created routes and would reduce the risk and intensity of impacts identified across large portions of the planning area.

Under the Proposed RMP, travel would be managed via a designated route system with 41,200 acres closed to other than foot and horse travel. This alternative is similar to Alternatives C and D, as both call for designated routes and similar closed acreage figures. The protective stipulations in Table 4.2.6-2 would directly and indirectly protect aquatic species and their habitats from new road and trail-related impacts and other resource uses by limiting and managing ground-disturbing activities including new routes.

The proposed management actions would call for decommissioning or obliteration of 50 miles of existing routes, compared with 0 miles in Alternative A, 205 miles under Alternative C, and 30 miles under Alternative D. This alternative would close select routes that were identified for resource conflicts but is not as beneficial to aquatic species as compared with Alternative C. The decommissioning of select routes would decrease erosion potential and sedimentation and turbidity impacts and would reduce the risk, magnitude, and intensity of identified impacts.

Proposed designation of travel routes (Appendix O) would have both short- and long-term impacts, as well as long-term benefits to aquatic species and their habitats. Moving to a system of designated routes would help to eliminate cross-country travel and user-created routes. Decommissioning and obliterating select routes would be help to reduce chronic sediment loading and turbidity impacts. Conversely, in areas such as SRMAs where recreation would be emphasized, the construction of new routes would result in long-term risk of erosion and sedimentation and turbidity impacts to aquatic species and their habitats. However, when properly designed and constructed, these routes would reduce impacts compared with many of the user-created routes currently in existence. Closing and rerouting unsustainable routes would reduce erosion

potential. Impacts associated with new route construction would be minimized at the time of project identification and planning.

Impacts from Lands and Realty Management. Proposed management of realty and lands actions and authorizations would impact aquatic species and their habitats by sedimentation and turbidity, reduction or loss of streamside vegetation cover, water quality alteration, habitat alteration, and water depletions. These impacts would be associated primarily with ROWs that disturb ground, such as new roads, pipelines, and power lines. These effects are addressed in detail in Alternative A. The Proposed RMP would call for more ROW avoidance acreage than Alternatives A and D and slightly less than Alternative C. This acreage would reduce the scope and intensity of identified impacts. The Proposed RMP is similar to Alternatives C and D regarding ROW exclusion acreages and nearly double what current management (Alternative A) provides. Effects would be similar in scope and intensity across the three action alternatives. Land tenure adjustments, including sale or exchange of public lands, could result in a loss or gain of aquatic habitat. These adjustments could result in either benefits or impacts on aquatic species and their habitats, depending on proposed uses of the lands in question. These activities would be evaluated at the time of project identification and planning, and aquatic species would be considered appropriately.

Under the Proposed RMP, 162,900 acres would be petitioned for withdrawal from mineral entry for locatable exploration or development. This alternative is more protective than Alternatives A or D but slightly less than Alternative C and would limit the scope and intensity of identified impacts on aquatic species. Under the Proposed RMP, the protective stipulations included in Table 4.2.6-2 would apply to most ROW actions, which would limit identified impacts.

Implementation actions associated with lands and realty management would be largely beneficial to aquatic species and their habitats. Collocating facilities would reduce new disturbances and reduce potential sedimentation and turbidity impacts. Encouragement of wind energy and any other new ground disturbing ROWs would likely result in some impacts including sedimentation and turbidity. These impacts would be mitigated at the time of project identification and planning.

Impacts from Coal Management. Proposed management actions for coal resources would have no impacts to aquatic species or their habitats, because no lands within the planning area are identified as having potential for coal leasing and development. This is the same under Alternatives C and D. Alternative A identified 28,500 acres as open to consideration of coal leasing.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under proposed management actions, the primary impacts on aquatic species and their habitats would be habitat alteration, water quality alteration, water depletions, and increased sedimentation and turbidity. These impacts are addressed in detail under Alternative A.

The Proposed RMP identifies 565,600 acres of federal mineral estate as open to leasing and development. This amount is substantially less acreage than Alternatives A and D and slightly more than Alternative C. Given the protective measures in place on a given lease, the impacts identified may be reduced at specific locations but would still occur over a broad area. Conditions of approval and select BMPs identified in Appendix G would help reduce the intensity of identified impacts. Identified impacts would be long term and chronic in areas where extensive road construction and use would occur associated with these activities. Approximately 99 percent of all of the proposed activity would continue to occur in the high-potential areas

where there is current activity in the western quarter of the planning area. Thus, despite the variance in acres open to consideration, the scope of impacts is not expected to vary among the alternatives, but the intensity of impacts could.

Implementation actions associated with using select resource objectives for guiding future reclamation of disturbed sites would benefit aquatic species and their habitats by reducing erosion and sedimentation and turbidity impacts.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals. Proposed management actions include the stipulations in Table 4.2.6-2, which would apply to all of these activities, except locatable minerals activities, which are subject to federal law and regulations under the General Mining Law of 1872. Withdrawal of acres from consideration of these activities is the primary means by which impacts would be reduced in scope. Locatable and salable mineral management could impact aquatic species and their habitats by habitat alteration, sedimentation and turbidity, loss of streamside vegetation cover, and water quality alteration. These impacts are discussed in detail under Alternative A. In particular, development of gravel pits near rivers and streams would have a higher risk of identified impacts to aquatic species. Water quality is a concern with certain mineral materials mining practices and, depending on location and scope, could have site-specific direct negative impacts over the long term.

Under proposed management actions, 342,700 acres would be open to salable/mineral materials disposal, slightly more than Alternative C but substantially less than Alternatives A and D. Thus, the scope and intensity of identified impacts would be reduced.

Proposed implementation actions associated with the disposal of salable minerals/mineral materials would have limited impact on aquatic species and their habitats. Disposal of mineral materials would be limited and site specific, and any potential impacts would be mitigated at the time of project identification and planning.

Impacts from Areas of Critical Environmental Concern Management. Under proposed management actions, 11 ACECs would be designated, totaling 46,400 acres. The prescriptions and stipulations associated with the management of these ACECs would have limited impact and would largely benefit aquatic species and their habitats by providing some indirect protections from some ground disturbing actions and activities. This alternative provides indirect protection to aquatic species from identified impacts from other resource uses.

Proposed management actions/stipulations associated with the ACEC designation would provide indirect protection on more acres than Alternatives A and D but less than Alternative C. In addition, overlapping stipulations would protect portions of these areas, and select protective measures in Table 4.2.6-2 would further limit and reduce impacts on aquatic species and their habitats from other resource uses.

The actions of treating weeds, monitoring the relevant and important values, use of selective vegetation treatments, and select wildland fire suppression techniques in ACECs would be beneficial to aquatic species and their habitats. These actions would maintain or improve habitats in select areas. Some treatments could result in short-term sedimentation and turbidity impacts addressed in detail in Alternative A. However, treatments would be designed to improve watershed health in the long term, and impacts would be mitigated during project identification and planning.

Impacts from Wild and Scenic Rivers Management. The Proposed RMP would determine Deep Creek Segments 2 and 3 as suitable for designation. It also calls for the adoption and implementation of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Appendix Q) to protect the free-flowing condition, water quality, ORVs, and tentative classifications for Colorado River Segments 6 and 7. A suitability determination would be deferred on these two river segments, and monitoring and evaluation of ORVs would control future suitability determinations on these two segments. Eligibility determinations will remain in place. Proposed management actions would help protect aquatic species and their habitats in the Colorado River and Deep Creek. Other protective measures included in Table 4.2.6-2 would still provide overlapping protections for aquatic species, but not for the same duration as potential WSR protective measures.

Proposed management actions would offer less protection than Alternative A, which would provide interim protection for all identified eligible segments. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations. Proposed management actions would be less protective than Alternative C, which would find all segments suitable for designation. Alternative D would be the least protective, as none of the eligible stream segments would be determined as suitable.

Alternative C

This alternative includes a variety of protective stipulations that either directly or indirectly protect and benefit aquatic species and priority habitats. This alternative contains fish and other aquatic species stipulations as well as other resource stipulations. In general, any NSO stipulation that limits ground-disturbing activity is beneficial to aquatic species and their habitats. Table 4.2.6-3 shows the primary protective measures and stipulations included for this alternative that would provide protections and reduce or minimize negative effects on aquatic species and their habitats under this alternative.

Impacts to fisheries and aquatic wildlife from soils, vegetation, wildland fire, WSAs, and renewable energy management would be the same as or similar to those described in Alternative A.

Impacts to fisheries and aquatic wildlife from special status species management, lands and realty management, and fluid minerals management would be the same as or similar to those described for the Proposed RMP.

Impacts from Fisheries and Aquatic Wildlife Management. Fisheries and aquatic wildlife management would benefit aquatic species and their habitats similar to the Proposed RMP as all perennial waters would be protected via stipulation CRV-NSO-16. Stipulation CRV-TL-7 would apply to all coldwater sport and native fish species to protect fish during spawning. Depending on the type of fisheries project or action, and stipulation exception criteria, the remaining protective measures identified in Table 4.2.6-3 would help to protect habitat for fish and other aquatic species from some activities.

In select areas where active fish habitat management in the form of projects would occur, impacts could include short-term loss or reduction of streamside vegetation cover, habitat alteration, and increased sedimentation and turbidity. These impacts are addressed in detail in Alternative A. This alternative would provide more protection from other resource uses than Alternatives A and D.

Table 4.2.6-3
Primary Protective Measures/Stipulations under Alternative C

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	Federal Mineral Estate
CRV-NSO-2 steep slopes greater than 50 percent	Newly proposed	76,200 acres	9,900 acres
CRV-NSO-3 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
CRV-NSO-5 streamside management zones	Newly proposed	28,500 acres	9,900 acres
CRV-NSO-6 riparian and wetland zones	1999 Oil and Gas Leasing ROD	3,000 acres	700 acres
CRV-NSO-16 perennial waters	Newly proposed	13,700 acres	8,900 acres
CRV-NSO-17 Fish Hatcheries	Newly proposed	9,100 acres	2,600 acres
CRV-NSO-32 endangered big-river fishes	Newly proposed	85 acres	0 acres
CRV-NSO-33 sensitive big-river fishes	Newly proposed	3,700 acres	400 acres
CRV-NSO-34 sensitive amphibian species	Newly proposed	4,100 acres	200 acres
CRV-CSU-1 slopes greater than 30 percent	Newly proposed	338,100 acres	119,700 acres
CRV-CSU-2 hydrologic features	Newly proposed	51,500 acres	17,900 acres
CRV-CSU-3 riparian/wetland vegetation zones	1999 Oil and Gas Leasing ROD	45,700 acres	14,200 acres
CRV-TL-7 coldwater sport and native fish spawning	Newly proposed	190 miles	60 miles
CRV-TL-18 occupied cutthroat trout waters	Newly proposed	45 miles	20 miles
CRV-All other NSOs combined	Existing and newly proposed	92,615 acres	9,700 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy or surface-disturbing activities
ROD record of decision
TL timing limitation (seasonal restriction

Implementation actions associated with management of fish and aquatic wildlife habitats would be beneficial to aquatic species in the long term as all actions or project would be developed to enhance aquatic habitats. It is possible that some treatments and projects would result in site specific short-term impacts, including sedimentation and habitat alteration. These potential effects would be mitigated at the time of project identification and planning.

Impact from Water Resource Management. Under this alternative, water management would benefit aquatic species and their habitats similar to the Proposed RMP. This alternative provides slightly less protection to ephemeral and intermittent systems based on buffer distance (50 feet vs. 100 feet) but slightly greater acreage amounts via stipulation CRV-CSU-2 for all hydrologic features. This alternative is more protective than Alternatives A and D.

The action of improving dysfunctional stream via treatments, projects, or management changes would provide long-term benefits to aquatic species and their habitats. Aquatic species require high-quality water to thrive. Select improvement measures could result in some site-specific, short-term impacts, primarily sedimentation and turbidity, but would be mitigated at the time of project identification and planning.

Impacts from Wildlife Management. Benefits and short-term impacts to aquatic species and their habitats would be generally the same as addressed under the Proposed RMP. This alternative includes several wildlife NSO stipulations, including stipulation CRV-NSO-8 for core wildlife areas that would collectively limit

ground-disturbing activities from large expanses of primarily upland habitats. These protective measures would directly and indirectly reduce the risk and scope of identified impacts by limiting ground-disturbing activities from other resource uses. Similar to the Proposed RMP, active management actions or projects could result in short-term impacts including sedimentation and turbidity. This alternative provides similar indirect protection as the Proposed RMP and more than under Alternatives A or D.

In areas where active wildlife habitat management in the form of vegetation treatments or projects would occur, impacts could include site-specific, short-term increases in sedimentation and turbidity. These impacts are addressed in detail under Alternative A. Proposed wildlife habitat management provides more protective measures than Alternatives A and D and is similar to but slightly more protective than the Proposed RMP.

The implementation action associated with proper power line construction to eliminate electrocution risk to raptors would have no impact to aquatic species or their habitats.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, six areas totaling 45,800 acres would be managed for wilderness characteristics. These land units would be protected with an NSO stipulation and would be closed to fluid minerals leasing. Management prescriptions/stipulations associated with the designation of these lands would benefit aquatic species and their habitats indirectly. Proposed management actions would provide greater protection than Alternatives A and D, which do not identify these lands for protection, and more protection than the Proposed RMP that does not include the Grand Hogback (11,400 acres).

The protection of wilderness character via select actions identified in Appendix F would largely benefit aquatic species and their habitats. Preservation of ecosystems and habitats would limit ground-disturbing activities and eliminate effects associated with those types of actions and activities. Active management of select aquatic species habitat could be limited, depending on the type of action or project identified. This limited management could result in reduced ability to improve some habitats but would be minimal in scope for aquatic species.

Impacts from Forestry Management. Under Alternative C, identified impacts and long-term benefits associated with forestry management would be the same as are addressed in detail in Alternative A, and forestry management under this alternative is similar to the Proposed RMP. However, the short-term impacts would be reduced in scope, as this alternative would seek to actively manage fewer acres of forest and woodland habitat, compared with Alternative A. The Proposed RMP and Alternative D would actively manage similar numbers of acres as this alternative. However, this alternative has more protective measures than the other alternatives and would limit the scope and intensity of identified impacts from forest treatments.

Impacts associated with management actions for forestry resources and select forest stand treatments and prescriptions include potential for sediment loading and turbidity and habitat alteration. Some of these effects could be longer term. However, proper forestry management would result in improved watershed conditions in the long term. Treatments would help to reduce catastrophic fire risk and improve water infiltration and absorption. Potential impacts associated with select treatments would be mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. None of the protective stipulations identified in Table 4.2.6-3 applies specifically to livestock grazing. Under this alternative, a total of 427,800 acres of BLM land would be open and available for livestock grazing, providing for approximately 35,500 AUMs. This amount is fewer acres but similar in AUMs. Impacts include sedimentation and turbidity, habitat alteration, water quality alteration, water depletions, and loss or reduction of streamside vegetation cover. These impacts are addressed in detail in Alternative A. The scope of impacts would be slightly reduced given the reduced acres open to grazing, but given the similar AUMs, the intensity of impacts would be increased since forage demands would be met on reduced acres. Impacts are generally the same under all the alternatives given the similar AUM figures.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to aquatic species and their habitats. Proper management and monitoring and subsequent changes in grazing practices based on monitoring would help to ensure the land health standards are met across the planning area. Meeting these standards would help to improve watershed conditions and reduce identified impacts in the long term.

Impacts from Recreation and Visitor Services Management. Under Alternative C, a total of 23,800 acres of land would be managed in two SRMAs and 71,400 acres would be managed in nine ERMAs. The primary protective stipulation is CRV-NSO-46, which limits ground-disturbing activities within the two SRMAs. However, these protections are for recreation and would not preclude increased recreation and visitor service amenities such as trail, roads, and infrastructure. Stipulation CRV-CSU-18 helps to reduce impacts in the ERMAs from other uses but does not preclude increased recreation and visitor service amenities. Stipulations in Table 4.2.6-3 would directly and indirectly protect aquatic species and their habitats from ground-disturbing activities caused by other resource uses.

Identified impacts would be the same as identified and discussed in detail in Alternative A and include habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, spread of aquatic nuisance species and disease vectors, and increased sedimentation and turbidity. Recreation impacts are generally the same in intensity and scope under all alternatives, especially with regard to unmanaged dispersed activities.

Implementation actions identified for recreation and visitor services management would result in minimal impacts to aquatic species and their habitats. The potential collection of fees and discretionary issuance of Special Recreation Permits for select activities would help to more effectively manage recreation activities. These actions would help to reduce identified recreational impacts to aquatic species and their habitats.

Impacts from Comprehensive Trails and Travel Management. Under Alternative C, no land would be open to off-road travel, compared with the 295,900 acres open to year-round off-route travel and 4,300 acres open seasonally to off-road travel under Alternative A. A total of 461,300 acres would be limited to designated routes, and 43,900 acres would be closed to all but foot and horse travel. The protective stipulations in Table 4.2.6-3 would directly and indirectly protect aquatic species and their habitats from new road- and trail-related impacts including habitat alteration and increased sedimentation and turbidity. These impacts are addressed in detail under Alternative A. The intensity and scope of impacts would be substantially reduced under this alternative compared with Alternative A. Impacts would be similar to the Proposed RMP and Alternative D.

This alternative would decommission or obliterate 205 miles of existing routes, compared with 50 miles under the Proposed RMP and 30 miles under Alternative D. This alternative would also close the most acres to use and would allow for the least amount of full-size vehicle use, which would decrease erosion risk and sedimentation and turbidity impacts on a larger scope and reduce the magnitude and intensity of identified impacts.

Implementation of travel management would have both short- and long-term impacts, as well as long-term benefits to aquatic species and their habitats. Moving to a designated route system would eliminate cross-country travel and new user-created routes. Decommissioning and rehabilitating select routes would be help to reduce chronic sediment loading and turbidity impacts. Conversely, in areas such as SRMAs where recreation would be emphasized, construction of new routes would result in long-term erosion and sedimentation and turbidity impacts to aquatic species and their habitats. However, when properly designed and constructed, these routes would provide reduced impacts versus many of the user-created routes currently in existence. Closing and rerouting unsustainable routes would reduce erosion potential. Impacts associated with new route construction would be minimized as practical at the time of project identification and planning.

Impacts from Coal Management. Under Alternative C, no lands are identified as suitable for coal leasing or development. This is the same as the Proposed RMP and Alternative D. There would be no impacts to aquatic species or their habitats. Alternative A identifies 28,500 acres as open to consideration and would have the greatest potential for impacts disclosed in Alternative A.

Actions that would require special conditions that must be met during more detailed planning, lease sale, or post-lease to protect other resource values would benefit aquatic species and their habitats by reducing impacts. These actions would be identified at the time of project leasing and planning.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals. Under Alternative C, impacts would be the same as addressed under the Proposed RMP, except that more overlapping protective measures identified in Table 4.2.6-3 would apply to these activities, except locatable minerals activities, which are subject to federal law and regulations under the General Mining Law of 1872. Withdrawal of acres from consideration of these activities is the primary means by which impacts would be reduced in scope. Locatable and salable mineral management could impact aquatic species and their habitats by habitat alteration, sedimentation and turbidity, loss of streamside vegetation cover, and water quality alteration. These impacts are discussed in detail under Alternative A.

Under this alternative, 317, 500 acres would be open to salable/mineral materials disposal, slightly less than the Proposed RMP and substantially less than under Alternatives A and D. The scope and intensity of identified impacts would be reduced under this alternative.

Implementation actions associated with disposal of salable minerals/mineral materials would have limited impact on aquatic species and their habitats. Disposal of mineral materials would be limited and site specific, and any potential impacts would be mitigated at the time of project identification and planning.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, 16 ACECs would be designated totaling 79,800 acres. The stipulations associated with the management of these ACECs would benefit aquatic species and their habitats indirectly. Although managed for select resource values, the

16 ACECs would help to protect habitat by limiting some ground disturbance by a protective NSO stipulation. This stipulation would provide additional protection to these species from identified impacts from other resource uses. This alternative has the greatest number of ACECs and the most acres protected for select resource values compared with the other alternatives.

The actions of treating weeds, monitoring the relevant and important values, use of selective vegetation treatments, and select wildland fire suppression techniques in ACECs would be beneficial to aquatic species and their habitats. These actions would maintain or improve habitats in select areas. Some vegetation treatments could result in short-term effects from sedimentation and turbidity, but long-term improvement of watershed conditions would help improve aquatic species habitats. Potential impacts associated with proposed treatments would be mitigated at the time of project identification and planning.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be found suitable for consideration as Wild and Scenic Rivers. This alternative would provide similar protections to these stream segments as Alternative A, except that a suitability determination would provide potentially longer-term protections in the form of NSOs. Protections would either be direct where protections overlap occupied habitats or indirect where protections are within watersheds that contain aquatic species. This alternative is the most protective, Alternative D would provide no wild and scenic protections, and proposed management actions/stipulations would be less protective than Alternatives A or C, which would provide interim protection for all identified eligible segments. However, policy guidance directs the BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the outstandingly remarkable values while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Alternative D

Alternative D includes several protective stipulations that either directly or indirectly protect or benefit aquatic species and their habitats, including limited species-specific protective measures as well as other resource stipulations. In general, any NSO that limits ground-disturbing activity is beneficial to aquatic species and their habitats. Table 4.2.6-4 shows the primary protective measures and stipulations proposed for this alternative that would provide protections and reduce or minimize negative effects.

Impacts and benefits to fisheries and aquatic wildlife from management of soils, water, all vegetation, wildlife, wildland fire, WSAs, coal, fluid minerals (oil and gas, oil shale, and geothermal resources), and renewable energy would be the same as or similar to Alternative A. Impacts to fisheries and aquatic wildlife from special status fish and other aquatic wildlife management, special status plants and terrestrial wildlife management coal management, and forestry management, would be the same as or similar to the Proposed RMP. Impacts to fisheries and aquatic wildlife from locatable minerals, mineral materials, and non-energy leasable minerals would be similar to both Alternative A and the Proposed RMP. Impacts from management of other resources and uses would be as described below.

Impacts from Fisheries and Aquatic Wildlife Management. Under Alternative D, benefits and short-term impacts to aquatic species and their habitats are similar as addressed under Alternative A. Under this alternative, CRV-NSO-17 would protect portions of the watersheds for the Rifle Falls and Glenwood Springs State Fish Hatcheries. CRV-CSU-6 would help to manage ground-disturbing activities near occupied habitats containing trout species. CRV-TL-7 would help protect select fish species during spawning. In select areas

Table 4.2.6-4
Primary Protective Measures/Stipulations under Alternative D

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	Federal Mineral Estate
CRV-NSO-2 steep slopes greater than 50 percent	Newly proposed	76,200 acres	9,900 acres
CRV-NSO-3 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
CRV-NSO-17 fish hatcheries	newly proposed	9,100 acres	2,600 acres
CRV-NSO-31 conservation populations of cutthroat trout	newly proposed	1,100 acres	800 acres
CRV-NSO-32 endangered big-river fishes	Newly proposed	85 acres	0 acres
CRV-NSO-33 sensitive big-river fishes	Newly proposed	3,700 acres	400 acres
CRV-CSU-1 slopes greater than 30 percent	Newly proposed	338,100 acres	119,700 acres
CRV-CSU-6 trout-bearing streams	Newly proposed	11,000 acres	5,000 acres
CRV-CSU-15 amphibian breeding sites	Newly proposed	4,100 acres	200 acres
CRV-CSU-7 BLM sensitive species	1999 Oil and Gas Leasing ROD	Not mapped; would apply as needed by species	
CRV-TL-7 coldwater sport and native fish spawning	Newly proposed	190 miles	60 miles
CRV-TL-19 conservation and core conservation populations of cutthroat trout	Newly proposed	14 miles	9 miles
CRV-All other NSO's combined	Existing and newly proposed	82,815 acres	12,500 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy or surface-disturbing activities
ROD record of decision
TL timing limitation (seasonal restriction)

where active fish habitat management in the form of projects would occur, impacts would include loss or reduction of streamside vegetation cover, habitat alteration, and increased sediment loading and turbidity. These impacts are addressed in detail under Alternative A. This alternative would provide increased protection to aquatic species compared with Alternative A, but less protection than the Proposed RMP or Alternative C, which provide NSO protections on all water bodies and riparian areas (Proposed RMP) and all perennial waters (Alternative C) as well as known or identified amphibian breeding sites.

Implementation actions associated with management of fish and aquatic wildlife habitats would be beneficial to aquatic species in the long term. It is possible that some treatments and projects would result in site–specific, short-term impacts, including sedimentation and habitat alteration. These potential effects would be mitigated at the time of project identification and planning.

Impacts from Vegetation Management – Riparian. Under Alternative D, riparian vegetation management would be beneficial to aquatic species and their habitats. However, under this alternative, riparian vegetation is protected by CRV-CSU-3 vs. an NSO, which would allow for more potential disturbance to riparian and aquatic habitats from ground-disturbing activities and increase impacts identified from other resource uses. The Proposed RMP protects all water bodies and riparian areas with an NSO similar to Alternatives A and C. Under this alternative, riparian vegetation management would still be subject to Land Health Standard 2 (BLM 1997a), which helps guide riparian management on public lands.

In select areas where active restoration of riparian areas would occur, impacts could include short-term loss or reduction of streamside vegetation cover, water quality alteration, and increased sedimentation and turbidity. These impacts are the same as addressed in detail in Alternative A.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative D, no lands would be managed for wilderness characteristics and protected with an NSO stipulation. No indirect benefits would result for aquatic species and their habitats from the prescriptive stipulations.

Impacts from Livestock Grazing Management. None of the protective stipulations identified in Table 4.2.6-3 applies specifically to livestock grazing. Under this alternative, a total of 442,200 acres of BLM land would be open to and available for livestock grazing, providing for approximately 36,500 AUMs. This amount is more acres and AUMs than Alternative C and the Proposed RMP but fewer than Alternative A. Impacts to aquatic species and their habitats include sedimentation and turbidity, habitat alteration, water quality alteration, water depletions, and loss or reduction of streamside vegetation cover. These impacts are addressed in detail in Alternative A. The scope of impacts would be slightly increased given the increased acres open to grazing, but given the similar AUMs, the intensity of impacts would be the same or slightly decreased since forage demands would be met on increased acres and use would be spread out. Impacts are generally the same under all the alternatives given the similar AUM figures.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to aquatic species and their habitats. Proper management and monitoring and subsequent changes in grazing practices based on monitoring would help to ensure the meeting of the land health standards across the planning area. Meeting these standards would help to improve watershed conditions in the long term.

Impacts from Recreation and Visitor Services Management. Under Alternative D, a total of 63,600 acres of land would be managed in seven SRMAs. A total of 33,000 acres would be managed in five ERMAs. The primary protective stipulation is CRV-NSO-46, which would protect lands by limiting large ground-disturbing activities within select SRMAs. This stipulation would not preclude increased recreation developments identified as the emphasis for select SRMAs. In addition, the protective measures in Table 4.2.6-4 would help to directly and indirectly protect aquatic species and their habitats by limiting ground-disturbing activities.

In SRMAs where recreation and visitor use increases are emphasized impacts on aquatic species and their habitats include habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, spread of aquatic nuisance species and disease vectors, and increased sediment loading and turbidity. These impacts are addressed in detail under Alternative A. In other SRMAs, where solitude and nonmotorized use are emphasized, aquatic habitat management would be balanced with recreation and impacts and conflicts would be limited. This alternative provides similar acreage protection as Alternatives A and C, and the Proposed RMP but far more than Alternative C. These would provide limited indirect protection of aquatic habitats.

Implementation actions identified for recreation and visitor services management could result in some increased impacts to aquatic species and their habitats. The emphasis on issuing SRPs for various activities could result in more recreation impacts discussed above. Potential fee collections would help to better manage recreation across the planning area. Potential impacts associated with select activities authorized via SRPs would be mitigated at the time of permit processing and planning.

Impacts from Comprehensive Trails and Travel Management. Under Alternative D, no land would be open to off-road travel, compared with 295,900 acres open to year-round off-road travel and 4,300 acres open seasonally to off-road travel under Alternative A. A total of 464,800 acres would be limited to designated routes and 40,400 acres would be closed to all but foot and horse travel. The protective stipulations in Table 4.2.6-3 would directly and indirectly protect aquatic species and their habitats from new road and trail related impacts, including habitat alteration and increased sedimentation and turbidity. These impacts are addressed in detail in Alternative A. The intensity and scope of impacts would be substantially reduced under this alternative compared with Alternative A. Impacts would be similar to the Proposed RMP and Alternative C.

This alternative would decommission or obliterate 30 miles of existing routes, compared with 50 miles under the Proposed RMP and 205 miles under Alternative C. This alternative would close the fewest acres to use and would allow for the similar miles of routes open to full-size vehicle use as Alternative A, which would increase erosion risk and sedimentation and turbidity impacts on a larger scope and increase the magnitude and intensity of identified impacts.

The implementation impacts would be the same as those addressed in Alternative C.

Impacts from Lands and Realty Management. Under Alternative D, management of realty and lands actions and authorizations would impact aquatic species and their habitats by sedimentation and turbidity, reduction or loss of streamside vegetation cover, water quality alteration, habitat alteration, and water depletions. These impacts are the same as identified and discussed in detail in Alternative A. This alternative calls for less ROW avoidance acreage than the Proposed RMP or Alternative C and is similar to Alternative A, which would increase the scope and intensity of identified impacts. This alternative is similar to the Proposed RMP and Alternative C regarding ROW exclusion acreages and nearly double what current management (Alternative A) provides. Land tenure adjustments including sale or exchange of public lands could result in a loss or gain of aquatic habitat. These adjustments could result in either benefits or impacts on aquatic species and their habitats, depending on the proposed uses of the lands in question. These activities would be evaluated at the time of project identification and planning and aquatic species would be considered appropriately.

Under this alternative, 132,700 acres would be petitioned for withdrawal from mineral entry for locatable exploration or development. This amount is less protective than the Proposed RMP and Alternative C but more protective than Alternative A and would increase the scope and intensity of identified impacts on aquatic species. Under this alternative, the protective stipulations included in Table 4.2.6-3 would apply to most ROW actions, which would reduce the intensity of identified impacts.

Implementation actions associated with the management of Lands and Realty Management under this alternative could result in some site-specific impacts to aquatic species and their habitats. Less emphasis on collocating facilities could allow for increased ground disturbance and result in potential sedimentation and turbidity impacts. Encouragement of wind energy project ROWs and granting ROWs for solar energy development per IM 2007-97 would likely result in some impacts including sedimentation and turbidity. These impacts would be mitigated at the time of project identification and planning.

Impact from Areas of Critical Environmental Concern Management. Under Alternative D, three ACECs would be designated totaling 20,200 acres. The prescriptions/stipulations associated with the management of these ACECs under this alternative would provide some indirect benefit to aquatic species in

select areas, including Mitchell Creek and portions of the Colorado River. Although managed for select resource values, the three ACECs would help protect aquatic habitats by limiting ground disturbance through a protective NSO stipulation. This stipulation would provide additional protection to aquatic species from impacts identified from other resource uses. This alternative has the least number of ACECs and the least acres protected for select resource values compared with the other alternatives and the Proposed RMP.

The actions of treating weeds, monitoring the relevant and important values, use of selective vegetation treatments, and select wildland fire suppression techniques in ACECs would be beneficial to aquatic species and their habitats. However, under this alternative, these actions would occur on much less acreage then in the Proposed RMP or Alternative C. These actions would maintain or improve habitats in select areas. Some vegetation treatments could result in short-term effects from sedimentation and turbidity but long-term improvement of watershed health.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the stream segments identified as eligible would be recommended as suitable for designation. Thus, no protections would be provided to preserve the free-flowing condition, water quality, ORVs, and tentative classifications. As compared with the other alternatives, aquatic species and their habitats would be protected the least under Alternative D, as only select protective measures found in Table 4.2.6-4 would help reduce identified impacts.

Cumulative Impacts

As it pertains to NEPA, cumulative effects are defined as "the effect that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions." For this plan, cumulative effects address the impact of implementing any one of the RMP alternatives in combination with other actions outside the scope of this RMP, either within the planning area or adjacent to it. For information on the current and baseline condition of aquatic species and their habitats, refer to Chapter 3, Affected Environment. The scope of analysis for cumulative impacts for aquatic wildlife takes in the mainstem Colorado River basin and its tributaries downstream to just beyond the CRVFO boundary on adjacent private lands and BLM lands managed by the adjacent Grand Junction Field Office. This scope accounts for the influence zone of past, present, and reasonably foreseeable actions that could cumulatively affect aquatic species.

Declines in the abundance or range of many aquatic species have been attributed to various human activities on federal, state, and private lands, such as (1) human population expansion and associated infrastructure development, and construction and operation of dams along major waterways; (2) water retention, diversion, or dewatering of springs, wetlands, or streams, and recreation, including off-road vehicle activity; (3) expansion of agricultural or grazing activities, including alteration or clearing of native habitats for domestic animals or crops; and (4) introduction of non-native plant, wildlife, or fish or other aquatic species, which can alter native habitats or outcompete or prey on native aquatic species. Many of these activities are expected to continue on lands within the range of the various aquatic species and could contribute to cumulative effects on these species within the planning area. Species with small population sizes, endemic locations, or slow reproductive rates, or species that primarily occur on nonfederal lands, would generally be highly susceptible to cumulative effects.

Past Actions. A variety of past actions have incrementally affected aquatic species and their habitats within the planning area on BLM, USFS, state, private, and other federal lands. Water diversions began when the first settlers to the region started to manage water for human uses, including irrigation for crops, livestock,

and domestic uses. As population centers within the planning area and beyond, such as Denver, continued to grow and expand, water demand increased. Western Colorado is considered "water rich" compared with the Front Range population center of Colorado, where water is more limited. Several dams and reservoirs and large trans-mountain water diversions were constructed to take water from headwater streams within the Colorado River Basin and move it through the Continental Divide to Front Range municipalities. Many of these water diversions and water rights are still in place today and have resulted in impacts on native stream and river flows, including the Colorado River. These impacts have affected aquatic species and their habitats by reducing wetted physical habitat, sediment aggradation, habitat alteration, and in some cases reduced sediment input and habitat complexity and diversity. In other cases, more sediment than current flows can effectively or efficiently move is causing impacts to aquatic habitats.

Introductions of non-native fishes were common in the late 1800s and throughout the 1900s. Several species were stocked for sport fish and food production, including rainbow trout, brown trout, brook trout, and Yellowstone and Snake River cutthroat trout. In addition, purposefully or by accident, other species have made their way to the western slope of Colorado, such as white suckers and longnose suckers. Non-native species often outcompete native species, and non-native fishes of the same genus or subspecies can hybridize with native species, reducing their genetic integrity and fitness.

Land management actions and activities have been ongoing since the settling of the west. Fire suppression, logging, livestock grazing, mining, natural gas development, conversion of native rangeland to agriculture, road construction, pipelines, power lines, railroads, and ever-increasing urban sprawl have all resulted in cumulative impacts within watersheds that contain aquatic species, including habitat alteration, reduction of streamside vegetation cover, water quantity and quality impacts, and site-specific increases in sediment and turbidity. Protective actions and designations, such as wilderness areas on lands administered by the USFS and WSAs on BLM lands, have protected some areas from impacts and helped reduce cumulative effects.

Present Actions. Many of the actions addressed in the past actions section above continue today. Urban sprawl continues, as does the demand for limited water supplies, water diversions, and impoundments. New large-scale water developments are limited, but select projects are in the works, and new ideas are being considered. Large-scale mining is all but gone, but potential still exists in some areas. Livestock grazing continues, as well as agriculture. Oil and gas development has increased in recent years, along with road construction. Logging has been largely replaced by prescriptive treatments aimed at managing forests and other vegetation types for other uses (wildlife, watershed improvement, and fuel reduction). Beetle-killed pine is a large and ever-increasing concern in the forested habitats within the planning area and has the potential to increase the risk of catastrophic fires in the near term.

Stocking non-native fishes is much more limited today, as emphasis has begun to shift to native species management. Recreation has emerged as an ever-increasing pursuit within the planning area and is expected to increase. Popular and common within the planning area on BLM lands and USFS-administered lands are rafting, boating, hunting, fishing, hiking, camping, skiing, rock climbing, mountain biking, and four-wheeling, among other pursuits. Oil and gas development is occurring in concentrated portions of the western quarter of the planning area, primarily on private and BLM lands. All of these activities are resulting in cumulative impacts, including site-specific sediment loading and turbidity, habitat alteration, and water quality and quantity impacts. Restoration and reclamation actions are more common today, as impacts are mitigated and as degraded habitats are improved.

Reasonably Foreseeable Future Actions. It is likely that many of those actions identified in the past actions and present actions sections will continue into the future. Urban sprawl and development are increasing as human populations increase within the planning area and outside. Water consumption and demand are increasing concurrently.

Continued development in the Eagle, Roaring Fork, and Upper Colorado River Valleys is anticipated to have impacts on stream and river flows. Continued and newly proposed water diversions to the Front Range to serve the water needs of Denver, Aurora, Colorado Springs, and other municipalities are likely. The major potential water project is the Homestake Project, which is jointly operated by the Cities of Aurora and Colorado Springs. Phase I of the project was completed in 1968, and Phase II has been granted the necessary federal and state permits and approvals for construction, including a ROD as part of NEPA by the USFS. If Segments 1 or 2 of the Colorado River are designated as wild and scenic and instream flow prescriptions are put into place, it could have an impact on Phase II development of the Homestake Project. The Clinton Ditch and Reservoir Company is the owner and operator of Clinton Gulch Reservoir in Summit County, which has a decreed water right of approximately 4,250 acre-feet of storage. Shareholders represent the major water users and providers in Summit County, as well as the largest ski resort in Grand County. Colorado Springs Utilities plans to develop conditional water storage rights associated with the Continental-Hoosier System, which diverts water from the headwaters of the Blue River, upstream of the study river segments. The Moffat Firming project proposes to divert more water out of headwater streams in Grand County for conveyance to Front Range locales. Irrigation rights are expected to continue being bought and sold in the future, with some new property owners informally changing how the right was historically used. As a result of population growth and land sales, more agricultural water rights may be converted to municipal and industrial uses.

Recreation demand is expected to continue to increase as western Colorado is a destination area for outdoor pursuits. Oil and gas development is expected to continue, as are livestock grazing, agriculture, and irrigation. One emerging issue is the potential for some level of oil shale development within and adjacent to the planning area. This development could result in large amounts of water use and could affect stream and river flows as well as increase sediment and turbidity and alter habitat.

Another emerging issue is the effects of a changing climate. Climate change has the potential to impact aquatic species by reducing suitable habitat, changing distributions, altering food webs, and altering water quality (temperatures). Scientists (Isaak et al. 2010, Hakk et al. 2010, Rieman and Isaak 2010, Wenger et al. 2011) predict that there will be an increase in the severity and frequency of droughts, floods, and wildfires, as well as changes in the timing of snowmelt and peak flows. Coldwater species such as trout are most susceptible to potential negative effects. The primary potential effect of climate change is reductions in suitable habitat. Limited research on this effect to fish exists but it has been studied and documented by Hari et al. 2006, and Winfield et al. 2010. Reductions in suitable habitat would result in reduced miles of occupied streams and reduced population size. Changes in timing of peak flows could also affect spawning times and breeding and recruitment success. Reduced population numbers and size would make select trout populations more susceptible to and increase the risk of localized extirpation from natural events such as floods and large wildfires. Amphibians that rely on ephemeral breeding ponds could be affected by increased frequency of drought. As new information emerges, impacts on other aquatic species could come to light. Local effects of a changing climate will vary in intensity and duration because of differences in habitat quality, distance from coastal areas, and elevation and topography of the watershed. Increasing human demand for water will place additional stressors on watersheds and will amplify the negative impacts of climate change on fish and amphibian populations. Identified NSO buffers on water bodies and riparian areas will help to protect these

habitats, and managing for late seral stage riparian habitats at maximum potential will help to provide stream cover and shade, which will help to reduce the effects of increased stream temperatures, particularly for trout.

Among the alternatives proposed, Alternative D would have greater potential for direct and indirect effects on aquatic species and their habitats and, subsequently, more cumulative impacts when added to the numerous actions, activities, and land management practices occurring on other federal, state, and private lands within the scope of analysis. The Proposed RMP and Alternative C would provide greater protections from BLM-initiated or -authorized activities and actions, would result in reduced direct and indirect effects, and subsequently would have reduced cumulative effects. The Proposed RMP protective measures are both broad as well as targeted. Alternative A is similar to Alternative D and would allow for greater potential cumulative effects on aquatic species and their habitats. Two programs in particular, trails and travel management and fluid minerals management, would allow for substantial cumulative effects under Alternative A, as off-route travel would continue to be allowed to go largely unabated across large portions of the planning area. Furthermore, natural gas development and associated road construction would continue to occur intensively within the western quarter of the planning area on both private and BLM lands. Roads are one of the single biggest issues with regard to aquatic habitat quality.

4.2.6.2 Terrestrial Wildlife

Impacts on terrestrial wildlife resources from implementation of each alternative are summarized in the following subsections. Information regarding potential impacts on special status species is presented in Section 4.2.7.

Assumptions and Methods

This section discusses potential impacts of other program objectives, allowable use, and management actions on terrestrial wildlife populations and their habitat, based on existing conditions described in Section 3.2.6. Impact analyses and conclusions were based on interdisciplinary team knowledge of resources and relevant data, on a literature review, and on the professional judgment of experts within and outside BLM. Spatial data analysis was conducted using ESRI ArcGIS desktop computer software. Impacts were quantified where possible, and, in the absence of quantitative data, best professional judgment was used. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if quantitative data were not necessary or available.

The following assumptions were used in the terrestrial wildlife analysis:

- Proposed decisions under all alternatives would conform to maintaining *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado* (BLM 1997a). Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Standard 3 addresses plant and animal communities and is incorporated as a goal. It states, "Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes." Environmental consequences resulting from proposed management action or allowable use decisions are often analyzed based on their ability to contribute to maintaining or achieving (i.e., benefit) or risk of causing a decline (i.e., adverse impact) in meeting Colorado Public Land Standard 3.

- The proposed management actions in each alternative would include the proposed mitigation in the form of stipulations (e.g., NSO, CSU, or TL stipulations) to reduce impacts on wildlife. Direct and indirect impacts of land uses on terrestrial wildlife are generally best mitigated by avoiding or minimizing the impact on the degree practicable with stipulations. The various management action and allowable use decisions outlined in Chapter 2 and the stipulations described in Appendix B emphasize this approach for maintaining or conserving terrestrial wildlife and their habitat. Impacts that cannot be avoided would at least be minimized by the application of COAs or BMPs (Appendix G).
- Wildlife habitat needs vary significantly by species. However, it is generally true that healthy and sustainable wildlife populations can be supported where there is a diverse mix of plant communities with multiple seral stages to supply structure, forage, cover, and other specific habitat requirements.
- Impacts on wildlife populations and habitat are not discrete since actions may benefit one species while having an adverse or beneficial impact on another.
- Wildlife populations fluctuate, sometimes widely, in response to natural factors, such as the abundance of prey, extremes in weather (e.g., severe winters and drought), outbreaks of wildlife disease, or insects (e.g., mountain pine beetle) that impact habitat. Maintaining high-quality habitat conditions would have some influence on reducing the severity of outbreaks and subsequent losses from diseases, but the prevalence in the environment of various diseases cannot be fully controlled, particularly at chronic levels of occurrence.
- Significant modifications to habitat suitability can impact the survivability and viability of populations (e.g., higher winter mortality or reduced reproductive success).
- Impacts on terrestrial wildlife from displacement depend on the location, extent, timing, or intensity of the disruptive activity. Impacts from displacement of wildlife would be greater for wildlife species that have limited habitat or a low tolerance for disturbance.
- The quality and quantity of winter ranges are generally considered to be the limiting factors on big game populations. The ability of these areas to support wintering populations is a major factor in determining yearlong population levels.
- The CPW would continue to manage wildlife populations, and the BLM would continue to manage wildlife habitat in coordination with the CPW. Big game habitat would be managed in coordination with CPW herd objectives and species-specific plans. Sufficient habitat currently exists to maintain current CPW DAU objectives for big game.
- In the context of this analysis, *avoidance* means reduced use and does not imply zero use or an absence of use by wildlife. Federal oil and gas regulations prevent the BLM from applying new or additional lease stipulations that would be developed through this planning effort to existing leases. However, federal regulations allow the BLM to apply other protection measures in conjunction with planning and implementing oil and gas projects. When making a decision regarding discrete surface–disturbing activities following site-specific environmental review, BLM has the authority to impose reasonable measures to minimize impacts on other resource values, including restricting the siting or timing of lease activities (43 CFR 3100; 43 CFR 3160; IBLA 2006-213, 2006-226; IBLA 2008-197, 2008-200).
- Site-specific mitigation measures supported by NEPA analysis are added during the implementation phase as conditions of approvals to the project. The term "Core Wildlife Habitat Areas" was used in the Draft RMP/Draft EIS under the Proposed RMP and Alternative C for the name of a stipulation.

The stipulation was renamed "Priority Wildlife Habitat" in Alternative B (Proposed RMP). The name change was necessary because core wildlife areas implied to readers of the Draft RMP/Draft EIS that these habitats were essential habitats for wildlife populations when in fact the areas were identified and prioritized as areas where surface-disturbing activities would be precluded to protect wildlife habitat in the context of managing multiple resources across the CRVFO. For the context of this analysis, "priority wildlife habitat" is the term used under the Proposed RMP and Alternative C. Priority wildlife habitat protects vegetation cover and forage on BLM lands with high and overlying wildlife values, including priority species habitat, sagebrush shrublands for sagebrush dependent species, wildlife migration corridors, big game severe winter and winter concentration areas, and locations of wild-life related vegetation treatments.

Disturbance. Disturbances are events that disrupt ecological systems; they may occur naturally (e.g., wildfires, storms, or floods) or be induced by human actions, such as recreation, forestry, energy development, ROW construction, urban development, roads, or alteration of stream channels. The disturbed animal incurs a physiological cost, 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. The effects of disturbances are determined in large part by their intensity, duration, frequency, timing, and the size and shape of the area affected. Continuous disturbance would probably result in reduced animal fitness and reproductive potential.

Human disturbance near raptor nests can result in the abandonment of the nest, high nestling mortality from overheating, chilling, or dehydration when young are left unattended if adults are flushed from the nest, premature fledging, and reduced access to resources (Gutzwiller et al. 1998). Evidence suggests that some falcons, ospreys, and owls are generally more tolerant of human-induced disturbance and human environments. Golden eagles, turkey vultures, northern harriers, northern goshawks, Cooper's hawks, and sharp-shinned hawks appear less tolerant, and buteos exhibit a wide range of acceptance levels.

A recognized consequence from recreation and human development adjacent to BLM land is the effect of domestic dogs on wildlife. Dogs allowed to run off-leash can chase, catch, and kill small wildlife species and potentially large species, such as big game. Even the scent left by a dog can have an effect on wildlife.

Roads, timber clearcuts, and oil and gas developments are not the only reported sources of disturbance that can affect wildlife use. Other sources may involve the following:

- Gutzwiller et al. (1998) experimentally subjected forest birds to increased human activity, which consisted of walking through breeding territories. Effects included nest abandonment and reduced nest attentiveness, leading to nest failure. However, Riffell et al. (1996) noted that this impact is not cumulative (i.e., it does not carry across years if the disturbance ceases).
- Friesen et al. (1995) discussed the exacerbating effect of disturbance on habitat fragmentation caused by decreased seclusion in the interiors of smaller patches. They found that 10-acre woodlots not located near human habitations supported more species and individuals of Neotropical migrant songbirds than did 62.5-acre urban woodlots.
- Freddy et al. (1986) reported that deer would move away in response to pedestrian traffic as close as 200 meters (660 feet).

- Parker et al. (1984) emphasized the importance of avoiding situations in which wintering deer would be forced to move to avoid human activity, owing to decreased energy stores in winter and greater effort in moving through snow.
- Joslin and Youmans (1999) provide in-depth information on the effects of recreation on Rocky Mountain wildlife in Montana. Their compendium includes a listing by Knight and Cole (1995) of specific effects of recreation on wildlife (excerpted below):
    - Viewing (close encounters)—Altered behavior, unnecessary energy expenditure during flight, altered nest placement, and reduced survivorship of young caused by abandonment or predation.
    - Backpacking, hiking, riding, and cross-country skiing—Flight, displacement, or elevated heart rate.
    - Rock climbing—Disturbance of preferred raptor perching and nesting sites.
    - Spelunking (caving)—Disturbance or abandonment of bat roosting and maternity sites.
    - Pets (dogs)—Stronger predator-alarm response than a person without a dog. Increased stress and energy expenditure while fleeing. Risk of injury or mortality.
    - OHVs—Potential disturbance (flight and stress) and redistribution.
    - Snowmobiles—Same as OHVs.

Dates for proposed timing limitations were developed based on maintaining consistency with the dates in "Colorado Division of Wildlife's Actions to Minimize Adverse Impacts to Wildlife Resources" (CDOW 2009a), recognizing local data or field observations.

Direct Habitat Loss. Direct habitat loss occurs when required life-sustaining conditions are lost, e.g., through removing vegetation or draining a pond. Removing vegetation affects wildlife by reducing the extent or quality of habitat in terms of food, cover, and structure for nesting and other uses. For example, removing vegetation during construction of a road or water tank essentially strips the affected area of any wildlife value. While closure and reclamation of disturbed areas can eventually restore lost habitat values, it may require years or decades for recovery to pre-disturbance structure and function.

Habitat Modification. Changes in habitat are generally less obvious and less severe than losses of habitat but can be significant, especially if small impacts accumulate across large areas. Examples include removal of too much forage by domestic livestock, invasions of weeds, and removal of tree cover during timber harvesting. Habitat modification (i.e., habitat treatment) can also be beneficial and is an important tool in wildlife habitat management. Examples include use of prescribed fires to stimulate new growth on older woody vegetation and thinning of overly dense shrubs to enhance forage production.

Habitat Fragmentation. Habitat fragmentation occurs when contiguous habitat is broken into smaller blocks by surface-disturbing activities. Fragmentation can reduce usable ranges and disrupt movements among habitats, transitional areas, and parturition area, can isolate populations of less mobile species, and can increase the number of habitat generalists (those that are not restricted to a specific habitat to meet their needs) and habitat-edge species (those that prefer the interface between two or more habitat types), while decreasing habitat specialists or habitat-interior species. Impacts of habitat fragmentation relate to the reduced

size of individual habitat blocks and the increased percentage of habitat edges on smaller blocks, compared with larger blocks. Thus, two 50-acre blocks of habitat may support fewer individuals of a particular species than one 100-acre block, and four 25-acre blocks may be incapable of sustaining any habitat-interior species. Habitat-interior species may avoid habitat edges because the species are either less well-adapted there than edge specialists and habitat generalists or they are more secretive and likely to seek the greater seclusion available away from an edge.

Some species benefit from breaks in continuous stands of vegetation. These "edge species" prefer the boundary between two different plant communities or successional stages. These species are also commonly associated with human habitation, including farmlands, ranchlands, and rural residential development.

Reduced Habitat Effectiveness. Habitat effectiveness is the comparison of the habitat and disturbance components that reflects an area's actual ability to support certain species of wildlife. The amount of habitat actually available to wildlife is called "effective habitat," and reductions in the amount of effective habitat (or "habitat effectiveness") can greatly exceed any direct habitat loss. Increasingly, there is a need to understand and predict the consequences of habitat alterations (WGFD 2004a). For example, Ruediger et al. (2006) discussed how elk use of habitat decreases as the proximity of that habitat to roads and highways increases. Lyon (1979) concluded that roads open to traffic caused available habitat to be less than fully effective.

Reed et al. (1996) calculated that the effective habitat loss associated with construction of new roads in an area open to logging was 2.5 to 3.5 times the actual habitat loss, assuming a "road-effect" zone extending 100 meters from a road. However, disturbances such as roads should not be considered independent of other criteria by which elk habitat is evaluated (Lyon 1979). Habitat effectiveness models often incorporate variables such as density of open roads, size and spacing of areas of forage and cover, quality of cover, seasonal habitats, availability of other similar habitats, historical disturbances, topography, and steepness of slope. Ruediger et al. (2006) noted elk responses to highways and roads vary by a number of factors, such as topography, vegetation, traffic volumes and how the highway is designed, and whether elk are hunted. These interrelated factors make a quantitative analysis particularly difficult, especially within the planning area's fragmented landscape that already has reduced habitat effectiveness.

Direct Mortality. Direct mortality can result in areas of increasing human use caused by collisions with vehicles, electrocution of raptors on utility lines, or inadvertent trampling of reptiles. In the case of oil and gas development, wildlife mortality associated with petroleum pollution has also been reported. Human activities, such as hunting, cause the direct mortality of animals and over the long term can affect the population numbers, male/female ratios, area densities, and population structure.

Habitat Avoidance. Direct disturbance to a species and possibly its habitat can affect its use of BLM lands. Avoidance or displacement occurs when wildlife make proportionately less use of particular areas than their accessibility would imply. Although the physical habitat is still present, the animals use it to a much lesser extent than before the disturbance. The result is a *de facto* loss of habitat because avoided areas meet no survival needs.

Some species are more tolerant of human activity than are others. Species such as big game must adapt to human-related disturbances to some degree, especially on winter ranges that have been altered by roads, public land investments, and residential and commercial development. But virtually all species have some

threshold of disturbance above which they would avoid or abandon an area or use it at a significantly reduced level.

Activities that are widely prevalent (e.g., urban development or recreation) or land use activities (e.g., energy development or logging) that are supported by an expansive network of roads or trails likely result in higher levels of wildlife avoidance. Wildlife often compensate for these site-specific disturbances by shifts in use of range, centers of activities, and use of other habitats (Van Dyke 1996). Surface disturbances or disruptive activities can move animals into less desirable habitat or private lands and increase competition for available resources with other species. It is important to note that avoidance does not mean total avoidance but refers to disproportionately low use.

Interference with Movement Patterns. Human-induced impacts can also affect wildlife by altering important daily or seasonal movement patterns. These patterns may be altered through shifts to avoid human activity, to avoid crossing open areas that provide inadequate cover, or to circumvent some physical barrier (e.g., fences and steep roadcuts). This type of impact is not as much of an issue for small mammals or reptiles that do not move across large areas or for birds that easily avoid them. Even without the need for these regular movements, most mammals tend toward some population dispersal as young seek new habitats to occupy. Dispersal is important to the species to ensure that suitable habitat is occupied and facilitate gene exchange between distinct populations. For large mammals, such as deer and elk, changes in the landscape can profoundly affect their ability to meet daily and annual requirements. For example, these large species must drink water regularly (daily during warm weather, and almost as often during winter), and home ranges must include sources of water. Blockage of a route between foraging or bedding areas and watering areas can cause the animals to abandon areas altogether. Seasonal movements between summer and winter ranges are also important for these species. For example, local movement of big game onto private lands occurs each fall in response to the influx of big game hunters onto BLM lands.

Impact Estimation. Impacts on wildlife are difficult to quantify. Among the reasons are the following:

- Species differ in their tolerance of disturbance.
- Species differ in their ability to utilize less desirable habitats if displaced or to otherwise adapt to changing conditions.
- Habitats differ in their ability to screen wildlife from areas of disturbance and in their importance to wildlife.
- The planning area's fragmented landscape has already experienced a loss of habitat effectiveness.
- Areas differ in their existing (baseline) quality and in the existing level of human activity to which wildlife may have already adjusted their use patterns.
- All of the above may differ by season or other variables, both within and among years and within and among areas.

Environmental Consequences

Proposed management action and allowable use decisions for terrestrial wildlife are considered to cause a beneficial impact—or just benefit—to terrestrial wildlife species and are discussed in the sections titled "Impacts from Terrestrial Wildlife Management." Impacts, some beneficial and some negative, on terrestrial wildlife would result from management actions and allowable uses proposed by other programs. The analyses

of other program's proposals are discussed under each program-specific impact section. Variations in proposed management actions and allowable use decisions are in accordance with the theme of the alternatives, each of which includes varying levels of benefit in the form of habitat maintenance, conservation, and improvement to terrestrial wildlife. Programs not addressed below were deemed to have no or negligible impacts on terrestrial wildlife under any of the four alternatives. The impacts of WSAs are the same across all alternatives and only discussed once in Alternative A.

Alternative A

Under Alternative A, the objective of the 1988 RMP for terrestrial wildlife management would continue to focus on (1) providing approximately 57,933 AUMs of big game forage (the amount to meet CPW big game population goals), (2) improving existing wildlife habitat, and (3) increasing wildlife species diversity as defined by the existing RMP, amendments, and species-specific plans.

Impacts from Terrestrial Wildlife Management. All alternatives allow for the introduction, translocation, transplantation, restocking, augmentation, and reestablishment of native and naturalized fish and wildlife species in cooperation with the CPW and USFWS, subject to the guidance provided by BLM Manual 1745 policy, and by existing or future memorandums of understanding with the CPW. Wildlife reintroductions would increase species and genetic diversity, would augment existing populations, and would reestablish species that were previously extirpated.

All alternatives would require biological inventories in areas of known or suspected habitat of species of interest (e.g., raptor nests and migratory birds) before approval of surface-disturbing operations. The implementation-level inventory would be used to prepare mitigating measures to reduce the impacts of surface disturbance on the affected species or their habitats. All alternatives would require energy companies to establish a set of reasonable operating procedures for employees and contractors working in high-value wildlife habitats through lease notices. Such procedures would be designed to inform employees and contractors of ways to minimize the effect of their presence on wildlife and wildlife habitats. Procedures might address such items as working in bear country, controlling dogs, and understanding and abiding by hunting and firearms regulations.

All alternatives would increase the permeability of the I-70 corridor for big game migration by providing long-term protection and restoration of wildlife linkages as per "A Landscape Level Inventory of Valued Ecosystem Components" (ALIVE) Memorandum of Understanding.

Disturbance from Public Travel, Access, and Land Use Activities. Winter ranges on BLM lands are becoming increasingly important, as adjacent private lands are altered by residential and commercial development. The CRVFO's objective is to minimize big game stress and disturbance from surface occupancy and surface-disturbing activities on winter ranges, winter concentration areas, severe winter ranges, migration corridors, and birthing areas. The amount of use that winter ranges receive from big game and other wildlife depends on the severity of the winter. To protect wintering wildlife, the BLM would continue to close important winter ranges to public motorized travel from December 1 to April 30 to protect wintering big game from potential disturbance caused by public motorized use (Table 4.2.6-5). Under severe winter conditions, the winter closure may be extended if requested by the CPW. Severity of the winter will be determined on the basis of snow depth, snow crusting, daily mean temperature, and whether animals are concentrated on the winter range during the winter months. Specific routes in the Castle Peak area are cooperatively managed with CPW to allow motorized vehicle access for late season big game hunting.

Table 4.2.6-5
Big Game Winter Closures for Alternatives A, B, C, and D

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Area	**Acres Closed to Motorized Use 12/1 to 04/30**	**Acres Closed to Motorized and Mechanized Use 12/1 to 04/15**		
Basalt Mountain(Alt C)/Basalt Mountain – South Portion (Alt B)	N/A	1,300	1,500	N/A
Boiler - East Elk Creek - New Castle (Alt B, C and D)	3,500	4,400	4,400	4,400
Cottonwood Creek	13,800	13,800	13,800	13,800
Dry Rifle Creek	N/A	2,200	2,200	2,200
East Eagle	N/A	6,000	6,000	N/A
Flatiron Mesa	800	800	800	800
Haff Pasture Portion of Fisher Creek (Alt A and D)/Fisher Creek-Cattle Creek (Alt B and C)	1,000	2,800	2,800	1,000
Hardscrabble	N/A	24,600	24,600	N/A
Light Hill	3,800	3,800	3,800	3,800
Old Man's Gulch-Red Hill Gypsum (Alt C Only)	N/A	N/A	13,000	N/A
Prince Creek and West Sopris Creek	N/A	N/A	1,700	N/A
Red Canyon-Hells Pocket-Bocco Mountain-East Castle Peak (Alt B and C)	6,500	14,500	14,500	6,500
Red Hill SRMA-North Side	2,600	2,600	2,600	2,600
The Crown	9,200	9,200	9,200	9,200
Thompson Creek./Holgate Mesa	N/A	9,500	9,500	9,500
Vulcan	N/A	N/A	900	N/A
West Rifle Creek	N/A	1,100	1,100	N/A
Winter Ridge-Black Mountain-Pisgah Mountain-Windy Point/Boore Flat-Domantle	33,500	33,500	33,500	33,500
Williams Hill	N/A	1,500	1,500	N/A
Total	**74,700**	**131,600**	**147,400**	**87,300**

Acronyms and Abbreviations:
Alt alternative
N/A Not applicable

The BLM would also apply a TL that would prohibit surface occupancy and surface-disturbing activities from December 1 to April 30 to protect big game (mule deer, elk, pronghorn antelope, and bighorn sheep) winter range, including crucial winter habitat and other definable winter range as mapped by the CPW. This TL may also apply to sundry notices that require an environmental analysis. In addition, wintering wildlife are

protected from motorized disturbance in other areas (e.g., WSAs, Thompson Creek ACEC, Deep Creek ACEC, Hack Lake SRMA, and the Burnt Tree Ridge area) by a closure to motorized over-snow travel and limitations to stay on designated routes (e.g., King Mountain). These seasonal limitations for other purposes indirectly preserve winter habitat effectiveness and reduce disturbance and habitat avoidance.

Under all alternatives, big game birthing areas for elk, bighorn sheep, and pronghorn are protected from surface occupancy and surface-disturbing activities by a TL. Under Alternative A, the TL prohibits surface occupancy and surface-disturbing activities on: elk calving areas from April 16 to June 30, pronghorn antelope fawning areas from May 1 to July 15, Rocky Mountain bighorn sheep lambing areas from May 1 to July 15, and desert bighorn sheep lambing areas from March 1 to May 1.

In all alternatives, TL and NSO stipulations on surface-use and surface-disturbing activities (not just oil and gas operations) would be applied during specified periods to protect active nest sites and fledgling habitat of raptors. Under Alternative A, NSO stipulations prohibit surface occupancy and surface-disturbing activities within a 0.125-mile radius of a nest site of golden eagles, ospreys, accipters, buteos, falcons (except kestrels), and owls. The TLs help to alleviate human-induced impacts such as displacement of raptors, nest abandonment or other human caused stresses. In Alternative A, the TL stipulations would be applied (1) from February 1 to August 15 within a 0.25-mile radius of a raptor nest sites for accipiters, falcons (except kestrels), buteos, and owls, to protect nesting and fledgling habitat during use, and (2) from April 1 to August 31 within a 0.5-mile radius of osprey nests to protect osprey nesting and fledgling habitat during use.

Under all alternatives, the BLM would apply TL and NSO stipulations to protect nesting waterfowl and shorebird habitat and rookeries. Under Alternative A, the NSO stipulation would prohibit surface occupancy and surface-disturbing activities to protect waterfowl an shorebird habitat and rookeries within significant production areas as mapped by CPW. In addition, a TL would be applied from April 15 to July 15 in a 0.25-mile radius around the nesting and production areas of the Fravert Watchable Wildlife Area, Consolidated Reservoir, and the King Mountain Reservoirs (e.g., Grimes-Brooks, Nobel, and Upper and Lower King Mountain) to protect nesting ducks. This TL is consistent with the TL decision made for the Roan Plateau portion of CRVFO. Other stipulations for major river corridors, municipal watersheds, riparian and wetland zones, and threatened and endangered species also indirectly protect birds.

The CRVFO 1999 Oil and Gas Leasing and Development Record of Decision and RMP Amendment) (BLM 1999b) applied an NSO stipulation for the protection of wildlife seclusion areas. The NSO stipulation prohibits surface occupancy and surface-disturbing activities within seclusion areas that provide high wildlife value: Starkey Gulch, Riley Gulch, Crawford Gulch, Paradise Creek, Coal Ridge, Lower Garfield, Jackson Gulch, Bald Mountain, and Battlement Mesa. An NSO stipulation was applied to protect a broad range of values from the impact of human intrusion. Exceptions have been and would continue to be granted based on approval by the BLM of a mitigation plan that suitably addresses the wildlife seclusion values at risk.

Under all alternatives, BLM Instruction Memorandum (IM) No. 2008-050 would provide guidance toward meeting the agency's responsibilities under the MBTA and Executive Order (EO) 13186. The guidance directs the CRVFO to promote the maintenance and improvement of habitat quantity and quality, and to avoid, reduce, or mitigate adverse impacts on the habitats of migratory bird species of conservation concern to the extent feasible and in a manner consistent with regional or statewide bird conservation priorities. Under Alternative A, the BLM would continue to apply conditions of approval on a case-by-case basis for the maintenance of migratory bird habitat.

All alternatives would offer NSO stipulations for raptors; however, Alternative A would be the least restrictive by prohibiting surface occupancy and surface-disturbing activities within a 0.125-mile radius of a nest site of golden eagles, ospreys, accipiters, buteos, falcons (except kestrels), and owls.

Under all alternatives, NSO stipulations would be applied to protect waterfowl and shorebird habitat and rookeries within significant production areas as mapped by the CPW.

CPW Big Game Population and Harvest Objectives. The BLM would continue to close routes to motorized use to help keep big game on BLM lands and reduce big game movement to private lands during the big game hunting season in the Castle Peak area. Under Alternatives A and D, areas accessed by the Stagecoach Trail (#8535) and Domantle Road (#8513) would be closed from October 1 to November 30. The Proposed RMP and Alternative C propose more routes (e.g., Dry and West Rifle Creeks) to be managed to reduce big game movement to private lands during the big game hunting season. In addition, specific routes within winter wildlife closures in the Castle Peak area would be cooperatively managed with CPW to allow vehicle access for late season big game hunting after December 1.

State Wildlife Areas. State wildlife areas (SWAs) were acquired by the state not only to protect wildlife habitat but also to provide the public with opportunities to hunt, fish, and watch wildlife (CDOW 2010g). Federal mineral estate exists under the SWAs. Under Alternative A, SWAs have an NSO stipulation applied to the federal mineral estate to protect wildlife habitat values from unwanted surface occupancy and surface-disturbing activities. Some portions of the Garfield Creek SWA are leased and being developed with seasonal drilling constraints. The NSO stipulation, a major constraint on surface-disturbing activities, does not prohibit fluid minerals leasing like closing the unleased portions to fluid mineral leasing under the Proposed RMP and Alternative C.

In summary, the benefits of terrestrial wildlife management action and allowable use decisions on terrestrial wildlife would vary between alternatives, based on the different temporal and spatial constraints on use and surface-disturbing activities in wildlife habitats. Based on these factors, Alternatives A and D are not as effective as Alternative C or the Proposed RMP at maintaining desirable species at viable population levels commensurate with the species' and habitats' potential through the life of the RMP.

Impacts from Soils Management. Under all alternatives, proposed actions would comply with Colorado Public Land Health Standard 1. Soils that achieve these standards would in turn maintain healthy wildlife habitat conditions. Therefore, the soils management goals and objectives under all alternatives would benefit terrestrial wildlife.

Surface-disturbing activities that negatively impact soils also indirectly impact plant growth and vigor in wildlife habitats. Harmful changes in vegetation cover or conditions negatively impact the condition and quality of wildlife habitats, reducing habitat effectiveness. Across all alternatives, an NSO stipulation would be applied on the debris flow hazard zone around the town of Glenwood Springs. In all alternatives, NSO stipulations would prohibit surface occupancy and surface-disturbing activities on slopes greater than 50 percent.

Requiring geotechnical engineering, reclamation plans, and monitoring of projects would minimize surface runoff and erosion of soils, thereby reducing the chances of habitat fragmentation. The CSU stipulations require special design measures to new construction on erosive soils and slopes greater than 30 percent. The

intentions of the stipulations were to apply the constraints to all public land uses, not just fluid mineral development, to reduce erosion and maintain soil site stability. The language under Alternative A for soils stipulations was adapted from oil and gas stipulations, unlike the Proposed RMP and Alternatives C and D stipulations that straightforwardly address all surface-disturbing activities.

Therefore, the soils management action and allowable use decisions under all alternatives would indirectly, but beneficially, contribute to maintaining and protecting the condition and quality of wildlife habitat, ensuring that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan.

Impacts from Water Resource Management. All proposed decisions would be consistent with applicable state and federal water quality standards. Under all alternatives, implementation actions would comply with Colorado Public Land Health Standard 5. Water resources that achieve these standards would indirectly maintain healthy wildlife populations. Therefore, the water resource management goals and objectives under all alternatives would benefit terrestrial wildlife.

NSO stipulations for major river corridors protect riverine areas, waterfowl and shorebird production areas, and wildlife habitat along the Colorado, Roaring Fork, Crystal, Frying Pan, Eagle, and Piney Rivers. NSO stipulations to protect domestic watershed areas also safeguard terrestrial wildlife habitat south of Rifle and north of New Castle.

Proposed water resources management action and allowable use decisions, along with complementary riparian stipulations, would guide proposed actions of all programs in a manner conducive to maintaining or improving water quality of all water bodies, including groundwater located on or influenced by BLM lands. Such species as waterfowl, which are commonly found in or near water bodies, are directly benefited. These decisions would indirectly benefit wildlife and wildlife habitats because the distribution and quality of water are important factors in maintaining viable terrestrial wildlife population levels commensurate with the species' and habitats' potential. Therefore, the water resource decisions under all alternatives would indirectly, but beneficially, contribute to maintaining the condition and quality of wildlife habitat, ensuring that Standard 3 for terrestrial wildlife would be met through the life of the plan. Alternatives A and D are similar but less restrictive on surface-disturbing activities.

Impacts from General Vegetation Management. Under all alternatives, proposed actions would comply with Colorado Public Land Health Standard 3. The overall vegetation goal is to provide healthy and productive plant communities of native and other desirable species at viable population levels commensurate with the species' and habitats' potentials. Plant communities that achieve these standards would in turn support terrestrial wildlife populations that are productive, resilient, diverse, vigorous, and able to reproduce. Therefore, the vegetation goals and objectives under all alternatives would benefit terrestrial wildlife.

Vegetation treatments are designed to move plant communities toward desired conditions. Under Alternative A, CRVFO vegetation management guidance would continue though the implementation of various RMP amendments (e.g., CRVFO Fire Management Plan—Wildland Fire Management and Prescriptive Vegetation Treatment Guidance) or program-specific plans developed by the BLM or other agencies, such as the CPW. Current management direction has been to restore the physical function and biological health of BLM land to achieve Colorado Public Land Health Standards. At the implementation level, vegetation manipulations would continue creating a more diverse age-class structure of vegetation by reducing canopy cover, changing vegetation density, mimicking natural stand conditions and natural regeneration processes, reducing weeds,

and thinning pinyon-juniper woodlands that are encroaching on sagebrush shrublands to protect the shrublands and increase the quality and quantity of herbaceous forage.

Successional vegetation management by habitat manipulations would be beneficial for (1) species dependent on younger seral stages, and (2) species that prefer a diversity of vegetation age-classes or managing for a diversity of species. However, there could also be adverse direct and indirect impacts on species that depend on large blocks of older seral stage habitats until vegetation communities reestablish themselves. Adverse impacts on these species would be direct habitat loss, modification, fragmentation, and reduced habitat effectiveness.

Noxious and invasive weeds are often of lower value to wildlife and degrade wildlife habitat by reducing optimal cover or food. Invasive non-native plants with little or no forage value for big game species are increasing. A concern of resetting vegetation seral stages through vegetation treatments is the invasion of undesirable plant species. Sagebrush-steppe communities are among the ecosystems most vulnerable to invasion and degradation by invasive weeds. For example, cheatgrass out-competes most native plants when moisture is limited. It can also change site-specific fire ecology and result in the loss of critical shrub communities. Cheatgrass would provide some short-term forage benefits to big game species in early stages of growth, but it lacks the ability to provide high-quality forage during most of the year.

Most surface-disturbing activities include the potential for allowing the introduction of noxious or invasive weeds. The CRVFO would continue implementation of its integrated weed management plan and EIS (BLM 2007c), which would allow the treatment of up to 5,000 weed-infested acres. This EA tiers to the programmatic EIS for use of herbicides on BLM lands in 17 western states (BLM 2007i). All applicable conservation measures, BMPs, and mitigation measures from the plan would be followed, helping to reduce adverse impacts on non-target vegetation. Across all alternatives, the BLM would hold project proponents responsible for monitoring and controlling noxious weeds that result from any new facilities, improvements, or other surface-disturbing activities. Actions common to all alternatives that control weeds would have a beneficial impact on wildlife habitat.

Impacts from Riparian Vegetation Management. Riparian habitat is one of the richest and most diverse habitat types. One percent of the BLM lands are composed of riparian areas. This small but important habitat type provides a multistoried plant community for terrestrial wildlife. Riparian corridors offer excellent travel corridors for safe movement between habitat types and promote the dispersal of wildlife populations. Riparian areas supply an abundance of edge habitat that is spread out over a large area, making cover more accessible to wildlife. Riparian areas also serve as security, resting, feeding, and staging areas for mammals and birds. The health of wildlife populations is directly related to overall health and functional capabilities of riparian and wetland resources, which in turn are a reflection of watershed health.

The objective of the riparian program is to attain riparian area PFC. Riparian areas are classified as in PFC when adequate vegetation and landform structure is present to dissipate stream energy from high flows. This condition reduces erosion, improves water quality, filters sediment, captures bedload, and aids floodplain development. Under all alternatives, riparian and wetland vegetation areas are managed under the goal of Colorado Public Land Health Standard 2. This standard includes ensuring riparian vegetation captures sediment and provides forage, habitat, and biodiversity. The management of wetland/riparian areas to maintain or improve their PFC rating would improve habitat conditions for various wildlife species that use these areas. However, numerous other species would also benefit from improved riparian PFC, including

amphibians, big game mammals that feed in these areas (e.g., moose), and raptors, migratory birds, and cavity-nesting birds that rely on riparian vegetation for stopover habitat, feeding areas, or shelter.

Alternatives A and C would continue applying the current NSO stipulation to riparian areas and wetland zones and a CSU stipulation 500 feet from the outer edge of riparian vegetation. These stipulations help avoid long-term and short-term direct adverse impacts on riparian areas. Application of the stipulations would ensure that riparian habitats provide conditions suitable to meet the life history requirements of various wildlife species. The protection of riparian areas is important because it is better to protect riparian habitat rather than try to restore degraded habitat. Healthy riparian areas support terrestrial wildlife communities that are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes. Therefore, implementing the proposed riparian management action and allowable use decisions would indirectly, but beneficially, contribute to maintaining the condition and quality of wildlife habitat, ensuring that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan.

Impacts from Fisheries and Aquatic Wildlife Management. Under all alternatives, proposed management actions and allowable use decisions would comply with Colorado Public Land Health Standard 3. In areas where these standards are being met, there is reduced risk to terrestrial wildlife from loss or reduction of streamside vegetation, offsite erosion, and increased sedimentation and turbidity associated with implementation-level projects and actions.

Protection of fish and other aquatic wildlife would be based on application of NSO, CSU, and TL stipulations and LNs in all alternatives. Under Alternative A, the existing aquatic wildlife NSO stipulation protects the quality and quantity of water sources supplying the Rifle Falls and Glenwood Springs State Fish Hatcheries by prohibiting surface occupancy and surface-disturbing activities within a 2-mile radius. The watershed protections under this stipulation also provide protections for populations of native fishes and sportfishes in Rifle Creek and Mitchell Creek and their tributaries, as well as adjacent habitat conditions for terrestrial wildlife. Although the NSO stipulations would indirectly conserve terrestrial wildlife habitat, the stipulations would probably constrain habitat improvement projects, such as prescribed fire. Mechanical, biological, and chemical wildlife habitat treatments would need site-specific design to mitigate impacts.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under all alternatives, no decision would be approved in this RMP revision or authorized on BLM lands that would jeopardize the continued existence of fish or aquatic wildlife species that are listed, officially proposed, or candidates for listing as threatened and endangered. The proposed management actions and allowable use decisions are directed at preventing the need for listing proposed, candidate, and sensitive species under the ESA, protecting special status species, and improving their habitats to a point where their special status recognition is no longer warranted (i.e., Colorado Public Land Health Standard 4).

Protection of special status species fish and other aquatic wildlife would be based on application of NSO, CSU, and TL stipulations and LNs in all alternatives. These management actions and allowable use decisions would result in site-specific, higher-quality habitat conditions for terrestrial wildlife, especially riparian-associated species. Alternative A proposes fewer constraints on use and surface-disturbing activities and a smaller area of constraints, so qualitatively it is estimated that it would indirectly, but beneficially, contribute the least to ensuring that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan. However, there would not be a planning area-wide quantitative measurable

difference on terrestrial wildlife populations between alternatives. Managing habitat for special status fish and other aquatic species at the implementation level would continue to involve many techniques, including instream structures, riparian plantings, and exclosure fences, removing impediments, and placing in-channel barriers and bank stabilization.

Although the proposed NSO stipulations would indirectly conserve and maintain terrestrial wildlife habitat, the stipulation would probably constrain habitat improvement projects, such as prescribed fire. Mechanical, biological, and chemical wildlife habitat treatments would need site-specific designs to mitigate for the NSO stipulation.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Under all alternatives, no decision would be approved in this RMP revision or authorized on BLM lands that would jeopardize the continued existence of plant and terrestrial wildlife species that are listed, officially proposed, or candidates for listing under the ESA. The proposed RMP decisions are directed at preventing the need for listing proposed, candidate, and sensitive species under the ESA, protecting special status species, and improving habitats for special status species to a point where their special status recognition is no longer warranted (i.e., Colorado Public Land Health Standard 4).

Management of special status plants and terrestrial wildlife and their habitat would be based on the application of: (1) NSO, CSU, and TL stipulations, (2) LNs, and (3) management action and allowable use decisions in all alternatives. Managing special status species during RMP implementation would continue to involve many techniques, including application of treatments to degraded habitats, introduction, translocation, transplantation, restocking, augmentation, and reestablishment of native species, and application of conservation measures and guidance from conservation plans.

The loss of a special status species can conceivably affect other terrestrial wildlife species. Decisions intending to benefit special status plant and terrestrial wildlife species would influence other species occurring in that same habitat. For instance, decisions that conserve or maintain habitat for special status species also help retain larger blocks of contiguous habitat, habitat connections, and wildlife corridors for terrestrial wildlife species that do not have special status. Thus, proposed decisions preventing use and occupancy and other surface disturbances that would degrade habitat would indirectly benefit terrestrial wildlife species that do not have special status. Alternatives A and D propose fewer constraints on use and surface-disturbing activities and a smaller area of constraints, so qualitatively it is estimated that those alternatives would indirectly result in the most potential for adverse impacts on terrestrial wildlife habitat.

Impacts from Visual Resource Management. The impacts from VRM decisions are primarily associated with limitations on surface-disturbing activities intended to maintain the scenic values of public lands. Different levels of scenic values require different levels of management. For example, management might be focused on preserving or retaining the existing character of a landscape with high scenic value, so the area would be designated VRM Class I or II. An area with less scenic value might be managed to allow for some landscape modifications, and those areas would be designated Class III or IV.

VRM Class I and Class II designations do not preclude land use activities, but the level of change to the landscape would be low. However the stipulations (e.g., CRVFO-NSO-22, CRVFO-CSU-9) applied to the VRM classes do constrain surface-disturbing activities. So qualitatively based on the acres of NSO and CSU stipulations to protect visual resources, the Proposed RMP is estimated to indirectly, but beneficially,

contribute the most to ensuring that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan.

At the implementation level, habitat improvement projects in VRM Class I and Class II areas would impose design requirements to mitigate for scenic values and achieve VRM Class objectives. Any changes to the landscape would need to repeat the basic elements of form, line, color, and texture found in the natural features of the landscape.

Impacts from Wildland Fire Management. The composition, structure, function, and pattern of wildlife habitats on BLM lands have been dramatically influenced by fire historically and by suppression more recently. Fire suppression has changed vegetation types and structure and has fostered unnaturally high fuel loads that could eventually result in catastrophic fires. In lower elevations, encroachment of pinyon-juniper woodlands in the absence of fire has decreased understory diversity and productivity. At higher elevations, the absence of fire or other disturbance has resulted in some aspen forests being replaced by spruce forests and in aspen stands becoming decadent, having much lower forage or cover value for wildlife.

The impacts of fire management on terrestrial wildlife would be the same under all alternatives, with all use guided by the current FMP, whose goals are restoring the physical function and biological health of the land to maintain and achieve Colorado Public Land Health Standards, protecting existing and improving degraded riparian areas, and limiting the spread of noxious and invasive plants, insect infestations, and disease. The specific wildland FMU objectives and strategies consider local wildlife values, such as maintaining healthy sagebrush shrublands. The FMP includes guidance specific to heavy equipment, motorized vehicle use and the placement of large fire camps, the aerial application of retardant or foam, WSAs and ACECs, threatened and endangered and other special status species, and vegetation treatments. All of these measures would directly and indirectly lessen the negative impacts of wildland fire suppression and prescriptive vegetation treatments on wildlife values over the life of the plan. Identified post-fire emergency stabilization and rehabilitation efforts would benefit terrestrial wildlife over the long term by decreasing erosion and restoring or improving habitat conditions after a fire, although there could be short-term adverse impacts.

The FMP has helped maintain and conserve wildlife values as well as allow for implementation of prescriptive vegetation treatments that benefit terrestrial wildlife. It is projected that the current FMP and FMUs would beneficially contribute to ensuring that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan in all alternatives.

Impacts from Cave and Karst Resource Management. Caves provide escape for terrestrial wildlife (e.g., reptiles, owls, bats, and small mammals), shelter from cold temperatures and snow during the winter, refuge from daytime heat in the summer, and water sources. While the CRVFO does not market, publish, or release information regarding cave locations to the general public, cave use has the potential to damage fragile and sensitive resources. Under all alternatives, cave and karst resources would be managed under specific cave management objectives and setting prescriptions that allow for appropriate access while addressing issues and concerns relating to preservation of the caves' pristine and fragile resources, wildlife values, scientific and research values, and visitor safety and rescue issues. The cave management objectives and setting prescriptions would retain the current physical, social, and operational qualities of caves. If caves are found to be significant, they would be managed in accordance with the Federal Cave Resources Protection Act. An NSO stipulation for the protection of the Deep Creek cave area would prohibit surface occupancy and surface-disturbing activities in that area. The NSO stipulation extends to 5,000 feet below the surface. The

NSO stipulation area encompasses the cave openings and portions of the subsurface features and watersheds immediately above the caves. Proposed management actions under the Proposed RMP and Alternatives A and C would directly benefit terrestrial wildlife species that use the Deep Creek cave area, such as bats that use caves for roosting, maternity colonies, or hibernation.

Impacts from Forestry Management. The annual allowable harvest is 1.8 MMBF in the CRVFO. However, harvest levels have averaged less than 10,000 board feet in the last 5 years. Lodgepole pine is the primary commercial species. Pinyon-juniper woodlands are managed as forest products, with an estimated allowable harvest of 6,465 cords. Most of this harvest is firewood for individual use. However, average annual firewood harvest over the last 5 years is 650 cords. All in all, the CRVFO forestry program is very small. In addition, past decisions regarding forest and woodland products management emphasized wood products, but forest management policy on federal lands has changed, emphasizing forest health and hazardous fuel reduction. Much of the current forest management is now guided by the Healthy Forests Restoration Act. Alternative A would actively manage the most acres of commercial forestland and woodlands. The Proposed RMP and Alternatives C and D would intensively manage fewer acres of commercial forest and woodland; and would apply limited management to the remaining forests and woodlands. At the implementation level, forest management would be performed using clearcuts, shelterwood cuts, pre-commercial and commercial thinning, seeding, and planting, timber stand improvement, sanitation and mechanical treatments, or prescribed fire for stand replacement or conversion. These forest management activities, including construction of timber access roads, could result in direct habitat loss, modification, or fragmentation and reduced habitat effectiveness for some terrestrial wildlife species, but could be a long-term benefit for others. These activities could include short-term impacts, such as the use of heavy equipment, helicopters, chemical applications, road construction, traffic, noise, and human presence. Since the CRVFO has limited lodgepole woodlands (i.e., Black Mountain and King Mountain) and no forester on staff, it is estimated that the intensive forest program would remain small. Since the BLM is managing for a diversity of wildlife species in balance with habitat and landscape potential, implementation of some forestry management actions might be a benefit for some priority wildlife species. For example, reducing pinyon-juniper woodland encroachment on sagebrush shrublands would benefit sagebrush-dependent species and wintering mule deer. The clearing of old, dense, relatively less productive woodlands could make more productive areas available to terrestrial wildlife species.

If forest management is performed, the proposed terrestrial wildlife management actions and stipulations (i.e., NSO, CSU, and TL) would adequately protect terrestrial wildlife. In addition, terrestrial wildlife habitat would be indirectly protected by proposed management actions and allowable use decisions for other resources. Weighing all the mitigating measures, it is projected that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan under all forest management alternatives.

Impacts from Livestock Grazing Management. Domestic livestock grazing would continue to be permitted under all of the alternatives. BLM lands would be grazed primarily by cattle but also sheep and some domestic horses. The relative numbers and kinds of livestock have not varied much over the last 10 years and are not expected to vary much in the future. Under all alternatives, implementation-level grazing decisions would comply with Colorado Public Land Health Standards and Guidelines for Livestock Grazing Management.

Some localized livestock distribution problems exist, however LHAs have found that most grazing allotments are meeting, or moving toward meeting, the standards If livestock grazing is the cause the standards are not

achieved, changes would be made to address the kind, numbers, and class of livestock, and the season, duration, distribution, frequency, and intensity of grazing use. All alternatives would allow implementation-level adjustments of livestock grazing management to meet land health objectives for terrestrial wildlife.

The impacts from livestock grazing management on wildlife habitat include competition for forage and water and habitat use. Grazing invariably reduces the height and ground cover of plants, at least temporarily, thus reducing the cover wildlife species need for protection, escape, feeding (including the availability of prey populations), roosting, breeding, and nesting. Inappropriate grazing or overgrazing could change habitat effectiveness and connectivity of wildlife habitats by changing the structure, composition, or diversity of vegetation. Impacts could be both short term and long term and could range from minor to major, depending on the grazing intensity, duration, season of use, and local climatic conditions. Managing the timing and intensity of livestock grazing is critical to maintaining habitat conditions preferable to wildlife. For example, cattle grazing during the early season could improve the quality of winter forage for elk, but cattle must be removed early enough in the fall to allow plants to regrow.

Alternative A has slightly more AUMs (39,200) available for livestock grazing. Based on LHAs, wildlife data and range compliance reports, none of the proposed alternatives would have any qualitative or quantitative negative impacts on: (1) the number, density, or composition of terrestrial species, or (2) the quality or connectivity of terrestrial wildlife habitat through the life of the plan.

Impacts from Recreation and Visitor Services Management. Conflicts between recreation and wildlife could increase over the life of the plan, given (1) the numerous outdoor activities available in this region, (2) increasing recreation demand, (3) increasing local populations, (4) emphasis on international tourism and marketing, and (5) the presence of world-class destination resorts. Two key issues with recreation use were noted during scoping: wildland-urban interface recreation use on big game winter ranges, and recreation use and development in sagebrush steppe communities. Recreation use on big game winter ranges and in sagebrush steppe communities can create short-term physiological and behavior impacts and long-term habitat avoidance. Recreation developments reduce habitat effectiveness and connectivity.

In all alternatives the most determinative RMP decision for R&VS is whether to designate an area as an RMA or not. Alternative A would continue managing eight areas as SRMAs (Bocco Mountain, Bull Gulch, Deep Creek, Gypsum Hills, Hack Lake, Red Hill, Thompson Creek, and the Upper Colorado River). All but Gypsum Hills and Bocco Mountain SRMAs have an NSO stipulation applied to retain the existing physical recreation setting characteristics (RSCs). Seven areas would continue to be managed as RMAs with an NSO stipulation to protect nonmotorized recreation opportunities. Nonmotorized recreation opportunities were further described as those areas where the visitor can generally expect to see fewer people, largely because access is more difficult or challenging, and can enjoy a mostly natural setting with a high degree of solitude and tranquility. Also, refer to Section 4.3.3 Recreation and Visitor Services, Section 4.3.4 Comprehensive Trails and Travel Management, and Appendix K, Recreation and Visitor Services Management Framework for Special and Extensive Recreation Management Areas, for specific recreation and travel proposals and analysis.

A secondary consideration is the type of activities being emphasized, the anticipated use levels, and the amount of recreation infrastructure necessary to accommodate the recreation demand. To fully understand the impacts of these factors, they must be considered in combination with each other.

In all alternatives, recreation would take place on BLM lands unless the lands are closed to human entry. Recreation activities and use would be unevenly dispersed and distributed by location, intensity, activity type, infrastructure, season, and time on BLM lands. Activities that create the most adverse effects either alter habitat or affect an animal's behavior. The severity of the response depends on the species involved and the characteristics of the disturbance. Birthing, nesting, and wintering areas are normally the most sensitive to human use and development because these areas are usually restricted geographically.

In the CRVFO, recreation use peaks during the summer in locations like the Colorado and Eagle Rivers, on weekends and evenings on BLM lands adjacent to communities or within easy access of communities, and during the fall big game hunting seasons when many resident and out-of-town hunters add to the mix of recreation. Areas managed for lower recreation use levels (i.e., total, group size, and contact) in undeveloped landscapes are considered less impacting to terrestrial wildlife, regardless of the identification or number of acres of recreation designation. It is important to note that some aspects that affect recreation use and, indirectly, wildlife are outside the parameters of this plan and BLM, such as urban growth and development, promotional marketing, the location of destination resorts, decisions made by other land and wildlife managing agencies, and new technology.

Developed recreation sites, within or outside of RMAs, would be small localized points of high use. Roads and trails would be linear corridors of high use. In all alternatives, recreation development (e.g., trails, trailheads, river access, and campgrounds) would likely increase disturbances, modify habitat, reduce connectivity, reduce habitat effectiveness, increase habitat fragmentation, increase habitat avoidance, and potentially change and interfere with movement patterns.

Realizing the discussion on recreation impacts above, the most important analysis consideration for terrestrial wildlife and terrestrial wildlife habitat is whether adequate mitigation is proposed to alleviate potential negative impacts from recreation use and development. Alternatives A and D lack the number and extent of the terrestrial wildlife mitigation in the form of management actions (e.g., winter big game closures, and core wildlife areas) and stipulations (e.g., NSO and TL) that are proposed under Alternative C and the Proposed RMP, respectively. Alternative A also lacks the limitations on recreation use (e.g., camping closures and firearm use restriction) provided under the Proposed RMP and Alternatives C and D. The risks to wildlife habitat (including sagebrush shrublands) and wintering wildlife from inappropriate or just increasing recreation use would be higher under Alternatives A and D.

Under all alternatives, RMP decisions and implementation actions for recreation would be somewhat mitigated by compliance with "Recreation Guidelines to Meet Public Standards on Bureau of Land Management Managed Lands in Colorado" (BLM 2000c). These guidelines specify that recreation use on BLM lands is managed to promote the survival and health of native wildlife, to protect wildlife habitat by preserving connectivity and avoiding fragmentation, and to minimize wildlife disturbances by limiting recreation use by type, season, intensity, distribution, or duration when necessary.

Impacts from Comprehensive Trails and Travel Management. Roads that provide access for the public can reduce the quality of habitats for many wildlife species as a result of the spread of weeds, collision mortality, behavior changes, disturbance, and habitat fragmentation. Shifts in distribution of wildlife away from roads may occur across a range of temporal and spatial scales. The shifts away from roads also are influenced by topography, slope, vegetation, intensity and duration of disturbance, type of road, and types of use on the road. Changes in habitat use, including relocation to other areas, can impair survivorship and

reproductive success by forcing the animals into areas of lower-habitat quality or increasing the density of animals relative to the carrying capacity of the habitat. Disturbance can also cause nest failure for raptors and other sensitive birds as a result of abandonment or reduced nest attentiveness by one or both adults or starvation of the young as a result of reduced hunting success.

Decisions about roads, including construction, reconstruction, closure, obliteration, or decommissioning, are complex because they affect a multitude of resources, and not just wildlife. Trails have effects that are much harder to describe. However, heavily used trails or those that support noisy or high-speed activity can have the same types of impacts associated with disturbance and displacement of wildlife to less suitable areas. No alternative prescribes road or trail densities that limit the number of roads or trails or the spatial distribution of routes. However, for areas designated as "limited to designated routes," the CRVFO would manage public travel according to the route designations proposed for each alternative. Through the life of the plan, site-specific travel management issues would cause some routes to be rerouted, closed, or seasonally limited. It is also likely that some additional trails would be created for public use to connect regional trails systems, to support local community trail systems, and to meet the recreation objectives in some SRMAs and ERMAs.

The impacts of travel decisions (i.e., OHV area designations and route decisions found in Appendix O) on wildlife and wildlife habitat would primarily depend on the number of acres open and closed to OHV use under each alternative, the specific routes open and closed for public use, the type of travel permitted, and the application of limitations (i.e., time or season of use). Inappropriate use, whether OHV or pedestrian, has the potential to damage wildlife habitat as well as disturb individuals or groups of animals. Cross-country travel in "open" travel areas would continue to create new unplanned routes into sensitive wildlife habitats and to increase habitat fragmentation. As opposed to Alternatives C and D and the Proposed RMP, Alternative A has area travel designations of "open" and "limited to existing routes," which allow unplanned expansion of routes. Over time, this alternative would cause the most direct and indirect impacts on wildlife populations and habitats. Inappropriate and unplanned travel allowed by the current travel designations, on approximately 296,000 acres under Alternative A, would be likely to cause the most impacts on the number, density, and composition of terrestrial species and the quality and connectivity of terrestrial wildlife habitat through the life of the plan. Foot travel is not limited in any alternative, and horse travel is limited only on the Storm King Trail.

Winter is a stressful time for most wildlife. Disturbance on wintering habitats can cause animals to utilize critical energy reserves and avoid foraging areas with the highest-quality forage. Constant disturbance during harsh winters would probably result in reduced animal fitness and reproductive potential. Seasonal travel limitations (e.g., closure of big game winter range from December 1 to April 30 and closure of the Red Hill SRMA from December 1 to March 31) would have benefits for wildlife by limiting disturbance and avoidance caused by motorized travel during the critical winter months.

Impacts from Lands and Realty Management. The following lands and realty decisions would impact terrestrial wildlife: land tenure adjustments, withdrawals, ROW and other land use authorizations (including renewable energy), and renewable energy development.

Land Tenure Adjustments. Land exchanges, acquisitions, and disposals would add or remove habitat from BLM jurisdiction. The effects of land tenure adjustments on wildlife species would be evaluated through site-specific environmental analysis for any proposed land disposal. Land disposals could result in the loss of

wildlife habitat, whereas acquisitions would benefit wildlife species by providing protections that would not be afforded on nonfederal ownership.

Under Alternative A, land tenure adjustments are performed to increase the overall efficiency and effectiveness of BLM land management. There is no specific guidance in the current plan regarding disposal or retention of BLM lands for the benefit of wildlife species.

Withdrawals. Withdrawing areas from mineral entry would offer long-term benefits for terrestrial wildlife by reducing any adverse effects that could result from mineral development. Deep Creek and Thompson Creek areas were identified to be recommended for withdrawal to the Secretary of the Interior for closure to the mining laws for locatable exploration or development (locatable minerals).

ROWs and other Land Use Authorizations. Construction, operation, and maintenance associated with ROWs could result in short-term impacts on a variety of wildlife species, including direct mortality, damage to burrows, temporary displacement, loss of forage, human presence, noise, and vehicular traffic. The spatial distribution, including density, composition, and frequency of species, could be altered by the location and size of the project, along with the intensity and duration of construction and maintenance. Aboveground ROW actions, such as communication sites and power lines, would have long-term impacts. These types of permanent structures are particularly hazardous to avian wildlife because of the potential for collision or electrocution. Long-term impacts could include loss of habitat and habitat modification and reduced habitat effectiveness. Habitat loss is caused by road construction and use, facility construction and placement, pipeline construction, field facility maintenance, ROW construction, range improvements, and indirect areas of disturbance surrounding these areas.

The length of time of reduced habitat effectiveness and avoidance would depend on the timeliness and effectiveness of reclamation efforts. If these disturbed areas are successfully reclaimed, the regrowth of native vegetation would provide ideal forage and foraging areas for some wildlife species (i.e., raptors and mammalian predators) if operation and maintenance are low.

Impacts from renewable energy development on terrestrial wildlife species (including migratory birds) would include habitat disturbance, introduction of invasive weeds, individual mortality, erosion and runoff, fugitive dust, noise, exposure to contaminants, and interference with behavioral activities. Operational impacts of most concern to ecological resources would be those associated with bird and bat strikes to turbines and associated infrastructure (e.g., transmission lines and meteorological towers) and, to a lesser extent, the electrocution of birds. Other concerns would include habitat fragmentation, noise, and disturbance caused by human and vehicular activity.

BLM lands identified as exclusion areas would be unavailable for ROWs. BLM lands identified as avoidance areas may not be totally unavailable but should be avoided if possible because some resource value may become damaged or detracted from if development were allowed. Alternative A designates 20,800 acres as ROW exclusion areas (unsuitable) and 101,300 acres as ROW avoidance (sensitive) areas. Under all alternatives, ROW avoidance and exclusion areas would apply to ROWs, other land use authorizations, and renewable energy. Although some terrestrial wildlife values (i.e., elk calving, raptors, and bighorn sheep) are considered in the identification of avoidance areas under Alternative A, the wide diversity of wildlife species and their habitats are not.

The amount of land proposed as open to ROW placement does not necessarily indicate the number of acres of important wildlife habitat that would be directly disturbed. At the land use level, the best indicator of reducing adverse impacts of future lands and realty decisions is the level of constraint and size in acres of protections or withdrawals directly or indirectly afforded to wildlife or wildlife habitats. Under all alternatives, ROWs would be subject to the concurrent NSO, CSU, and TL stipulations approved in the RMP and applied during the site-specific environmental analysis to eliminate or lessen the impact of ROWs.

Through the life of the plan, Alternatives A and D would pose more risk of not sustaining area-specific wildlife habitat conditions because of the extent and types of stipulations proposed to mitigate for adverse impacts of lands and realty actions.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts associated with minerals exploration and development would include habitat loss, habitat modification, and loss of habitat effectiveness. Impacts result from the removal of vegetation (surface disturbance) and subsequent occupation of areas for oil and gas well pads, open pit mines, and associated roads and infrastructure. These impacts extend beyond the physical structures (Kaal et al. 2008). Many species of wildlife would avoid areas with high levels of noise, roads with frequent automobile and truck traffic, and areas surrounding structures. Repeated human disturbance of big game populations on crucial winter ranges can change activity patterns, increase predation, reduce access to resources, and increase energy expenditures necessary for survival (NMDGF 2010). Radiotelemetry and global positioning system (GPS) collaring data have shown elk to avoid oil and gas development by moving to less developed areas (BLM 2008m).

Each phase of oil and gas development—from exploration and construction through operation and abandonment—has a specific combination of impact type, intensity, and duration.

- Construction, Drilling, and Completion—The initial phase of development typically lasts for 25 to 40 days per well, depending on depth, geology, equipment used, and other variables. Associated activities include blading an access road and pad (with an average combined area of 3.4 acres per well) and nearly continuous operation of a drill rig and other specialized heavy equipment. During completion operations, specialized equipment is used to force fluids and associated materials into the gas-producing zones to fracture the rock and increase gas flow. On average, more than 500 round-trips by heavy trucks and pickups are associated with each new well.
- Production and Maintenance—This phase typically involves minimal personnel in the field, except at compressor stations and water disposal facilities, with periodic traffic to each well for monitoring and maintenance. Interim reclamation of temporarily disturbed areas of pads (areas not needed for routine production and maintenance) is conducted when the last well on a pad has been completed. Temporarily disturbed areas along roads and pipelines are reclaimed immediately after construction. Successful interim reclamation for weed and erosion control is expected to occur within 3 to 5 years after an area has been seeded with a BLM-approved seed mix. However, restoration to productive wildlife habitat could take 20 years or longer. The remainder of the disturbed area is occupied by surface facilities and ongoing human activity throughout the life of the well.
- Abandonment—The final phase of an oil or gas well occurs at the end of its productive life, typically ranging from 20 to 40 years. During abandonment, surface facilities are removed, wells are plugged, and access roads are reclaimed unless deemed necessary for resource management or if requested by the landowner. These activities involve a short-term increase in workers and vehicles in the project

areas. Abandonment and reclamation require approximately 3 days per well and 4 days per mile of access road, for a crew of four people.

- Final Reclamation—Restoration of temporarily disturbed areas at the well pad and along the access road begins on completion of construction. Attaining reclamation standards in terms of erosion control, weed control, and establishment of vegetation cover typically requires at least 3 to 5 years after planting. Actual recovery of reclaimed areas to conditions that represent productive wildlife habitat may take 20 years or longer, especially in drier sites. Areas of long-term disturbance, which are occupied by surface facilities and ongoing human activity throughout the life of the well, are reclaimed after abandonment.

Oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling would occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill drilling and step-out drilling would be the major portion of future activity. Of the BLM mineral estate in the high-potential area, approximately 88 percent has been leased and is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling is predicted in the areas identified as no known potential. Consequently, wildlife impacts relating to the location of oil and gas development would not be expected to vary among alternatives. Under Alternative A, all WSAs and the Thompson Creek ACEC (formerly Natural Environment Area) would remain closed to fluid minerals leasing and geophysical development. Over the life of the current RMP, closing areas to fluid mineral leasing would maintain wildlife habitat connectivity and reduce wildlife habitat fragmentation.

The CRVFO 1999 "Oil and Gas Leasing and Development, Record of Decision and RMP Amendment" identified stipulations for leases issued after 1999 to reduce impacts on wildlife. They included NSO stipulations for state wildlife areas, major river corridors, and raptors; TL stipulations for big game winter habitat, big game birthing areas, grouse, raptors, osprey, white pelicans, greater sandhill cranes, and ferruginous hawks; and LN stipulations for wildlife and wildlife habitat. The ROD also included an NSO stipulation for wildlife seclusion areas. This NSO stipulation prohibits surface occupancy and surface-disturbing activities within seclusion areas that provide high wildlife value: Starkey Gulch, Riley Gulch, Crawford Gulch, Paradise Creek, Coal Ridge, Lower Garfield, Jackson Gulch, Bald Mountain, and Battlement Mesa. An NSO stipulation was applied to protect a broad range of values from the impact of human intrusion. Exceptions have been granted and would continue to be considered based on approval by the BLM of a mitigation plan that suitably addresses the wildlife seclusion values at risk.

Federal oil and gas regulations prevent the BLM from applying new or additional lease stipulations that would be developed through this planning effort to existing leases. Federal regulations do allow the BLM to apply other protection measures in conjunction with planning and implementing oil and gas projects. When making a decision regarding discrete surface–disturbing activities following site-specific environmental review, BLM has the authority to impose reasonable measures to minimize impacts on other resource values, including restricting the siting or timing of lease activities (43 CFR 3100; 43 CFR 3160; IBLA 2006-213, 2006-226; IBLA 2008-197, 2008-200).

Site-specific mitigation measures supported by NEPA analysis are added during the implementation phase as conditions of approvals to the project. Alternative A also requires reasonable mitigation of impacts of past and proposed oil and gas development within a geographic area plan when well pad densities exceed one pad per 640 acres or road densities exceed 3 miles per 640 acres. Examples of additional regulatory protections that the BLM applies to existing leases include requirements of adequate reclamation, weed control, erosion control, and dust abatement. Such measures are developed in concert with the BLM during preparation of the environmental analysis.

East of the Grand Hogback, little impact on terrestrial wildlife from fluid mineral development is expected under all alternatives because of the lower potential for gas resources. BLM lands west of the Grand Hogback would continue to experience habitat loss, habitat modification, and loss of habitat effectiveness. Alternative A anticipates the development of approximately 2,662 federal wells on 333 multi-well pads and approximately 3,347 acres of surface disturbance. This acreage includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 2,181 acres on interim reclamation of well pads. The landscape would continue to exhibit a loss of connectivity of habitats because of the increased presence of corridors and roads. The spatial distribution, including density, composition, and frequency of species, would be impacted by the intensity and duration of fluid mineral development and production. Alternative A identifies the most acres as open to leasing and gas development. Despite the variance in acres open to leasing and gas development, the scope of the impacts is not expected to vary among the alternatives, but the intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback. Maintaining current levels of terrestrial wildlife populations west of the Grand Hogback, commensurate with the species' and habitats' potential, would be at risk under all alternatives. Alternatives A and D would pose more risk that the habitat conditions necessary for a variety of terrestrial wildlife species would not be sustained than under the Proposed RMP or Alternative C as a result of the potential level of development and disturbance.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The effects of mineral resource development and production on wildlife could vary, depending on the location and degree of disturbance, the proximity to key habitats, and the need to develop roads and other support facilities. Environmental contaminants associated with mining could affect wildlife species in many ways and at many levels within the ecosystem. Some contaminants (e.g., lead, arsenic, and cyanide) associated with mines could cause acute or chronic effects on resident wildlife. Site-specific impacts on wildlife would be addressed in individual mining plans of operation.

Acres of locatable minerals, mineral materials sales, and non-energy leasable minerals open to development would vary by alternative, with Alternatives A and D having the most open acres. However, the amount of land that is open to mineral use does not necessarily indicate the number of acres that would be directly disturbed since the amount of expected mineral development is low. Recognizing that mineral development technologies change through time and because there are no specific actions being evaluated at this time, the indicator of effects between alternatives is the level and type of protection provided to wildlife or wildlife habitats. Adverse effects of minerals decisions on terrestrial wildlife and their habitat would be reduced (by locale and season) by the application of the protective management action and allowable use decisions in addition to recommendations for withdrawals.

The spatial distribution, including density, composition, and frequency of species, would be impacted by the intensity and duration of mineral development. Under all alternatives, minerals would be subject to the

concurrent stipulations for each alternative. If mineral development would occur through the life of the plan, Alternative A would pose more risk of not sustaining the area-specific wildlife habitat conditions than under the Proposed RMP and Alternative C but less risk than under Alternative D.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, the BLM would designate and protect relevant and important values in the following ACECs: Blue Hill, Bull Gulch, Deep Creek, Glenwood Springs Debris Flow Hazard Zone, Lower Colorado River, and Thompson Creek. ACEC designations and their management prescriptions offer long-term benefits for the conservation and protection of terrestrial wildlife that occur within their boundaries by limiting or preventing surface disturbance, human activities, and associated habitat degradation and fragmentation. ACECs designated specifically to protect scenic, wildlife, or geologic values would directly benefit all terrestrial wildlife species and their habitats. ACECs designated to preserve historic or cultural values would indirectly benefit wildlife by limiting surface disturbance and preserving habitat. Impacts on wildlife vary between alternatives, primarily according to the proposed number of acres for the proposed ACECs. Table 4.2.6-6 displays the amount of important big game winter habitat that would be maintained and conserved by ACEC designations proposed in the different alternatives.

Table 4.2.6-6
Acres of Mule Deer and Elk Severe Winter Range and Winter Concentration Areas within Proposed ACECs

	Alternative A Total Acres	Alternative B (Proposed RMP) Total Acres	Alternative C Total Acres	Alternative D Total Acres
ACECs	27,000	46,400	79,800	20,200
Mule Deer Severe Winter Range	10,000	20,500	29,100	8,700
Mule Deer Winter Concentration Area)	800	10,000	20,800	700
Elk Severe Winter Range	7,300	15,300	19,100	6,000
Elk Winter Concentration Area	1,800	6,700	10,000	800

Acronyms and Abbreviations:

ACEC Area of critical environmental concern

The protection and conservation of terrestrial wildlife and their habitats under Alternative A would be less than under the Proposed RMP and Alternative and C but more than under Alternative D. The reverse is true for wildlife habitat improvements because ACEC designation may adversely affect terrestrial wildlife by restricting habitat treatments or the methods available to perform wildlife habitat improvements because of potential impacts to the values the ACECs are managed to protect.

Impacts from Wilderness Study Area Management. The BLM has no discretion to change management of WSAs through this planning process, with the exception of decisions relating to VRM designation and motorized vehicle use. Under all alternatives, the CRVFO would continue to manage Bull Gulch, Castle Peak, Eagle Mountain, and Hack Lake WSAs, consistent with BLM Manual 6330 (BLM 2012c).

Managing WSAs to maintain wilderness characteristics would directly benefit wildlife by reducing habitat fragmentation and modification, maintaining habitat effectiveness, and reducing disturbances through

constraints on surface-disturbing activities, motorized and mechanized types of travel, permanent new development, ROWs, and fluid minerals leasing.

Although WSAs maintain and conserve wildlife habitat for a variety of species, the reverse is true for wildlife habitat improvements, because WSA designation may adversely affect wildlife by restricting the methods available to improve wildlife habitat. Direction for managing wildlife in WSAs is prescribed by BLM Manual 6330 – *Management of Wilderness Study Areas* (BLM 2012c). All proposed actions would need to be scrutinized to determine whether the action would be necessary to conserve the wildlife species. The impacts are the same across all alternatives since the acres and locations of WSAs are the same under all alternatives.

Impacts from Wild and Scenic Rivers Management. The designation of a stream segment as eligible for inclusion in the NWSRS would benefit terrestrial wildlife that use habitats directly associated with the stream segments (e.g., riparian, wetlands, and open water) by mandating the protection of the river's free-flowing condition and restricting surface-disturbing activities within 0.25 mile of the river.

Under Alternative A, all stream segments would be identified as eligible for inclusion in the National Wild and Scenic River System. To be eligible for Wild and Scenic River designation, a river or stream segment must possess one or more ORVs, must have sufficient water quality to support those values, and must be free flowing. ORVs could be scenic, recreational, geological, fish related, wildlife related, historic, cultural, botanical, hydrological, paleontological, or scientific.

Although WSR eligibility would maintain and conserve wildlife habitat for a variety of species, the reverse is true for wildlife habitat improvements, because protection of eligible segments, especially those classified as wild or scenic, would adversely affect wildlife by restricting the methods available to improve wildlife habitat.

Impacts from Transportation Facilities Management. Transportation corridors and the subsequent fencing (e.g., Interstate 70 and State Highway 82) can cause habitat loss, habitat fragmentation, and habitat modification, and can create barriers to wildlife movement. Effects can also be indirect, such as displacement or increased mortality of wildlife. High-speed roads (state highways and paved county roads outside the jurisdiction of the BLM) have the greatest potential for direct mortality. Under all alternatives, BLM-maintained roads would continue to have a native or gravel surface, with about 60 to 80 miles of roads being maintained each year.

The BLM has no authority over state or county roads. East of the Grand Hogback, little expansion of transportation facilities authorized by the BLM is expected based on the lower potential for gas resources under all alternatives. The greatest change in transportation facilities would be associated with energy development west of the Grand Hogback. BLM lands west of the Grand Hogback would continue to experience habitat loss, habitat modification, and loss of habitat effectiveness, with some degree of difference based on the level of development proposed. Maintaining current levels of terrestrial wildlife populations, west of the Grand Hogback, commensurate with the species' and habitats' potential, would be at risk under all alternatives. Based on the proposed level of development, Alternative A would pose more risk that the habitat conditions necessary for a variety of terrestrial wildlife species would not be sustained than under the Proposed RMP or Alternative C but less risk than under Alternative D.

Alternative B - Proposed RMP

Impacts to terrestrial wildlife from management of other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to those described under Alternative A, except as described below. All management actions and allowable use decisions proposed in the Proposed RMP and Alternatives C and D for the benefit of terrestrial wildlife species would offer short- and long-term beneficial effects for wildlife resources. The degree of benefit often varies by the theme of each alternative. Proposed decisions focus on managing habitat with overall results of maintaining healthy, productive animal communities of native and other desirable species at viable population levels commensurate with the species' and habitats' potential.

Under the Proposed RMP, stream conditions associated with past, ongoing, and future planning, construction, and maintenance actions in the I-70 corridor would be improved as per the "Stream and Wetland Ecological Enhancement Program (SWEEP) Memorandum of Understanding."

Disturbance from Public Travel, Access, and Land Use Activities. An animal in good physical condition may not be measurably impacted by human activity while one in the winter may burn precious energy while avoiding humans and pets (Bernatowicz 2004). To protect wintering wildlife, the BLM would apply a TL on big game winter habitat under all alternatives.. Under the Proposed RMP, the TL prohibits surface occupancy and surface-disturbing activities from December 1 to April 15 to protect big game (mule deer, elk, moose, pronghorn, and bighorn sheep) winter range, including crucial winter habitat and other definable winter range as mapped by the CPW 2009. This TL may also apply to sundry notices that require an environmental analysis.

In addition, the BLM would increase the number of big game winter ranges closed to public motorized and mechanized travel. The closure dates would be from December 1 to April 15 (Table 4.2.6-5). The closure date is 15 days less than under Alternative A; however, it also applies to mechanized use, which is dominant on low-elevation winter ranges that often can be snow-free by April 15. The dates are consistent with the dates in "Colorado Division of Wildlife's Actions to Minimize Adverse Impacts to Wildlife Resources." Under severe winter conditions, the winter closure may be extended if requested by the CPW.

To reduce the disturbance of humans and dogs, the Proposed RMP and Alternatives C and D would reduce the stress of harsh winters on big game by eliminating human activity and dogs at the request of the CPW on an area-specific basis. The closures would be defined by a combination of factors such as snow depth, snow crusting, daily mean temperatures (long periods of cold temperatures), and concentrations of animals. Some people have suggested that the BLM should close the majority of winter ranges to all human activity. The fragmented public-private landscape with so much wildland-urban interface and limited staff for enforcement makes such a proposal unrealistic to effectively implement. This proposal is a flexible approach that can be applied when and where it is most needed.

Under the Proposed RMP, authorized activities resulting in the removal of vegetation and broad-scale use of pesticides would be subject to a TL stipulation (i.e., Migratory Bird Nesting Season) that would protect BCC from disturbance during the nesting season. As opposed to the COA in Alternatives C and D, the TL is a more appropriate application of the protection measure since it is typically applied to surface-disturbing activities. The TL would apply to activities that would take place between May 15 and July 15 and would

consider: the scale, the type, and the duration of the project; species potentially present; weather conditions; distance to known nests, elevation, habitat types present; and type of equipment to be used.

In all action alternatives, the BLM would apply a TL that constrains surface occupancy and surface-disturbing activities to protect use of nesting and fledgling habitat. The following buffer widths for non-special status raptor species would also be applied.

A 0.25-mile radius:

- February 15 to July 15 for red-tailed hawk and all owls
- April 1 to July 15 for Swainson's hawk
- April 1 to August 31 for osprey
- April 15 to July 15 for sharp-shinned hawk and Cooper's hawk

A 0.5-mile radius:

- December 15 to July 15 for golden eagle
- March 1 to September 15 for northern goshawk
- March 15 to July 15 for prairie falcon

The Proposed RMP and Alternatives C and D do not propose an NSO stipulation for wildlife seclusion areas but the Proposed RMP and Alternative C propose an NSO stipulation for priority wildlife habitat. The rationale is based in the simple fact that BLM has been unable to manage for wildlife seclusion values as a result of the dominance of previous leases issued before the 1999 Glenwood Springs Resource Area (GSRA) "Oil and Gas Leasing and Development ROD and RMP Amendment," when the NSO stipulation for wildlife seclusion areas took effect. The NSO stipulation also does not apply to split-estate lands or directional drilling into a federal lease from private land. In summary, these leases are being held by extensive development and production with no opportunity to ever apply the NSO stipulation.

An NSO stipulation for priority wildlife habitat (CRVFO-NSO-7) would be applied under the Proposed RMP and Alternative C. Priority wildlife habitat prohibits surface occupancy and surface-disturbing activities to protect vegetation cover and forage on BLM lands with high and overlying wildlife values, including habitats of high wildlife value for multiple species. These values on BLM lands include the following:

- Priority species habitat
- Sagebrush shrublands for sagebrush dependent species
- Wildlife migration corridors
- CPW mapped mule deer critical winter habitat
- CPW mapped mule deer and elk migration corridors
- CPW mapped elk concentration areas
- CPW mapped bighorn sheep, winter, severe winter and winter concentration areas

- Canada lynx landscape linkages
- Locations of wildlife-related vegetation treatments

The NSO stipulation would apply to all use or occupancy of the land surface for fluid mineral exploration and development as well as to all other surface occupancy and surface-disturbing activities. The NSO stipulation would reduce habitat fragmentation and maintain habitat effectiveness and connectivity for a multitude of species. More importantly, priority wildlife habitat would conserve big game winter concentration areas defined as that part of the winter range where densities are at least 200 percent greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of 10; and big game severe winter ranges defined as that part of the overall range where 90 percent of the individuals are located when the annual snowpack is at its maximum or temperatures are at a minimum in the two worst winters out of 10 (Table 4.2.6-7).

Although the Proposed RMP has less priority wildlife habitat acreage than Alternative C, specific priority wildlife habitat areas were amended from the Draft RMP/Draft EIS through consultation with CPW and in response to public comments. Protecting priority wildlife habitat areas in the Proposed RMP and Alternative C addresses key issues identified in the development of the alternatives and meet the intent of scoping.

Table 4.2.6-7
Acres of Mule Deer and Elk Severe Winter and Winter Concentration Ranges within Priority Wildlife Habitat under the Proposed RMP and Alternative C

	Alternative B (Proposed RMP) Total Acres	Alternative C Total Acres
Priority Wildlife Habitat	45,600	57,600
Mule Deer Severe Winter Range	21,700	34,500
Mule Deer Winter Concentration Area	24,600	35,100
Elk Severe Winter Range	16,400	20,600
Elk Winter Concentration Area	22,000	29,300

Acronyms and Abbreviations:
RMP resource management plan

Under the Proposed RMP and Alternative C, winter big game closures from December 1 to April 15 have been proposed in many areas where there are designated motorized and mechanized routes. Priority wildlife habitat areas such as Horse Mountain and Arbaney-Kittle have few designated motorized or mechanized routes. Many of these winter big game closures complement the application of the NSO stipulation constraining development in habitats important for wintering big game (Table 4.2.6-8). These corresponding management proposals would help ensure habitat effectiveness is maintained over the life of the plan.

Under the Proposed RMP and Alternative C, the BLM would ensure habitat connectivity of big game ranges by identifying big game migration corridors as retention areas. All action alternatives would increase the permeability of the landscape by providing long-term protection and restoration of wildlife linkages by reducing the density of roads and trails in priority big game habitats and avoid developing permanent structures that restrict wildlife movement.

Table 4.2.6-8
Acres of Winter Big Game Closure within Priority Wildlife Habitat under the Proposed RMP and Alternative C

	Alternative B (Proposed RMP) Total Acres	Alternative C Total Acres
Priority Wildlife Habitat	45,600	57,600
Winter Closure	26,800	49,300

Acronyms and Abbreviations:
RMP resource management plan

Snags (standing dead trees) provide important habitat for many wildlife species and cavity nesting birds. The Proposed RMP and Alternative and C would broadly manage all forest types to provide an average snag retention density of three snags per acre.

CPW Big Game Population and Harvest Objectives. To reduce big game movement to private lands during the big game hunting season and to increase game hunter success, the CRVFO has worked with CPW on seasonally limiting motorized use on specific routes during the big game hunting seasons. The Stagecoach Trail and Domantle Road (8 miles total) in the Castle Peak area have been traditionally gated from October 1 through November 30. The Proposed RMP and Alternative C proposed moving the beginning date to August 20 to be ahead of the big game archery and muzzleloader hunting seasons to help reduce big game movement to private lands during those hunting seasons too.

The Proposed RMP and Alternative C also propose seasonal route limitations in the Dry Rifle Creek area and the West Rifle Creek area from October 1 to November 30. These routes add 10 additional miles to the existing seasonal route limitations. BLM has worked in concert with the CPW to perform vegetation treatments for big game and sagebrush-dependent species in the Dry Rifle Creek and West Rifle Creek areas. The combination of seasonal route limitations from October 1 through November 30 and the habitat treatments would probably keep more animals on BLM land and accessible to hunters.

In turn specific routes in the Cottonwood Creek winter wildlife closure would be cooperatively managed on a year-to-year basis with CPW to allow motorized vehicle access for late season big game hunting. The access would facilitate meeting harvest goals in the GMU.

State Wildlife Areas. SWAs would have the highest level of protection from land use activities under the Proposed RMP because it combines the closure to fluid mineral leasing and the stipulation CRVFO-NSO-7 for priority wildlife habitat which includes SWAs. The closure to fluid mineral leasing protects 12,900 acres of SWAs that have federal mineral estate underlying the state-owned surface land. For Garfield Creek SWA the actual acreage of protection is only 2,500 acres of federal mineral estate because 7,400 acres of federal mineral estate available for fluid mineral leasing is already leased. However if any of the leases on the 7,400 acres expire or are withdrawn, the area would not be available for leasing again. The application of NSO stipulation for priority wildlife habitat will protect SWAs from other mineral development that is part of the federal mineral estate.

Impacts from Water Resource Management. Impacts would be similar to those under Alternative A except that under the Proposed RMP and Alternative C, an NSO stipulation prohibits surface occupancy and surface-disturbing activities within a buffer distance of a hydrologic feature. Under the Proposed RMP, the

buffer distance would be 325 horizontal feet from the outer edge of riparian and wetland zones. Alternative C provides a similar streamside management protection zone but with a smaller buffer distance of 50 feet from the ordinary high water mark of any hydrologic feature (i.e., ephemeral, intermittent, perennial channels, wetland, lake, fen, or spring).

Under the Proposed RMP, additional NSO and CSU stipulations would be applied to protect water resources that would indirectly conserve and maintain wildlife habitat. An NSO and CSU stipulation would constrain surface occupancy and surface-disturbing activities within a municipal watershed and public water supply; and an NSO stipulation would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of major river corridors. The major river corridor NSO stipulation provides a broader protection of riverine and adjacent areas and reduces some of the duplication provided by multiple stipulations under Alternative C.

Under the Proposed RMP and Alternative C, areas and acres with constraints on surface-disturbing activities would be increased, compared with Alternatives A and D.. The stipulations would indirectly conserve and maintain terrestrial wildlife habitat; however, the stipulations would probably constrain habitat improvement projects such as prescribed fire. Mechanical, biological, and chemical habitat treatments would need to be designed to avoid all ephemeral, intermittent, perennial channels, wetlands, lakes, fens, and springs.

Impacts from General Vegetation Management. The Proposed RMP and Alternatives C and D propose specific direction for vegetation management.

For forest and woodlands, direction would include the following:

- Manage lodgepole pine and aspen on an even-aged basis to transition from homogeneous stands of over-mature aspen and lodgepole pine to create a more diverse age-class structure across the landscape.
- Manage other species (e.g., pinyon-juniper, Engelmann spruce, Douglas-fir, subalpine fir, and limber pine) on an uneven-aged basis to mimic natural stand conditions and natural regeneration processes.
- Maintain or contribute towards the restoration or development of old-growth structure and composition.

For rangeland management, this direction would include the following:

- Manage sagebrush steppe to transition from homogeneous stands of old sagebrush to create a more diverse age-class structure across the landscape and to improve diversity and cover of understory species.
- Reduce encroachment of pinyon-juniper and other tree species in sagebrush steppe.
- Manage salt and desert shrub to improve vigor and composition of shrubs, diversity and cover of native understory species, and cover by microbiotic crust.
- Manage native grasslands to maintain ecological functions.

Land health assessments have noted that many locations vegetation communities are in decline because of the dominance of cheatgrass, the presence of weeds, the poor diversity and low percent of grasses and forbs,

hedging big game, and pinyon-juniper encroachment. In general, some vegetation types in specific locations have reduced nutritional value for wildlife but often still provide cover and security needs.

For example, a local concern pertains to the lack of natural disturbances in sagebrush communities and the encroachment of pinyon-juniper woodlands into surrounding areas, especially sagebrush shrublands. Although mature pinyon-juniper forests provide high-quality thermal and escape cover for big game, they eliminate understory vegetation by depriving understory plants of sunlight, moisture, and nutrients as pinyon-juniper forests expand and age. Pinyon-juniper removal and other treatments increase the availability, palatability, and nutrition of forage on big game ranges; in addition, it benefits all sagebrush-dependent species.

Under the Proposed RMP and Alternatives C and D, these objectives would be achieved through the use of restoration techniques including revegetation, fertilization, and soil amendments; the use of vegetation manipulation (e.g., fire, mechanical, biological, and chemical treatments); identification and protection of old-growth stands; and, regarding noxious and invasive weeds, prevention of their establishment, treatment of existing, and reduction in their spread.

Mimicking natural periodic disturbance is often necessary to stimulate plant productivity, increase diversity, and increase nutritional value. Improving vegetation in upland areas would provide more forage to big game species and other herbivorous species that occur in these areas and have a direct beneficial impact. In addition, vegetation treatments in upland areas often divert livestock and wildlife use from riparian and wetland areas, thus increasing the vigor and structural diversity of these plant communities.

Most wildlife species would move into adjacent untreated areas, but direct mortality during the vegetation treatments is possible. TL stipulations for big game birthing areas, for raptors and waterfowl and shorebird nesting and production areas, along with timing limitations for migratory birds, are proposed under all alternatives to mitigate the short-term impact of vegetation treatments.

Specifically retaining old-growth stands would provide healthy and productive habitat for cavity-nesting species. Dead trees or snags provide a valuable forest component for wildlife, which uses these standing habitats as a place to feed, nest, perch, and roost. Some small mammals and birds use large, downed woody material as a place to live and feed on insects, seeds, and fungi.

The spread of noxious, invasive, and non-native weed species would be controlled through implementation of the "Noxious and Invasive Weed Management Plan for Oil and Gas Operators" to meet the requirements of the Colorado Noxious Weed Act. Actions taken to help slow the spread of weeds would reduce the adverse impacts of surface-disturbing activities that result in the adverse alteration of wildlife habitat.

Healthy, productive, and diverse plant communities support terrestrial wildlife communities that are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes. Therefore, implementing the proposed vegetation management action and allowable use decisions would indirectly, but beneficially, contribute to maintaining the condition and quality of wildlife habitat, ensuring that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan.

Impacts from Riparian Vegetation Management. Impacts would be similar to those under Alternative A except that the Proposed RMP and Alternatives A and C would apply NSO and CSU stipulations to prohibit or constrain surface occupancy and surface-disturbing activities within riparian areas. Alternative D would apply only a CSU stipulation to constrain surface occupancy and surface-disturbing activities within 500 feet from the outer edge of riparian vegetation, which is less restrictive on surface-disturbing activities. This reduced protection could result in allowable surface-disturbing activities within riparian habitats, but when coupled with the stipulations for water resources and fish and other aquatic species, riparian areas would still be mostly protected.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP applies an NSO stipulation for fish-bearing streams and a TL for coldwater sport and native fish in addition to an NSO stipulation for fish hatcheries. These stipulations would protect fish-bearing streams by constraining surface-disturbing activities by location and timing. Since aquatic wildlife and their habitat support (i.e., food, forage, shelter, breeding, or nesting habitat) a variety of terrestrial species, these proposed decisions would indirectly result in higher-quality habitat conditions for terrestrial wildlife. Alternative C and the Proposed RMP propose more constraints on use and surface-disturbing activities, and a larger area of constraints, so qualitatively it is estimated that they would indirectly, but beneficially, contribute the most to ensuring that Colorado Public Land Standard 3 for terrestrial wildlife would be met through the life of the plan.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Terrestrial wildlife species would generally benefit from proposed management actions and allowable use decisions for special status plants and terrestrial wildlife species, because they usually share similar species protection and habitat conservation objectives. Alternative C and the Proposed RMP would include more constraints on use and surface-disturbing activities and a larger area of constraints for special status species. Consequently, it is estimated that these alternatives would be the most beneficial to indirectly reducing adverse impacts on terrestrial wildlife habitat.

Impacts from Cave and Karst Resource Management. The NSO stipulation for the cave and karst resources applied in the Proposed RMP and Alternatives C and D would prohibit surface occupancy and surface-disturbing activities of around known cave and karst resources to a depth of 5,000 feet below the surface. The NSO stipulation area encompasses cave openings and portions of the subsurface features and watersheds immediately above the caves. The NSO stipulation for the protection of cave and karst resources including the Deep Creek Cave area would be applied to known caves in the CRVFO. The Proposed RMP and Alternatives C and D would protect known caves but would not protect caves yet undiscovered. The potential indirect impacts to terrestrial wildlife that use caves would parallel the coverage of the NSO stipulations.

Impacts from Livestock Grazing Management. Impacts would be similar to those described under Alternative A, except that this alternative would make approximately 35,500 AUMs available for livestock grazing. Of the 63 vacant allotments, two would be made available for grazing while others would be closed or combined with adjacent allotments. Seven active allotments would be closed to grazing.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP and Alternatives C and D, BLM lands would be designated as SRMAs or ERMAs or left undesignated. Within SRMAs, R&VS management is recognized as the predominant land use focus, where specific recreation opportunities and

RSCs are managed and protected on a long-term basis. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Since management within ERMAs is commensurate with the management of other resources and resource uses, all R&VS decisions would be compatible with other resource objectives.

In SRMAs, where the predominant land use focus is R&VS, terrestrial wildlife would be at greater risk for negative impacts. Generally, the greatest impact to terrestrial wildlife would occur in SRMAs that (1) emphasize accommodating or attracting higher numbers of visitors increasing the risk of disturbance, or (2) require an expansion of recreation trails and facilities that would fragment (i.e., cause loss of connectivity) wildlife habitat. Priority wildlife habitat would generally be most compatible with BLM lands that are undesignated for R&VS or designated as ERMAs, because wildlife management and conservation would be emphasized, or emphasized on an interdisciplinary basis commensurate with the management of R&VS. Overlap with ERMAs does occur in the following priority wildlife habitat areas: Cottonwood-Eby Creek, New Castle North, Thompson Creek, and Wolcott.

In the Proposed RMP and Alternatives C and D, wildlife disturbance would be mitigated through additional winter closures that apply to both mechanized and motorized use, potential closures to human activity and dogs during harsh winters, and indirectly through travel route designations. The Proposed RMP and Alternatives C and D include limitations (e.g., camping closures, firearm use restriction, or SRPs) on inappropriate recreation use. The Proposed RMP and Alternative C, with the additional wildlife mitigation in the form of management actions (e.g., winter big game closures) and stipulations (e.g., NSOs and TLs), better protect wildlife from disturbance and would better maintain habitat effectiveness, through the life of the plan.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as or similar to those under Alternative A, except that the Proposed RMP and Alternatives C and D have no area travel designations of "open" or "limited to existing routes," which has been identified in land health assessments and other documents as causing negative impacts to wildlife habitats. BLM lands would have area designations of "limited to designated routes" which prohibit overland cross-country motorized and mechanical travel. This designation would be a benefit to terrestrial wildlife species by (1) reducing inappropriate human disturbances, and (2) prohibiting the proliferation of user created routes as is currently occurring on BLM lands.

While road density itself may not be the best measure of habitat effectiveness for wildlife, road and trail designations and use play an important role in habitat security, fragmentation, and disturbance from human activities. For example, Table 4.2.6-9 displays the existing route densities (Alternative A) in priority wildlife habitat.

While no prescriptive standard (i.e., miles of routes/square mile of habitat) is being proposed, the Proposed RMP and Alternative C propose reducing the amount of routes and the type of use on the routes through travel route designation. Table 4.2.6-10 displays proposed public travel route designations (i.e., vehicle, ATV, motorcycle, mountain bike, and foot/horse) for the Proposed RMP and Alternative C within priority wildlife habitat. There is a reduction in route density (including mountain bike routes) from Alternative A (1.89 miles/square mile) to the Proposed RMP (1.04 miles/square mile) and Alternative C (0.62 miles/square mile). In both the Proposed RMP and Alternative C motorized routes are well below 1 mile/square mile within priority wildlife habitats. Qualitatively, travel designations under both the Proposed RMP and Alternative C

Table 4.2.6-9
Existing (Alternative A) Route Density within Priority Wildlife Habitat

Priority Wildlife Habitat	Square Miles	Miles of Routes/Square Miles of BLM Land		
		Roads	All Motorized	Total Including Mtn. Bike
Arbaney-Kittle	3.77	0	0	4.8
Cottonwood/Eby Creek	15.01	8.5	16	16
Dry Rifle Creek	3.75	13.8	20	20
Fisher Creek	7.65	8.4	8.6	15.9
Horse Mountain	8.18	12.5	12.5	12.5
Light Hill	5.92	14	14	14
Main-West Elk Ridge	1.75	7	7.3	7.3
New Castle North	9.3	12.2	12.9	12.9
Thompson Creek/Holgate Mesa	5.34	12.5	12.5	12.9
West Elk Ridge	3.64	11	11	11
West Rifle Creek	1.7	3.8	3.8	3.8
Williams Hill	2.39	1.7	1.7	1.7
Wolcott (Ute Creek)	3.08	2.6	2.6	2.6
Total	**71.48**	**108**	**122.9**	**135.4**

Table 4.2.6-10
Public Travel Route Designations within Priority Wildlife Habitat for the Proposed RMP and Alternative C

Priority Wildlife Habitat	Miles of Routes/Square Mile of BLM Land							
	Alternative B (Proposed RMP)				Alternative C			
	Square Miles	Roads	All Motorized	Total Including Mtn. Bike	Square Miles	Roads	All Motorized	Total Including Mtn. Bike
Arbaney-Kittle	3.77	0	0	4.7	NA	NA	NA	NA
Cottonwood/Eby Creek	15.01	7.5	7.5	7.5	15.01	4.3	4.3	4.3
Dry Rifle Creek	3.75	6.9	6.9	13.1	3.75	7	7	7
Fisher Creek	7.65	1.5	1.5	7.4	7.65	0.7	0.7	0.7
Horse Mountain	8.18	9.4	9.4	9.4	8.18	8.1	8.1	8.1
Light Hill	5.92	9.9	9.9	9.9	5.92	9.5	9.5	9.5
Main-West Elk Ridge	1.75	2.3	2.3	2.3	1.75	3	3.1	3.1
New Castle North	9.3	3.8	3.8	6.9	9.3	4	4	4
Thompson Cr./Holgate Mesa	5.34	3.8	3.8	5	5.34	0	0	0
West Elk Ridge	3.64	5.4	5.4	5.4	3.64	5.4	5.4	5.4
West Rifle Creek	1.7	3.3	3.3	3.3	1.7	0	0	0
Williams Hill	2.39	0	0	0	2.39	0	0	0
Wolcott (Ute Creek)	3.08	0	0	0	3.08	0	0	0
Total	**71.48**	**53.8**	**53.8**	**74.9**	**67.71**	**42**	**42.1**	**42.1**

Acronyms and Abbreviations:

BLM Bureau of Land Management
N/A not applicable
RMP resource management plan

would offer increased habitat security and a decrease in the effect of public travel in priority wildlife habitats, with Alternative C providing the most benefit. Cumulatively, the reduction in routes along with the NSO stipulation for priority wildlife habitat and seasonal closures, should increase the habitat effectiveness of these areas over the life of the plan.

It is important to note that the level of fragmentation, based on the physical existence of routes on the ground, would be unchanged unless the existing routes are rehabilitated or naturally revegetate as a result of a lower level of use or facilities, such as communication sites, livestock facilities, and ROWs, and their associated roads are removed. The tables also do not address the intensity of use. For example, conversion of motorized routes to mountain bike routes may result in more use, especially in popular recreation areas near communities.

The Proposed RMP would prohibit over-snow travel on more acres than Alternatives A or D but less than Alternative C. The additional areas and acres that would be closed to over-snow travel would benefit terrestrial wildlife species by (1) reducing the sight and sound disturbances, and (2) minimizing activities that increase current use levels and human-induced snow compaction (Claar et al. 1999).

The combination of additional travel limitations and the reduced number of designated routes would be beneficial to helping maintain the number, density, and composition of terrestrial species and the quality and connectivity of terrestrial wildlife habitat through the life of the plan. The Proposed RMP would be more beneficial than Alternatives A or D but slightly less beneficial than Alternative C because of the extent of the limitations.

Impacts from Lands and Realty Management. Impacts would be similar to those described under Alternative A, except under the Proposed RMP and Alternatives C and D, the following areas would be designated as ROW avoidance areas: ACECs not included in ROW exclusion areas, occupied habitat for sage-grouse, occupied habitat for special status species, wetlands, and wildlife treatments. Land use authorizations within these areas would be avoided to the extent possible so as not to damage or diminish the terrestrial wildlife values, thereby offering protections to local terrestrial wildlife populations. For example, authorizing wind energy development would permanently alter habitats and create collision hazards for bats and bird species.

Under the Proposed RMP and Alternative C, the following areas are included as retention areas: elk severe winter range; mule deer critical winter range; deer and elk migration corridors; priority wildlife habitat; major river corridors; and habitats for proposed, candidate, and listed species under the ESA. These retention areas benefit terrestrial wildlife by retaining high-value wildlife habitats in federal ownership unless a land exchange proposal provides similar or greater value to terrestrial wildlife.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The types of impacts would be similar to those described under Alternative A, except that the Proposed RMP would result in more development, estimated to total approximately 4,198 federal wells on 525 multi-well pads, with an estimated 5,276 acres of surface disturbance. This total includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 3,439 acres on interim reclamation of well pads. The Proposed RMP identifies fewer acres as open to leasing and gas development than Alternatives A and D, but more acres than Alternative C. Despite the variance in acres open to leasing and gas development, the scope of the impacts is not expected to vary among the alternatives, but the

intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback.

Federal oil and gas regulations prevent BLM from applying new or additional lease stipulations that would be developed through this planning effort to existing leases. However, under all alternatives, federal regulations would allow BLM to apply mitigation measures consistent with decisions proposed in this RMP revision as terms and conditions for discretionary approvals (e.g., ROW actions) and apply COAs to augment existing protections related to lease activities. These measures could be applied on a case-by-case basis at the implementation level and could locally lessen the adverse impacts of energy development on terrestrial wildlife populations west of the Grand Hogback. Also, the Proposed RMP and Alternative C propose reducing the impacts of direct and indirect habitat loss and fragmentation in conjunction with oil and gas development by requiring reasonable onsite or offsite mitigation associated with construction of new well pads, access roads (including upgrading of existing two-track routes), pipelines, and centralized tank facilities. Mitigation would consider the extent and intensity of development, existing habitat quality, and options available within the project boundary or in other areas of federal or private land.

The Proposed RMP and Alternatives C and D do not propose an NSO stipulation for wildlife seclusion areas. The rationale is that the BLM has been unable to manage for wildlife seclusion values as a result of the fluid mineral leases issued before the 1999 GSRA Oil and Gas Leasing and Development ROD and RMP Amendment, when the NSO stipulation for wildlife seclusion areas took effect. Only approximately 640 acres of the wildlife seclusion areas are left unleased. Decisions from this RMP revision would apply to those 640 acres. In lieu of wildlife seclusion areas, the Proposed RMP and Alternative C propose an NSO stipulation (CRVFO-NSO-7) to be applied to priority wildlife habitat on unleased BLM lands. The NSO stipulation would prohibit surface occupancy and surface-disturbing activities on priority wildlife habitat areas (58,500 acres) to protect vegetation cover and forage on state wildlife areas and BLM lands with high and overlying wildlife values. This NSO stipulation would create minor negative impacts to high-potential resources because priority wildlife habitat areas are mapped as having a low to moderate potential for the occurrence of gas resources (Table 4.2.6-11).

Table 4.2.6-11
Potential for Occurrence (Acres) of Oil and Gas Resources within Priority Wildlife Habitat

	Alternative B (Proposed RMP) Total Acres	Alternative C Total Acres
Priority Wildlife Habitat	45,600	57,600
Low Potential	30,200	37,000
Moderate Potential	14,400	20,300
High Potential	0	0
No Known Potential	1,200	0

Acronyms and Abbreviations:
RMP resource management plan

Under all action alternatives, terrestrial wildlife and their habitats would indirectly benefit from an increase in stipulations and areas closed to fluid minerals leasing for other resources.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be the same as or similar to those under Alternative A except that under the Proposed RMP, 11 ACECs would be designated.

Based on a qualitative use of acres within ACEC designation, the Proposed RMP would be better than either Alternatives A or D at indirectly providing for the maintenance and conservation of wildlife habitat.

Impacts from Wild and Scenic Rivers Management. The BLM has not identified, not brought forward, and is not analyzing instream flows in this planning process and is not required to do so until after designation. At the time of designation, the BLM would write a WSR management plan that would then address the needed instream flows.

Under the Proposed RMP, the BLM would determine that the Deep Creek Segments 2 and 3 are suitable for inclusion in the NWSRS. The suitability determination and associated decisions would help protect terrestrial habitat in Deep Creek canyon from potentially undesirable land uses.

The Proposed RMP would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Appendix Q), in concert with BLM land management authorities, to protect the free-flowing nature, ORVs, classification, and water quality of Colorado River Segments 6 and 7. If monitoring indicates that the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* is not adequately protecting flow-dependent and water-dependent ORVs, the BLM would initiate a process to evaluate suitability factors and make a suitability determination. The eligibility determination for the two segments will remain in place until a suitability determination is made. The management action and allowable use decisions would provide direct and indirect protections for the ORVs and with stakeholder cooperation, may better support the area's terrestrial wildlife, because the stakeholders would attempt to operate their water facilities in a manner that meets water supply objectives and protects the ORVs. With no *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, water flows would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use over the life of the plan.

All other segments would be determined not suitable and released from further protection under the WSR Act.

The Proposed RMP would be more beneficial to wildlife than Alternative D, where no segments are found suitable. BLM's policy is to protect any ORVs identified in the eligibility study until a decision on suitability can be made. Thus Alternative C as well as Alternatives A would be most beneficial in conserving habitat. However, policy guidance directs the BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Alternative C

Impacts to terrestrial wildlife from general vegetation management, and lands and realty management would be similar to those described under the Proposed RMP. Impacts from management of all other resources and uses would be the same as or similar to those described under Alternative A, except as stated below.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to those under Alternative A and the Proposed RMP, except as described below.

Disturbance from Public Travel, Access, and Land Use Activities. As opposed to the Proposed RMP and Alternative C, Alternative D would decrease the number of big game winter ranges closed to motorized

and mechanized vehicles (Table 4.2.6-5). The areas closed would be slightly greater than Alternative A, with the addition of the Dry Rifle Creek area the New Castle area (north of town) and the Thompson Creek/Holgate Mesa area. Of all action alternatives, Alternative D offers the fewest limitations on disturbances from public travel and access.

CPW Big Game Population and Harvest Objectives. To reduce big game movement to private lands during the big game hunting season and to increase game hunter success, the CRVFO has worked with CPW on seasonally limiting motorized use on specific routes during the big game hunting seasons. The Stagecoach Trail and Domantle Road (8 miles total) in the Castle Peak area have been traditionally gated from October 1 through November 30. The Proposed RMP and Alternative C proposed moving the beginning date to August 20 to be ahead of the big game archery and muzzleloader hunting seasons to help reduce big game movement to private lands during those hunting seasons too.

The Proposed RMP and Alternative C also propose seasonal route limitations in the Dry Rifle Creek area and the West Rifle Creek area from October 1 to November 30 to reduce big game movement to adjacent private lands. These routes add 10 additional miles to the existing seasonal limitations during the fall big game hunting seasons.

State Wildlife Areas. SWAs would be closed to fluid minerals leasing under the Proposed RMP and Alternative C, eliminating the opportunity to develop fluid minerals on federal mineral estate available for fluid mineral leasing. However, other minerals included in the federal mineral estate would be available for development and could negatively impact SWAs under Alternative C since it does not include an NSO stipulation (CRVFO-NSO-7).

Impacts from Water Resource Management. Impacts would be similar to those under the Proposed RMP except, under Alternative C, a 100-foot (50 feet beyond the NSO) CSU stipulation for hydrologic features is proposed. The stipulation would apply to ephemeral, intermittent, and perennial channels, wetlands, lakes, fens, springs, and their associated plants, and in turn would benefit terrestrial wildlife by ensuring water sources are protected. The areas and acres with constraints on surface-disturbing activities would increase, compared with other alternatives. It would conserve and maintain terrestrial wildlife habitat; however, the stipulation would probably constrain habitat improvement projects, such as prescribed fire. Mechanical, biological, and chemical habitat treatments would need to be designed to avoid all ephemeral, intermittent, and perennial channels, wetland, lake, fens, and springs.

Impacts from Fisheries and Aquatic Wildlife Management. The indirect impacts would be similar to those under Alternative A and the Proposed RMP, except Alternative C would be slightly more beneficial because it proposes application of an NSO stipulation to all perennial waters instead of only fish-bearing streams. It also applies a TL for coldwater sport and native fish, in addition to an NSO stipulation for fish hatcheries.

Impacts from Special Status Plants and Terrestrial Wildlife Management. The Proposed RMP and Alternative C propose more constraints on use and surface-disturbing activities, and a larger area of constraints. Therefore, it is qualitatively estimated that Alternative C the Proposed RMP would indirectly be the most beneficial to reducing adverse impacts from surface-disturbing activities and use on terrestrial wildlife habitat.

Impacts from Managing to Protect Wilderness Characteristics. Terrestrial wildlife resources are a supplemental value that contributes to an area's wilderness character. Under Alternative C, all land units would be managed consistent with the *Proposed Management and Setting Prescriptions for BLM Lands Outside of WSAs Being Managed to Protect Wilderness Characteristics*. This level of management would ensure that these lands are managed to preserve their wilderness characteristics. The prescriptions collectively retain the area's natural biological integrity, which benefits terrestrial wildlife by maintaining habitat connectivity and habitat effectiveness.

Management activities on these lands would emphasize natural processes for wildlife management. While wildlife habitat treatments are not specifically excluded, wildlife management would emphasize natural processes for wildlife management. This emphasis could constrain using vegetation manipulation techniques such as mechanical, chemical, or prescribed fire to improve wildlife habitat. Activities such as hunting and trapping would be allowed consistent with the State of Colorado regulations. Stocking wildlife species native to the area may be permitted. Introduction of threatened, endangered, or other special status species native to North America may be allowed.

Impacts from Cave and Karst Resource Management. Alternative C proposes to apply both the NSO stipulation for the Deep Creek Cave area and the cave and karst occurrence NSO stipulation. Alternative C would protect known caves and caves yet undiscovered in the Deep Creek area. Alternative C would offer the greatest extent of protection for caves and special status wildlife species that use caves

Impacts from Livestock Grazing Management. Impacts would be the similar to those described under Alternative A. Of the 58 vacant allotments, all would be closed. The rationale for closing the allotments is for the benefit of wildlife. Three currently active allotments would be closed to grazing (County Line, Smith Gulch, and Alkali Gulch). This alternative offers the greatest potential increase in herbaceous vegetation for forage and cover for wildlife.

In addition, closing vacant allotments such as Oasis Creek allotment would be an effective strategy to reduce commingling potential (WGFD 2004b) between wild sheep and domestic sheep and goats. If vacant allotments are stocked with sheep in the future, then the chance of disease transmission might increase. The more vacant allotments that are closed near bighorn ranges, the less likelihood of disease transmission.

Impacts from Recreation and Visitor Services Management. Under the Alternative C theme, current recreation uses would be recognized but not necessarily accommodated when land uses are considered. Impacts from R&VS would be the same as or similar to those under the Proposed RMP, except that Alternative C would designate only the Red Hill and Upper Colorado SRMAs. No overlap exists with SRMAs except a small inconsequential overlap between the Colorado River SRMA the Winter Ridge-Deer Pen priority wildlife habitat.

Under Alternative C, three additional ERMAs (Hack Lake, King Mountain, and the Crown) would be identified to sustain the principal recreation activities and the associated qualities and conditions. Proposed management actions and allowable use decisions for terrestrial wildlife would mitigate implementation-level recreation developments that would impact wildlife in ERMAs and on lands undesignated for R&VS. Overlap with ERMAs occurs in the following priority wildlife habitat: Cottonwood-Eby Creek, Crown, East Eagle, Fisher Creek, Hernage-Abrams, New Castle, Tenderfoot Mesa, Thompson Creek, and Wolcott.

Alternatives C and D and the Proposed RMP, respectively, propose more limitations (e.g., camping closures, firearm use restriction, and SRPs) on inappropriate recreation use. Alternative C includes the most wildlife mitigation in the form of management actions (e.g., winter big game closures) and stipulations (e.g., NSO and TL stipulations) to reduce disturbance and maintain habitat effectiveness. Alternative C best ensures that Colorado Public Land Health Standard 3 for terrestrial wildlife would be met through the life of the plan.

Impacts from Comprehensive Trails and Travel Management. The additional travel limitations and reduced number of designated routes proposed under Alternative C would further decrease travel related disturbance to wildlife. Alternative C would be slightly more beneficial than the Proposed RMP in reducing recreational disturbance to wintering terrestrial wildlife on low elevation winter ranges because additional areas are closed to over-snow travel (e.g., East Eagle, Red Hill-Gypsum, Grand Hogback, and the Vulcan).

Impacts from Lands and Realty Management. Alternative C adds occupied sensitive species habitat, wetlands and riparian areas, deer critical winter range, and elk severe winter range to the list of criteria for BLM lands found in the Proposed RMP that would be retained for long-term management. Although additional BLM lands have been added in Alternative C, the total number of acres is slightly less than the Proposed RMP.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be similar to those described under Alternative A, except that Alternative C would result in less development, estimated to total approximately 2,206 federal wells on 276 multi-well pads, with an estimated 2,774 acres of surface disturbance. This total includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 1,814 acres on interim reclamation of well pads. Alternative C identifies the least amount of acres as open to leasing and gas development. Despite the variance in acres open to leasing and gas development, the scope of the impacts is not expected to vary among the alternatives, but the intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback. Under Alternative C, priority wildlife habitat would be closed to fluid minerals leasing and geophysical exploration. Closure would eliminate the disturbance of wildlife and the fragmentation of wildlife habitat by fluid mineral development and geophysical exploration.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be the same as or similar to those under Alternatives A and the Proposed RMP, except that under Alternative C, 16 ACECs would be designated. Based on a qualitative use of acres within ACEC designation, Alternative C would be the best at indirectly providing for the maintenance and conservation of wildlife habitat.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible river segments would be recommended as suitable for wild, scenic, or recreational classification under the NWSRS. This alternative would be more beneficial to terrestrial wildlife compared with the Proposed RMP, where two segments are found suitable. Because BLM's policy is to protect any ORVs identified in the eligibility study until a decision on suitability can be made, Alternative A and Alternative C would differ administratively; however, the implications to terrestrial wildlife habitat and management would be the same, at least on an interim basis.

Alternative D

Impacts to terrestrial wildlife from management of other resources would be the same as or similar to those described above for Alternative A, except as stated below.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to those under Alternatives A and C and the Proposed RMP, except as described below.

Disturbance from Public Travel, Access, and Land Use Activities. The BLM would close important winter ranges to public motorized and mechanized travel from December 1 to April 15 to protect wintering big game from potential disturbance caused by public use (Table 4.2.6-5). However, the areas and acres proposed to be closed are lower than under the Proposed RMP or Alternative C but still higher than under Alternative A.

A CSU stipulation is proposed under Alternative D for SWAs, which is considered a moderate constraint that allows surface-disturbing activities on unleased SWA lands, unlike the Proposed RMP and Alternative C, which close unleased SWA lands to fluid minerals leasing. The surface-disturbing activities could increase habitat fragmentation and reduce habitat connectivity.

CPW Big Game Population and Harvest Objectives. The BLM would continue to close routes to motorized use to help keep big game on BLM lands and reduce big game movement to private lands during the big game hunting season in the Castle Peak area. Under Alternatives A and D, areas accessed by the Stagecoach Trail (#8535) and Domantle Road (#8513) would be closed from October 1 to November 30. The Proposed RMP and Alternative C propose more areas (e.g., Dry and West Rifle Creeks) managed to reduce big game movement to private lands during the big game hunting season.

State Wildlife Areas. Under Alternative D, SWAs have an CSU stipulation applied to the federal mineral estate to protect wildlife habitat values from unwanted surface occupancy and surface-disturbing activities Stipulation CRV-CSU-4 does not prohibit fluid minerals leasing. Stipulation CRV-CSU-4 is a moderate constraint on land uses. The CSU stipulation allows some use and occupancy of the surface while protecting identified resources or values. Alternative D proposes the least protections for SWAs.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Alternatives A and D propose less constraints on use and surface-disturbing activities, and a smaller area of constraints, so qualitatively it is estimated that those alternatives would indirectly result in the most potential for adverse impacts on terrestrial wildlife habitat.

Impacts from Livestock Grazing Management. Impacts would be the similar to those described under Alternative A, except that Alternative D would make approximately 36,500 AUMs available for livestock grazing. Of the 59 vacant grazing allotments, five would be made available for grazing, while others would be closed or combined with adjacent allotments. Four currently active allotments would be closed to grazing (County Line, Alkali Gulch, Alkali Creek Common, and Dry Creek Pete and Bill).

Impacts from Recreation and Visitor Services Management. Under the theme of Alternative D, overall management would favor recreation use as well as other land uses. Recreation infrastructure would be constructed to accommodate higher use levels and a destination tourism market for mountain biking in many of the proposed SRMAs (e.g., The Crown, Fisher Creek, Hardscrabble/East Eagle, Red Hill, a portion of Thompson Creek, and Upper Colorado River). Generally, more conflicts are anticipated to occur with terrestrial wildlife in areas that (1) emphasize accommodating or attract higher numbers of visitors, increasing the risk of disturbance, or (2) require an expansion of recreation trails and facilities that would fragment (i.e., cause loss of connectivity) wildlife habitat. The anticipated increases in recreation use and infrastructure, as

well as the reduced mitigation (less than the Proposed RMP or Alternative C), would increase the risk of disturbance of wildlife. Alternative D would also pose the most potential of habitat fragmentation and loss of habitat connectivity over the life of the plan.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as or similar to those under the Proposed RMP except that fewer areas (e.g., Hardscrabble, Basalt Mountain-South Portion, , Williams Hill, East Eagle, or West Rifle Creek) and acres would be closed to protect wintering big game. In addition, within those areas more year-round motorized and mechanized travel would occur as a result of the travel designations.

Impacts from Lands and Realty Management. Under Alternative D, elk winter range, mule deer winter range, and deer and elk migration corridors are not included in retention areas. These high-value wildlife habitats would be at risk because they would not necessarily be maintained in federal ownership.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be similar to those under the Proposed RMP and Alternatives A and C, except that the Proposed RMP and Alternative D anticipate more development, estimated to total approximately 4,198 federal wells on 525 pads with an estimated 5,276 acres of surface disturbance. This total includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 3,439 acres on interim reclamation of well pads. Alternative D identifies fewer acres as open to leasing and gas development than Alternative A, but more acres than the Proposed RMP and Alternative C. Despite the variance in acres open to leasing and gas development, the scope of the impacts is not expected to vary among the alternatives, but the intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback. West of the Grand Hogback, Alternative D offers a high risk that the habitat conditions would not be sustained as a result of the proposed increase in development and the reduction in proposed stipulations.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be the same as or similar to those under Alternatives A and C and the Proposed RMP, except that under Alternative D, only three ACECs would be designated. Based on a qualitative use of acres within ACEC designation, Alternative D would be the least beneficial at indirectly providing for the maintenance and conservation of wildlife habitat.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the stream segments identified as eligible would be recommended as suitable for designation. Thus, no protections would be provided to preserve the free-flowing condition, water quality, ORVs, and tentative classifications. As compared with the other alternatives, terrestrial wildlife species and their habitats would receive the least indirect benefits under Alternative D..

Cumulative Impacts

Past and present actions that have had and are having direct and indirect impacts on terrestrial wildlife are discussed in Chapters 3 and 4. Cumulative effects include other future federal, state, local, or private actions that are reasonably certain to occur in the planning area and their cumulative impact. Adjacent federal landowners include the KFO, White River CRVFO, and the Grand Junction Field Office, WRNF, and Routt National Forest. The CPW administers some land within the planning area but directly affects wildlife through the introduction and transplantation of wildlife and the regulation of hunting of game species.

Generally, cumulative impacts on wildlife result from surface disturbances and disruptive land uses and vary by species. Habitat type conversion, degradation, fragmentation, and loss have significant adverse effects on wildlife but sometimes take years to manifest as population reductions. Quantified data on the existing and future extent of land uses are not available. However, where these land use activities occur, their contribution would result in some increased level of cumulative impact greater than the impacts of activities proposed or authorized by the BLM on BLM lands.

For example, BLM lands in the CRVFO contain a large amount of interspersed private lands and some small parcels of state lands. Approximately 80 percent of BLM lands are within 1 mile of private lands, making for an enormous amount of wildland-urban interface issues. An undetermined amount and diverse variety of commercial, residential, and agricultural land use are ongoing on these lands. Big game winter habitats in the Eagle-Vail, Roaring Fork, and Colorado River valleys have been converted from agricultural lands to urban areas by the expansion of towns and supporting facilities. The trend of subdividing ranches to accommodate residential and commercial development is expected to continue and contribute to habitat fragmentation. As the urban interface expands, some tracts of BLM land may eventually become disconnected or isolated from other native habitats and ultimately adversely affect biological diversity in the planning area. In some areas, there may be a long-term slight reduction in livestock grazing through the sale of ranches and the resulting residential and commercial developments.

The towns of Basalt, Carbondale, Eagle, Gypsum, Glenwood Springs, New Castle, Silt, and Rifle all border BLM lands that are used as "backyard" recreation areas by local residents. These local community centers are reasonably certain to continue to grow in both geographic extent and population over the life of the plan. In addition, local world-class destination resorts, such as Aspen and Vail, and their accompanying businesses would continue marketing efforts to attract visitors year-round. Demand to use BLM lands and expand local recreation opportunities is expected to continue with these regional pressures. The long-term management challenge would be minimizing impacts on wildlife through constraints, stipulations, and limitations, without simply closing areas to all human use.

Proposed management actions and allowable use decisions under Alternatives A and D would maintain terrestrial wildlife habitats and protect individual and local wildlife populations from disturbance. However, habitat effectiveness would slowly but slightly decrease over time, in particular in such areas as lands leased for energy development and those BLM lands near growing communities, since Alternatives A and D recognize and accommodate more land uses. Alternative A has the greatest risk of negative cumulative impacts on BLM lands when viewed in conjunction with those activities currently occurring and reasonably certain to occur on adjacent private lands. Alternative D would result in the greatest impacts on terrestrial wildlife west of the Grand Hogback based on the amount of energy development and the estimated acres of disturbance in combination with other land uses.

The increasing effects of conversion of native sagebrush shrublands to agriculture, invasion by non-native plant species, energy and associated developments, rural expansion, and off-route travel have reduced, degraded, or fragmented sagebrush habitats in many key locations. The continued modification of sagebrush on private lands and other ownerships would cumulatively reduce the availability and quality of that habitat within the planning area. The Proposed RMP and Alternative C both address reducing sagebrush steppe fragmentation and land use impacts on sagebrush-dependent species on BLM lands.

The Proposed RMP focuses on strategically managing to protect critical habitats, sagebrush habitats, wildlife corridors, winter ranges, and priority wildlife habitat, while moderately limiting surface-disturbing activities and human uses. Alternative C emphasizes sustaining the ecological integrity of habitats for all priority wildlife species and as well as improving habitats. Alternative C places major constraints on surface-disturbing activities and the most limitations (e.g., area and seasonal) on human uses. In particular, Alternative C has the most actions to prevent habitat fragmentation, such as closing allotments to livestock grazing and fluid minerals leasing, applying NSO stipulations, designating the fewest SRMAs for destination visitors, managing the most lands to protect their wilderness character, identifying the most ROW exclusion areas, and designating the most ACECs and suitable WSR segments. As such, cumulative impacts in the form of habitat fragmentation, habitat modification, habitat effectiveness, disturbance, and avoidance would be the least under Alternative C.

The largest federal land management agency in the planning area is the USFS. The 2002 WRNF ROD provided for a wide variety of recreation opportunities and forest uses while promoting ecosystem health (WRNF 2002). In relation to terrestrial wildlife and wildlife habitats, the forest plan strives to promote ecosystem health and conservation through the mix of management area allocations, standards and guidelines, to actively manage to improve wildlife habitat, to maintain or contribute to the maintenance of species viability, and to protect landscape linkages that allow for landscape-scale movement, migration, and dispersal of forest carnivores and other wide-ranging wildlife species. This is analogous to the resource emphasis proposed under the Proposed RMP and Alternative C. Anticipated actions on private lands may result in further reductions in connectivity between habitats at lower elevations, but the Proposed RMP, and, better yet, Alternative C, in combination with the WRNF direction, would best provide for wide-ranging terrestrial species, such as raptors, migratory birds, mule deer, and elk.

Land health assessments and this analysis conclude terrestrial wildlife populations and associated habitats on BLM lands are meeting Colorado Public Land Health Standard 3 for terrestrial wildlife species and would continue to do so at a watershed scale under all alternatives. Alternative C and the Proposed RMP best reduce the possibility of localized departure from meeting Colorado Public Land Health Standard 3.

4.2.7 Special Status Species

This section describes the potential impacts on special status species from implementing management actions for the special status species program as well as allowable uses and management actions for other resource programs. Special status species include federally listed, proposed, and candidate threatened or endangered species, BLM sensitive species, and Colorado state-listed species. Existing conditions regarding special status species are discussed in Section 3.2.7.

Although substantial data on known locations and habitats within the planning area are available, the data are neither complete nor comprehensive for all special status species known to occur or with potential habitat that might exist within the planning area. 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. Impacts were quantified when possible. In the absence of quantitative data, best professional judgment based on scientific reasoning was used. As a result, some impacts are discussed in more general terms.

Under all alternatives, no decision would be approved in this RMP revision or authorized on BLM lands that would jeopardize the continued existence of special status plant species that are listed, proposed, or candidates for listing as threatened or endangered. Implementation of the special status species program is directed at preventing the need for listing of proposed or candidate species under the ESA, protecting special status species, and improving their habitats to a point where their special status recognition is no longer warranted (i.e., Land Health Standard 4).

Direct and indirect impacts of land uses on special status species are generally best mitigated by avoiding or minimizing the impact to the degree practicable with stipulations (e.g., NSO, CSU, and TL). The various management actions and allowable use decisions outlined in Chapter 2 and stipulations described in Appendix B emphasize this approach for maintaining or conserving special status species and their habitat. Impacts that cannot be avoided would at least be reduced by the application of COAs or BMPs.

Assumptions Common to All Special Status Species

The analysis was based on the following assumptions:

- Impacts on special status species can occur from actions that result in direct mortality of special status species, loss of habitat or modifications to habitat suitability, and in the case of special status wildlife, actions that displace individuals or disrupt behavior. Because special status species have specific habitat requirements, and their habitats are often diminishing, disturbance to the species or their habitat could result in population declines, which could adversely affect viability of local populations.
- Since special status species populations are, by their nature, generally small and localized, the total area affected by other activities or restrictions is less important than where the activities or restrictions occur in relation to special status species and their habitat.
- The health of special status species populations is directly related to the overall health and functional capabilities of upland, aquatic, riparian and wetland resources, which in turn are a reflection of overall watershed health.

- Ground-disturbing activities could lead to modification (positive or negative) of habitat and loss or gain of individuals, depending on the nature of the activity, the intensity of the surface disturbance, the amount of area disturbed, the location of the disturbance, and the species affected.
- Road density in a given area (watershed) and the distance of roads from special status species habitat provide an indication of the potential for impacts on special status species. For fish and aquatic wildlife, roads are a measure of lands available for accelerated water transport and potential erosion and offsite sediment transport. For plants, roads also contribute to increasing exposure to dust, reducing pollinator habitat, and providing a niche for invasive and noxious weeds. However, the actual impacts and degree of impacts depend on additional variables, such as the class of road (dirt, gravel, or paved), road condition (rutted, bar ditched, or properly drained) the type of vegetation between the road and occupied or suitable habitat, the topography, the ecological condition of the suitable or occupied habitat, and soil characteristics.
- Special status species health, population levels, and habitat conditions fluctuate in response to natural factors. Periods of drought or excessive moisture and outbreaks of diseases that affect special status species directly or alter habitat (e.g., mountain pine beetle) would likely affect special status species population levels.
- Implementation-level actions would be further assessed at an appropriate spatial and temporal scale and level of NEPA analysis. Additional field inventories would likely be needed to determine whether any such species could be present in the project area.
- Land uses would be managed to maintain or move toward meeting the *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado* (BLM 1997a) on a landscape basis. Site-specific NEPA environmental analysis would assess whether management actions would contribute to the maintenance or achievement of land health standards or risk causing a decline in land health conditions.
- All permitted activities that could affect federally threatened or endangered species would be required to undergo ESA Section 7 consultation with the USFWS, and would need to be mitigated to ensure that those species would not be adversely affected on a project-specific basis or at a cumulative level.
- The BLM would implement measures to conserve BLM sensitive species and their habitats to reduce the likelihood and need for these species to become listed (BLM 2008j).
- The BLM would implement the standard operating procedures and mitigation measures from the *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement*. (BLM 2007i) and conservation measures from the associated biological assessment. These measures would mitigate the potential impacts from herbicide treatments.
- Success of mitigation depends on the specific protective measures employed and the assumption that proper implementation of these measures would take place. Adaptive management would be used (i.e., changing techniques, as necessary) until success is achieved.
- Many of the resources and uses have NSO or CSU stipulations that extend beyond or overlap the NSO or CSU stipulations listed for protection of special status species. Although NSO or CSU stipulations for other resources and uses may offer additional benefits (e.g., reduced erosion, sedimentation, and weed invasion) and indirectly support special status species management, in most cases, these benefits would be negligible or redundant to the protections provided by stipulations for

special status species. For these reasons, impacts on special status species from NSO or CSU stipulations associated with other resources will not be addressed unless they provide a more restrictive stipulation or cover a broader area than the stipulations for special status species under that alternative.

- On occasion, conflicts arise between different resource protections in a given area (e.g., special status species and visual, soil, and cultural resources). Where these conflicts occur, there is the potential for adverse impacts on special status species if protections applied to the other resources are more stringent, and as such, have priority over protections to special status species. For example, a CSU stipulation for protection of sensitive plants may not be implemented because moving the proposed activity would encounter an NSO stipulation for steep slopes or cultural resources. Impacts could be direct, by loss of individuals or populations, or indirect, by fragmentation or alteration of potential habitat. These types of conflicts and resulting impacts on special status species are anticipated to increase as development intensifies.

4.2.7.1 Special Status Species—Plants

Methods of Analysis

The main contributors to surface disturbances that could affect special status plants are minerals and energy development, wildland and prescribed fire, vegetation management (such as weed control, brushbeating, and mechanical removal of trees), livestock grazing, recreation, travel, and issuance of ROWs. Regardless of the nature of the disturbance, surface-disturbing activities may result in the following effects on special status plants:

- **Direct Mortality.** Mortality can result from crushing, trampling, or physically removing plants. Contact with herbicides or other chemicals, such as those associated with oil and gas development, can also cause direct mortality. Reduction in total numbers of individuals within the population may lead to reduced genetic diversity and a reduced ability to withstand natural or human-caused disturbance events.
- **Loss of Vigor or Reduced Reproductive Success.** Trampling and contact with chemicals may not always result in direct mortality but can cause a reduction in vigor that affects the ability of the plant to reproduce and sustain the population. Herbivory (consumption of inflorescences, seeds, or stems and foliage of special status plants) can result in reduced reproductive success, or in some cases, death. Dust deposition on special status plants may reduce photosynthetic ability or the ability of pollinators to transfer pollen between plants.
- **Direct Loss of Potential or Occupied Habitat.** Surface-disturbing activities, such as construction and use of roads, trails, parking lots, buildings, power poles, wind turbines, and ponds, may result in permanent loss of occupied or potential habitat. This loss would reduce the total habitat capable of supporting special status plant populations and fragment remaining populations. In some cases, closure or reclamation of disturbed areas may eventually restore lost habitat values. However, often the site cannot be restored to conditions that support the special status plants and habitat may be permanently lost.
- **Changes in Habitat Structure.** A canopy cover of shrubs offers habitat characteristics that appear to be favorable for the germination and establishment of several special status plant species, such as Colorado hookless cactus and Harrington's penstemon. Shrubs may provide protection for some

special status plants from herbivory or trampling and may provide improved moisture availability or reduced moisture loss under the canopy. Surface-disturbing activities that significantly reduce the percent canopy cover of shrubs may allow increased herbivory or moisture loss, resulting in decreased vigor or mortality of special status plants.

Increases in canopy cover can also be detrimental to certain special status plants. For example, invasion of sagebrush communities by pinyon and juniper trees can reduce sunlight and nutrients available to Harrington's penstemon. When invasion by pinyon-juniper trees reaches an advanced stage, populations of Harrington's penstemon are at risk, since the species cannot persist under dense canopies of pinyon and juniper trees.

- **Competition.** Changes in species composition also affect special status plant populations. Proliferation of invasive and noxious weeds or other invasive plants may render habitat unsuitable by outcompeting special status plants for water and nutrients or by preventing seedling from germinating and establishing. Occupied Colorado hookless cactus habitat that is dominated by cheatgrass appears to inhibit germination of seedling cactus, thereby threatening the long-term viability of these populations. In some cases, increases in canopy cover and density of native species, particularly grasses, can compete with special status plants for limited water and nutrients.

  Other special status plant species, such as the Roan Cliffs blazing star and Parachute penstemon, thrive in environments where vegetation is sparse and competition is low. Increases in vegetation cover (after disturbances, such as fire or mechanical treatments, or seeding) may cause competition with special status plants, resulting in decreased vigor or mortality.

- **Loss of Pollinators or Pollinator Habitat.** Actions that disturb pollinators or destroy their habitat can have a detrimental impact on special status plant species. Long-term loss of pollinators can reduce the reproductive ability of these plant species and affect maintenance and genetic diversity of populations.

- **Habitat Fragmentation.** Habitat fragmentation occurs when contiguous habitat is broken up by surface-disturbing activities, reducing overall potential habitat and reducing movement of pollinators or genetic material among habitats. Smaller populations received fewer pollinator visits and therefore seed production was lower in small populations. Small population size decreases reproductive success and increases inbreeding and loss of genetic variation. As a result, fragmentation may lower population viability and increase local population extinction risk (Kolb 2008). Herbivory did not decrease with population size; therefore, herbivory enforces fragmentation effects by further reducing the number of flowering individuals (Kolb 2008). Closure and rehabilitation of roads within special status plant habitat may benefit the long-term survival of special status populations by decreasing habitat fragmentation.

- **Soil Compaction.** Soil compaction resulting from heavy equipment or vehicle travel may reduce soil pore size and water infiltration, thereby inhibiting maintenance or establishment of special status plants.

- **Erosion or Sedimentation.** Special status plants may be washed away or have roots exposed by erosion from surface-disturbing activities, such as blading or bulldozing roads. Special status plants may be buried by sedimentation resulting from disturbances upslope of special status plant populations.

- **Alteration of Hydrologic Conditions.** Some special status plant species (such as Ute ladies'-tresses orchid), which depend on seasonally flooded environments, subirrigated soils, or seeps, may be adversely affected by changes in water flow. For example, construction of roads may redirect natural water flows, causing reduced (or increased) water flow downslope of the road.
- **Changes in Fire Regime.** Changes in species composition, either within special status plant habitat, or in adjacent plant communities, may alter the natural fire regime to which the plants are adapted. Cheatgrass, a highly flammable annual grass, may drastically increase the frequency of fire in special status plant habitat, affecting the survivability and viability of the population.

Together, these impacts could lead to fewer and more fragmented special status populations that are more at risk for extirpation as a result of reduced habitat quality, diminished reproductive ability, and altered fire regime. Impacts on special status plants from implementation of the RMP are summarized by alternative in the following subsections.

Environmental Consequences

Impacts on special status plants would result from some of the management actions and allowable uses included under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on special status plants under any of the four alternatives.

Alternative A

Impacts from Special Status Species Management—Plants. Management for special status plant species may include various actions, such as stipulations restricting surface-disturbing activities, designating ACECs to provide special management attention, closing selected roads that are negatively affecting habitat, or implementing habitat improvement projects.

Table 4.2.7-1 compares management protections for special status plants by alternative. Under Alternative A, an NSO stipulation for threatened, endangered, proposed and candidate plants and wildlife would prohibit surface-disturbing activities in occupied habitat and habitat necessary for ecosystem processes. This stipulation encompasses approximately 5,250 acres of habitat on BLM lands and would afford direct protection for occupied habitat of special status plants. A CSU stipulation for BLM sensitive plants and wildlife would also provide some protection, allowing relocation of surface-disturbing activities, but is unlikely to avoid all individuals where populations are extensive and would not protect potential, but currently unoccupied, habitat. The CSU stipulation would apply to 112,800 acres.

Under the current management plan, no ACECs would be designated to provide protection for special status plants. ACEC designation is used for resources that require special management and ACECs are typically withdrawn from locatable mineral entry, managed as ROW exclusion or avoidance areas, and restricted from a net increase in travel routes. These special management prescriptions provide broad protection from habitat fragmentation and loss of potential habitat.

Management actions to improve habitats for these species include, but are not limited to, herbicide applications to reduce cheatgrass infestations in occupied and potential habitat, removal of pinyon-juniper trees encroaching into sagebrush habitat, and decommissioning or relocating select travel routes that are impacting special status plants or their habitat. These actions could improve habitat for special status plants and maintain or increase population size. In general, vegetation treatments that improve the cover and

Table 4.2.7-1
Protective Management for Special Status Plants by Alternative

Special Status Plant Protections	Buffer	Applicable Species	BLM Surface Acres by Alternative			
			A	B (Proposed RMP)	C	D
No Surface Occupancy Stipulations						
GS-NSO-12	Broad habitat	Federally listed or candidate plants and wildlife	5,200			
CRVFO-NSO-9 (CRV-NSO-18 in Alt. D)	200 meter	Federally listed or candidate plants		1,100		900
CRV-NSO-19	200 meters	Federally listed or candidate and BLM sensitive plants			23,000	
CRVFO-NSO-10	200 meters	BLM sensitive plants within ACECs		2,200		
CRVFO-NSO-11	Broad habitat	DeBeque phacelia		Habitat unmapped	Habitat unmapped	Habitat unmapped
CRVFO-NSO-28	ACEC boundary	All listed and sensitive plants within Mt Logan Foothills ACEC		4,000		
Controlled Surface Use Stipulations						
GS-CSU-3	Broad habitat	All BLM sensitive plants and wildlife	112,800			
CRVFO-CSU-6	100 meters	BLM sensitive plants outside ACECs		6,400		
CRV-CSU-9	100 meters	All BLM sensitive plants				12,700
Number of ACECs for Special Status Plants			0	4	5	0
Number of ACEC Acres for Special Status Plants			0	12,500	14,200	0

Acronyms and Abbreviations:
ACEC area of critical environmental concern
BLM Bureau of Land Management

diversity of forbs, reduce invasive and noxious weed infestations, and reduce shrub density and woodland encroachment in sagebrush habitats would benefit special status plants and their pollinators in the long-term.

Impacts from Soils Management. An NSO stipulation (GS-NSO-15) would protect soil resources by prohibiting surface disturbances related to oil and gas facilities on steep slopes greater than 50 percent. Several special status plant species such as Parachute penstemon (*Penstemon debilis*), Roan Cliffs blazing star (*Mentzelia rhizomata*), and Cathedral Bluffs meadowrue (*Thalictrum heliophilum*) grow on steep talus slopes. Occupied Parachute penstemon habitat would also be covered by an NSO stipulation for federally listed, proposed and candidate species habitat (GS-NSO-12), but the steep slope stipulation would provide additional protection for suitable but unoccupied habitat. The Roan Cliffs blazing star and Cathedral Bluffs meadowrue are BLM sensitive species, which would be covered by a CSU stipulation (GS-CSU-3), so the NSO stipulation for steep slopes would provide greater protection for these species. Soils management in Alternative A would provide the least protection to special status plants of any alternative because the steep slope NSO would apply only to oil and gas activities and would not apply to pipelines. The other alternatives would implement more restrictive soil stipulations.

Impacts from Water Resources Management. Water resources management would include an NSO stipulation (GS-NSO-3) prohibiting surface-disturbing activities within 0.5 mile on both sides of major river corridors. This stipulation would provide protection for the Ute ladies'-tresses, which is known to occur adjacent to the Roaring Fork River and has the potential to occur near other river corridors.

Known populations of the Ute ladies'-tresses would be covered under an NSO stipulation for threatened and endangered species (GS-NSO-12) in the current management plan. However, the NSO restriction would be applied only on occupied habitat, which is less than 0.5 mile from the rivers. The NSO for major river corridors would provide a wider buffer, thereby enhancing protection of threatened plant habitat from indirect impacts, such as sedimentation, soil erosion, or weed invasion.

Alternative A would provide the same protection for special status plants as under Alternative D but less protection than under Alternative C and the Proposed RMP (Alternative B). Alternative C would include an NSO stipulation within 50 feet of all hydrologic features, and the Proposed RMP would provide an NSO within 325 feet (100 meters) of all perennial streams, water bodies and riparian areas, which would protect any special status plants within these areas from surface disturbances.

Impacts from Vegetation Management—General. Vegetation management includes a variety of treatments, such as: timber harvest; prescribed fire; unplanned fires managed for resource benefits; manual, mechanical, chemical, or biological vegetation treatments; riparian plantings; weed treatment; and seeding disturbed or treated areas. Vegetation treatments may have beneficial or adverse effects on special status plants, depending on the type of treatment performed and the resultant structure and composition of the vegetation community.

Vegetation treatments, especially those that use heavy equipment, could result in crushing and death of individual plants or direct removal of vegetation, which would expose soils and make indirect impacts, such as erosion and weed invasion, more likely.

Vegetation treatments that increase diversity in plant species and age classes, control weeds, stabilize soils, improve pollinator habitat, and promote a more natural fire regime would benefit most special status plant species. Impacts of vegetation management actions, both beneficial and adverse, would be similar across all alternatives.

Impacts from Vegetation Management—Forest and Woodland. Vegetation treatments for forest and woodland include mechanical treatments and prescribed fire. None of the special status plant species in the CRVFO is located in forested areas that would be directly impacted by vegetation treatments in forest or woodlands.

Fuels reduction in forests would cause indirect benefits to special status plants by reducing the potential for a large-scale severe fire that could spread to special status species habitat and kill individuals or populations.

Impacts from Vegetation Management—Rangeland. Vegetation treatment methods for rangelands include mechanical, prescribed fire, biological and chemical treatments. Vegetation treatments may have beneficial or adverse effects on special status plants depending on the type of treatment performed and the resultant structure and composition of the vegetation community.

Vegetation treatments that are not designed to meet special status species objectives could have adverse impacts on special status plants. Harrington's penstemon, which grows in Wyoming and mountain big sagebrush habitats, often grows under the canopy of sagebrush shrubs. The shrub cover protects the special status plants from grazing and trampling and may provide a better moisture regime. Vegetation treatments that significantly reduce the density of shrubs may leave the Harrington's penstemon plants vulnerable to trampling and grazing. Treatments to remove pinyon and juniper trees encroaching into sagebrush habitat would provide long-term benefits to Harrington's penstemon populations by removing the tree canopy which could eventually render habitat unsuitable for penstemon due competition for light and nutrients. Treatments that involve heavy equipment or mastication of the trees could result in short-term losses of penstemon plants due to crushing or burying of plants under a heavy mulch layer.

Colorado hookless cactus, which grows in salt-desert shrub habitat, also favors the microclimate under the shrub canopy. Seedlings, in particular, find protection from trampling as well as shade and increased moisture within the shrub canopy. Fire or other vegetation treatments that remove canopy cover may adversely affect this species.

Many special status plants thrive in vegetation communities without a high degree of competition from other vegetation. Treatments that substantially increase herbaceous cover, particularly graminoid cover, may actually degrade habitat conditions for these species. Conversely, vegetation treatments that result in an increase in forb cover may benefit special status plant species by improving habitat for pollinators. The implementation of vegetation treatments that reduce invasion of pinyon-juniper woodland into sagebrush habitat would benefit Harrington's penstemon by reducing competition with the trees for sunlight and nutrients.

Ground disturbances associated with specific mechanical vegetation treatments may increase the risk of invasion or expansion of cheatgrass or other weeds, which may directly compete with rare plants for limited resources or alter soil microbial communities which support these rare species. Invasion by cheatgrass may increase fine fuel loading and subsequent wildfires in areas which normally would have insufficient fuels to carry fires. Before implementing any vegetation treatments that could create surface disturbance, biological surveys would be conducted and a site-specific NEPA document would be prepared. Safety buffers around listed plants would prevent direct impacts.

Vegetation treatments that improve the diversity and age-class structure of native species may provide benefits for special status plants by reducing the potential for weed invasion and by improving habitat for pollinator species. Fuels reduction in shrubland habitat would reduce the potential for a large-scale, severe fire that could kill individuals or populations of special status plants. Vegetation treatment actions and their impacts would be similar in all alternatives.

Impacts from Vegetation Management—Riparian. Current management includes an NSO stipulation (GS-NSO-2) to prohibit surface-disturbing activities within riparian vegetation. No surface-disturbing activities would be allowed within the riparian or wetland zone unless the activity would cause no loss of riparian vegetation or the vegetation lost can be replaced within 3 to 5 years with like vegetation. This restriction would also protect the Ute ladies'-tresses orchid and its wetland habitat from direct impacts of surface-disturbing activities. Potentially beneficial actions such as riparian-area restoration and vegetation treatments would be allowed if long-term impacts could be fully mitigated and the activity would benefit and enhance the riparian area.

Vegetation treatments in riparian areas could include the use of herbicides, fire, or mechanical removal of exotic plant species, such as tamarisk or Russian olive. Application of herbicides has a remote potential for accidental drift into special status plant habitat. In the long term, activities to maintain or improve riparian health would probably benefit occupied and potential habitat for Ute ladies'-tresses orchid. These activities could include streambank stabilization projects, or construction of livestock, wildlife, and recreation exclosures within riparian habitats.

Impacts from Vegetation Management—Weeds. Noxious and invasive weed management activities include herbicide use, biological controls, and mechanical or manual treatments in weed-infested areas. Actions conducted in areas near special status plant habitat could benefit these species by removal of species that would compete with native species for available space and resources.

If herbicide treatments were to occur in special status plant habitat, plants could be crushed by trucks or ATVs during ground applications, and injury or death of plants could occur. Herbicides could come into contact with and impact special status plants through drift, runoff, wind transport, accidental spills, or direct spraying. Potential impacts could include one or more of the following: death, loss of photosynthetic tissue, reduced vigor, abnormal growth, or reduced reproductive output. Risks to special status plants from spray drift are greater with smaller buffer zones between target and non-target vegetation and application from greater heights (i.e., aerial application or ground application with a high boom). Application rate is a major factor in determining risk, with higher application rates associated with greater risk to plants.

The CRVFO would implement relevant SOPs and mitigation measures presented in the *Final Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS* (BLM 2007i) to ensure that adverse impacts to special status plants from weed treatments are avoided. In addition, the BLM would follow the conservation measures identified in the USFWS and NMFS *Endangered Species Act Section 7 Consultation and Biological Opinion for the Proposed Vegetation Treatment Program for 17 Western States* to protect federally listed, proposed, or candidate threatened or endangered species (BLM 2007i). The conservation measures include suitable buffer distances between treatment sites and populations of special status plant species to avoid negative effects from aerial drift, runoff, or wind erosion during and following treatments. The buffer distances vary based on the herbicide formulation. Adherence to the SOPs and to the mitigation and conservation measures would ensure that all practicable means to avoid or minimize harm to special status species have been adopted by the CRVFO.

Biological control by domestic animals could kill or injure special status plants through browsing and trampling. Concentrated grazing by domestic animals could increase soil erosion from loss of plant cover or loss of biological soil crusts. Biological control agents such as insects and pathogens do not typically have an effect on non-target plant species or habitats. However, some biological control agents have been known to attack species in addition to the target plant. All biocontrol agents would be tested before release to ensure they are host-specific.

In general, the effects of manual treatment methods would be minimal, both because of the low level of environmental impact of this method and the limited area where manual treatment is feasible. Special status plants could be directly killed or injured by treatment or trampling, but soil disturbance and risks of erosion would be minimal with manual methods. Manual treatments would have an overall beneficial effect on special status plant habitat.

Subsequent revegetation of treated areas could include broadcast seeding followed by raking or harrowing or drill seeding, or possibly cultivation (discing) before seeding. Plants could be crushed by tractors or ATVs during the drill seeding or injured or killed during cultivation or raking. Before any cultivation would be implemented, cultural and biological surveys would be conducted and a site-specific NEPA document would be prepared. Safety buffers around special status plants would prevent direct impacts. Revegetation could increase the vegetation cover around special status plant species, creating more competition and limiting resources available to special status plants. It could also create a beneficial effect to special status plants by restoring the site with native vegetation that was present before weeds dominated the area.

With proper implementation, all weed treatment methods would have long-term beneficial effects to special status plant species. Elimination or reduction of invasive and noxious weeds would benefit special status plant communities by reducing competition. This reduced competition would provide more resources (e.g., water and nutrients) to special status plants and other native plants, allowing them to reestablish sites previously dominated by weeds. The type and degree of weed management actions are expected to be similar between alternatives, and impacts would be similar across alternatives.

Impacts from Fisheries and Aquatic Wildlife Management. Activities in support of the fisheries and aquatic wildlife management program may include controlling or removing invasive aquatic species, improving aquatic habitat by installing instream habitat structures, or planting riparian vegetation. Habitat improvements that involve surface disturbances in potential or occupied habitat for the Ute ladies'-tresses orchid could cause direct mortality to the species. Under Alternative A, an NSO stipulation for threatened and endangered species (GS-NSO-12) would prohibit surface-disturbing activities in Ute ladies'-tresses habitat, so adverse impacts would be avoided. In the long term, the orchid would benefit from habitat treatments that improve riparian habitat. These actions and impacts would be similar across all alternatives. Alternative A has the fewest protective stipulations for fish and other aquatic wildlife management, so Alternative A would have the least indirect benefits for special status plants of all alternatives.

Impacts from Terrestrial Wildlife Management. Habitat manipulations such as prescribed burns and mechanical and chemical controls are typically used to improve habitat for wildlife. While habitat manipulations for wildlife in the vicinity of special status plants could hold some long-term benefits for the species, there could be short-term adverse impacts from vegetation treatments, as discussed in Vegetation Management—Rangelands.

Restrictions or stipulations on surface-disturbing activities within wildlife habitats that overlap with special status plant habitat could benefit special status plants within the restricted areas. The current NSO stipulations to protect wildlife seclusion areas (GS-NSO-11) and SWAs (GS-NSO-4) would not have any direct benefit to special status plants since these stipulations do not overlap any known habitat for special status plants. The NSO stipulation to prohibit surface-disturbing activities within 0.125-mile radius of an active nest of most raptor species (NSO-CO-3) would benefit special status plants that occupy similar or adjacent habitats. Alternative A would have the least restrictions on surface-disturbing activities and would have the least benefit to special status plants of all alternatives.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts from management of special status fish and other aquatic wildlife would generally be the same as or similar to impacts from management of general fish and other aquatic wildlife.

Impacts from Special Status Species Management—Terrestrial Wildlife. In addition to the stipulations mentioned above that would apply to both special status plants and terrestrial wildlife, there are other stipulations that may minimally benefit special status plants. For example, the NSO stipulation that protects a 0.25-mile radius around greater sage-grouse leks, would help protect habitat for Harrington's penstemon within sagebrush vegetation.

Impacts from special status wildlife management would be beneficial for special status plants. Alternative A has the least restrictions on surface disturbances and would have the least benefit for special status plants of all alternatives.

Impacts from Visual Resources Management. VRM class designations would either limit or allow surface-disturbing activities in certain areas, thereby affecting special status plants. The natural character of the landscape must be maintained in VRM Class I or II areas; moderate to major modifications to the character of the landscape could occur in areas designated as VRM Class III or IV. Managing areas as VRM Class I would prohibit most vegetation treatments and other surface-disturbing activities, except for those actions that would not create a visual impact (e.g., weed treatments) or would preserve the existing degree of naturalness. VRM Class II would allow for limited small-scale surface disturbances, such as vegetation treatments (e.g., sagebrush mowing, weed management, and timber harvest), as long as the project design features were adequate to protect the scenic values and blend in with the existing surroundings. Areas managed as VRM Class III and IV would allow greater landscape modifications and therefore greater surface disturbance which could impact special status plants.

Under Alternative A, existing NSO stipulation GS-NSO-16 to protect VRM Class I areas within ACECs would apply to Bull Gulch, Deep Creek, and Thompson Creek ACECs and SRMAs and Hack Lake SRMA. The small populations of Harrington's penstemon within these ACECs and SRMAs would be protected by this stipulation. Portions of the occupied habitat for Colorado hookless cactus, DeBeque phacelia, and Naturita milkvetch would be designated VRM Class II. VRM Class II is protected with a CSU stipulation GS-CSU-5 to allow relocation of activities beyond 200 meters to protect visual values. Habitat for special status plants may be protected where it coincides with VRM Class II zones. However, it may also present a conflict if VRM Class II zones are adjacent to special status plant habitat and activities are moved into special status plant habitat to retain visual character.

Alternative A would protect the fewest acres with a VRM Class I or II designation. The Proposed RMP would protect the most acreage with VRM Classes I and II and, followed by Alternatives C and D, respectively.

Impacts from Wildland Fire Management. The analysis of the impacts of wildland fire management include prescribed fire, unplanned natural fire managed for resource benefits, wildland fire suppression, and non-fire fuels treatments, as well as the impacts of wildland fire itself.

Wildland Fire and Fire Suppression. Fire management could affect special status plant species in several ways. The fire itself could result in the death of individual plants or the alteration of their habitat. The construction of fire lines using hand tools or heavy machinery could also affect special status plants by crushing or uprooting individual plants, increasing erosion and sedimentation, and providing a vector for the invasion or expansion of invasive and noxious weeds. The CRVFO Fire Management Plan has BMPs in place to guide wildland fire suppression while in habitat areas known to contain federally listed, proposed, or

candidate plant species. Section 7 consultation with USFWS has concurred with BLM's determination that these guidelines would be "not likely to adversely affect" listed plant species.

Suppressing fires would lead to fewer acres burned, and as such would cause the least amount of short-term direct disturbance to vegetation. Suppression therefore would make direct loss of special status species and habitat fragmentation less likely. However, as fewer areas would experience wildland fire, these areas would also have the fewest beneficial impacts on potential habitats (e.g., clearing undergrowth, stimulating germination of native species, or age class diversification) and would create a long-term buildup of fuels. Large-scale, severe wildland fires caused by excessive fuel loading from maximum fire suppression would reduce vegetation cover, change species composition, and likely kill special status plants and their seedbank.

Many special status plant species are found in salt-desert shrub habitat where wildland fire did not historically burn because of the sparse vegetation cover (Chambers et al. 2009). However, the invasion of cheatgrass (*Bromus tectorum*) into the salt-desert shrub ecosystem has increased fine fuel loads, which can carry fires through areas where they did not previously burn. If these areas burn, it would result in a proliferation of cheatgrass that could outcompete special status plants.

Unplanned Fire Managed for Resource Benefit. Areas where fire would be allowed would result in the most direct disturbance to vegetation and could lead to direct loss of individual special status plants or entire populations, or adverse changes to occupied or potential habitat. Most areas where unplanned fire would be allowed to burn are areas with intact healthy ecosystems that are resilient to disturbances, have high resistance to weed invasion, and historically frequent fire return intervals. Fires in these areas may result in the most habitat improvement and age-class diversification, which would benefit special status plants in these habitats.

Prescribed Fire. Under all alternatives, prescribed fire would be used to reduce hazardous fuel loading. Prescribed fires, including fire line construction and use of staging areas, could adversely affect special status plant species by trampling or uprooting individual plants or altering habitat, as previously described. However, the severity of this impact would be much less than that described above for wildland fire suppression or management of unplanned natural fire, because planned natural fires would generally be preceded by a survey for special status plants, and surface-disturbing activities would be designed to avoid occupied special status plant species habitat whenever possible. Habitat manipulations resulting from the use of fire may also benefit special status plants over the long term by improving vegetation conditions and reducing fuel loadings that would lower the risk of large-scale, severe fires.

Fire plays an important role in mountain big sagebrush sites that support some populations of Harrington's penstemon. The historical fire return interval in this community type ranged from 25 to 75 years, depending on soil type and annual precipitation. Fire reduced shrub densities, removed invading pinyon pine and juniper trees, and increased herbaceous cover. Fire may have mixed impacts on Harrington's penstemon, depending on the fire frequency and severity and on the intensity of grazing after a fire. As discussed under Vegetation Management—Rangeland above, the complete removal of shrub canopy may leave the special status plants vulnerable to grazing and trampling and may promote increase herbaceous vegetation that would compete with the special status plants for water and nutrients. The ability of the plant community to resist weed invasion depends on many factors, including the presence of weeds before the fire, plant diversity and cover before the fire, fire intensity and duration, and climate and elevation.

Emergency Stabilization and Rehabilitation. Stabilization and rehabilitation efforts would benefit special status species over the long term by decreasing erosion and restoring or improving habitat conditions after a fire, although there could be short-term adverse impacts. The use of heavy equipment within special status plant species habitat could crush individual plants and segment populations. Rehabilitation efforts often focus on seeding of grasses with quick germination and establishment characteristics to stabilize soils after a fire. An increase in grass cover may suppress some species of special status plants, which frequently grow in ecosystems with low vegetation cover.

Wildland fire management practices would be similar across all alternatives, and impacts would be the same or similar under all alternatives.

Impacts from Forestry Management. Forestry and woodland management actions include commercial timber harvest, as well as firewood, poles, Christmas trees, pine nuts, timber, and seed collection. Commercial forestry (e.g., timber harvests and sales) are restricted to upland forests. These activities could include the use of heavy equipment, helicopters, chemical applications, road construction, and culvert installation, and typically result in increased traffic, noise, and human presence.

None of the special status plants species in the CRVFO occurs in forested areas that would be directly impacted by commercial timber harvesting. The BLM sensitive species Harrington's penstemon occurs in habitats adjacent to suitable commercial forestlands. Construction of roads through occupied and suitable Harrington's penstemon habitat to access the timber could kill this special status plant and cause a loss of habitat, and may reduce plant vigor by increasing dust.

Collection of seeds and other plant parts is a forestry management activity that could have adverse impacts on special status plants. Collection of seeds within special status plant species habitat could result in loss or damage to plants. Seeds are typically gathered by thrashing the plants with tennis racquets. Motorized vehicles are used as part of the collection activity. Seed collecting permits would generally not be authorized in areas of BLM sensitive plants unless special status plant species were targeted for the purpose of increasing seed for restoration. Collection of listed plants or plant parts would require a permit from USFWS. Potential impacts from forest and woodland harvesting or from seed and live plant collection would be avoided or mitigated during site-specific NEPA analysis for proposed projects.

Impacts from Livestock Grazing Management. The primary impacts on special status plants from implementation of the livestock grazing program can occur from actual grazing or from surface-disturbing actions related to range developments, such as the construction of fences, water pipelines, cattle guards, and livestock ponds.

Livestock Grazing. Potential impacts of livestock grazing vary by the special status plant species and their habitats. Many of the special status plants in the CRVFO grow in areas with naturally sparse vegetation cover. Some of these species also occur on steep, talus slopes. These habitats typically receive only incidental livestock use, and impacts from grazing would be minimal.

Several other special status plants occur in sagebrush or riparian habitats that can receive heavy livestock grazing. Direct impacts are more likely to occur where livestock congregate. Grazing in these habitats could cause direct loss or trampling of special status plant individuals or populations, especially special status plants that are palatable to animals. Livestock grazing can also cause a decrease in total vegetation cover, an increase

in areas of bare ground, a change in species composition, soil compaction, erosion, sedimentation, and an increased potential for weed invasion and spread, all of which could reduce the health and vigor of the special status plant community, as well as alter the natural fire regime.

Dispersed, light grazing could have beneficial impacts on special status plant habitat. Grazing may decrease the cover of other vegetation that competes with special status plants for sunlight and nutrients. Grazing also reduces litter and fine fuel loading, which could reduce the scale and severity of wildfires. A reduction in the scale and severity of the fires would be beneficial particularly for special status species in the salt desert shrub environment, which is not historically adapted to wildfires.

Management of livestock grazing would comply with Colorado Public Land Health Standards and Guidelines for Livestock Grazing under all alternatives. In areas where livestock grazing causes land health standards not to be met, changes would be made to make significant progress toward meeting those standards. Making such changes would help reduce adverse impacts on special status plants by improving overall soil and vegetation condition. Of the allotments that were determined not to be meeting the land health standards, livestock grazing was considered a significant causal factor in only a few allotments. The County Line allotment, which contains occupied habitat for several special status plants, was one where livestock grazing was contributing to the failure to meet land health standards. Changes in grazing use, including a temporary deferral from livestock grazing, have been implemented to move the allotment toward meeting the land health standards.

Under Alternative A, approximately 488,300 acres would be available for grazing (488,300 acres) with 39,200 AUMs allocated under current management. No active allotments would be proposed for closure for resource concerns or lack of forage. Alternative A would have the most acres and AUMs available for livestock grazing and the least management restrictions; therefore, impacts to special status plants would likely be greatest under Alternative A.

Range Developments. Construction of range developments has the potential to directly impact special status plant species through direct mortality during construction. The construction of fences or livestock ponds would concentrate livestock use and would potentially affect occupied special status plant habitat in the vicinity through trampling or grazing of plants, changes in species composition, and invasion of noxious weeds. Placement of salt and mineral supplements can also lead to cattle concentration in habitat for special status plant species and could result in similar impacts. Many range improvements would also have long-term benefits to special status plant species by improving livestock distribution and reducing localized excessive utilization levels, which would minimize disturbance, weed spread, and soil compaction in any one area. Stipulations would be attached to new range development projects, such as construction of stock ponds or fences, to require grazing permittees to monitor and control weeds within the project area.

Under all alternatives, when deemed necessary and feasible by the BLM, livestock grazing would be excluded or deferred for two growing seasons on disturbed areas (e.g., reclaimed seeded areas, except for pipelines), or until monitoring data indicated that vegetation cover, species composition, and litter accumulation were adequate to support and protect watershed values, meet vegetation objectives, and sustain grazing use. Where grazing is deferred, reclaimed and reseeded areas would have time to become established, and the risk of weed invasion would be reduced. Impacts would be beneficial and long term.

Impacts from Recreation and Visitor Services Management. Recreational use includes a variety of activities that may impact special status plants. Surface-disturbing activities have the potential to adversely

affect special status plants by crushing or trampling plants or by removing or altering habitat. These activities include construction of campgrounds, parking lots and trails, camping outside designated areas, foot, horse, or motorized or mechanized vehicle traffic off existing roads or trails. Visitor use is expected to increase within the planning area under all alternatives. All of the identified impacts associated with recreation would be expected to increase proportionately.

R&VS management would include the designation of SRMAs under all alternatives. In the SRMAs, recreation would be the main emphasis and management would facilitate specific activities and meet desired outcomes. Remaining lands would be managed as RMAs or ERMAs to achieve a balance between recreation and other resources and uses. In certain SRMAs emphasis activities include motorized recreation, mountain biking, and hiking, among others. In other SRMAs current management promotes solitude and nonmotorized activities. In SRMAs where management emphasizes increased use and development, it is likely that more routes and trailheads would be created to meet user demand and desired experiences.

Under the current plan, seven of the SRMAs (Bocco Mountain, Bull Gulch, Deep Creek, Gypsum Hills, Hack Lake, Thompson Creek, and the Upper Colorado River) and one of the RMAs (Pisgah Mountain) include occupied habitat for the BLM sensitive plant, Harrington's penstemon. The management emphasis in Bocco Mountain and Gypsum Hills would be on motorized recreation opportunities. An NSO stipulation on occupied habitat for listed, proposed, and candidate plants and a CSU stipulation on occupied habitat for BLM sensitive plants would allow relocation of new surface-disturbing activities or special project design measures to lessen impacts on special status plants. However, an overall increase in route density and vehicular traffic would probably lead to loss of potential but unoccupied habitat, fragmentation of overall habitat, and increased dust deposition on plants. Disturbed areas also serve as niches where invasive weedy vegetation can take hold. Humans can also serve as dispersal mechanisms for invasive and noxious weed species and help spread weeds to new areas. Many invasive and noxious weeds are aggressive and can dominate a site to the exclusion of native plants, including special status plants.

The other SRMAs and the RMA under Alternative A with special status plant habitat are managed primarily for hiking and horseback riding opportunities, with low density of trails and low levels of use anticipated. Impacts on special status plants within these SRMAs and RMA would be minimal. Except for Bocco Mountain and Gypsum Hills, an NSO stipulation would protect the SRMAs and RMAs with special status plant habitat from incompatible surface-disturbing activities. This restriction would indirectly provide protection for Harrington's penstemon within these areas.

Alternative A would create fewer impacts than under Alternative D, which would allow for the most development and use that may affect habitat for special status plants. Alternative C would place less emphasis on development of new trails and other infrastructure for recreation which would impact less vegetation and special status plant habitat but would also protect fewer acres with an NSO stipulation. The Proposed RMP would impact less habitat than Alternative D with fewer SRMAs emphasizing increased use and development and with the application of NSOs to the most acres. Alternative C would likely have the least impact on special status plants, followed by the Proposed RMP and Alternatives A and D.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, a total of 295,900 acres of the CRVFO would be open to cross-country OHV travel. Travel management under this alternative allows for substantial proliferation of user-created routes, which could create widespread impacts on special status plants. Impacts of travel management actions could include direct mortality of special status plants,

habitat destruction and fragmentation, soil compaction, transportation of invasive and noxious weeds from infested areas to uninfested areas, increased dust, and increased access for illegal collectors. Disturbances from cross-country travel (casual use) would probably be greatest to special status plant species and their habitat because these activities occur over widespread areas and are generally unsupervised. Unlike permitted activities (e.g., mineral development, ROWs, and vegetation treatments) that are subject to site-specific environmental review and mitigation measures, casual use activities do not have to undergo the same level of scrutiny and could therefore result in detrimental impacts on special status plants. Visitor use is expected to increase within the planning area under all alternatives, which would probably result in increased trail and road use. All of the identified impacts associated with trail and road management would be expected to increase as well.

Under Alternative A, approximately 186 miles of roads occur within 200 meters of special status plant habitat (the most of any alternative). Impacts would vary depending on the class of road, so that more impact would result from dirt roads than from gravel or paved roads. Vehicle traffic on dirt and gravel roads creates dust, which can inhibit photosynthesis and decrease plant vigor and pollination success. Roads also provide a vector for weed invasion, which can degrade special status plant habitat.

As compared with the other alternatives, Alternative A would result in the greatest risk of impacts on special status plants, because of the amount of existing routes within special status plant habitat that are open to full-sized vehicles, and because most of the habitat is considered open for cross-country travel.

Impacts from Lands and Realty Management. Lands and realty actions include making land tenure adjustments, issuing rights-of-way (ROW), and withdrawing lands from mineral activity. The effects of land tenure adjustments on special status plants would be determined through site-specific environmental analysis for any land disposals or acquisitions. Although there is no specific guidance in the current plan regarding disposal or retention of special status species habitat, BLM policy (BLM 2008j) is to "retain in federal ownership all habitat essential for the survival and recovery of any listed species." Disposal of habitat for proposed, candidate, or sensitive species may result in loss of populations and habitat, unless lands leaving public ownership are guaranteed protection under other ownership. Land acquisitions involving special status plants and their habitats would provide additional protection by managing them under BLM's guidelines and regulations.

ROWs, including roads, pipelines, power lines, wind and solar power sites, and communications sites, could be proposed in populations and habitats for special status plants. Construction of ROWs in special status plant habitats could cause direct removal of special status plants, increased habitat fragmentation, conversion of habitat to unsuitable habitat types, or degradation of habitat caused by sedimentation or weed invasion. Construction and operation of road ROWs could provide increased access for illegal collectors.

In Alternative A, approximately 20,800 acres would be designated as "unsuitable" for siting of utility and communication facilities, precluding the construction of these facilities, and approximately 101,300 acres would be designated as "sensitive" for these uses, requiring special mitigation measures if avoidance is not possible. Under the other alternatives, the term "unsuitable areas" would be replaced with "exclusion areas" and "sensitive areas" replaced with "avoidance areas." These terms would apply to all ROWs and not just utilities and communication sites.

In Alternative A, unsuitable areas would include Deep Creek and Bull Gulch ACECs, Thompson Creek Natural Environment Area, and the Hack Lake area. Potential adverse impacts from ROWs would be greatest under this alternative since it designates the fewest acres as exclusion or avoidance areas for utility and communication facilities and none for other ROWs. However, listed, proposed, and candidate threatened and endangered plant species would be protected through an NSO stipulation and BLM sensitive plants would be afforded some protection by a CSU stipulation, which would lessen the impacts. Several small populations of Harrington's penstemon within ROW exclusion areas would receive greater protection than that provided by the CSU stipulation for BLM sensitive species.

BMPs and weed control measures in the ROW terms and conditions would serve to minimize impacts of surface disturbances. Under all alternatives, adverse impacts from lands and realty actions would be greater than beneficial impacts, but impacts would be greatest under Alternative A.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, Geothermal Resources). Of all types of mineral and energy development, oil and gas development has the greatest potential for impacts on special status plants, given the current level of development and the high potential for oil and gas resources in the area. Direct impacts associated with fluid minerals development and seismic explorations include direct mortality of special status plants due to clearing of sites to build pads, roads, pipelines, and facilities and from construction equipment and vehicles operating in occupied habitats.

Indirect impacts would include physical loss of potential habitat for special status plants and their pollinators; soil erosion and compaction; habitat fragmentation (reduced patch sizes of undisturbed vegetation); changes in plant community composition, structure, density; and canopy cover. Disturbed areas serve as niches where invasive weedy vegetation can establish and proliferate. Weeds may outcompete native vegetation, including special status plants. Where weeds such as cheatgrass dominate, this could lead to changes in the fire regime contributing to more frequent and extensive wildfires which further reduces the cover and abundance of those native plant species which do not readily resprout following fire. Mechanical or chemical weed treatments on disturbed areas could also cause direct mortality or injury to plants.

Construction and operation of facilities expand current roadway systems and increase both traffic and visits to otherwise remote areas. Increased traffic could result in increased mortality of special status species from trampling of habitat and poaching by illegal collectors. Fugitive dust associated with increased soil disturbance and vehicular traffic within special status plant habitat can reduce the photosynthetic activity of plants and reduce pollination success. In the long term, dust may reduce seed productivity and recruitment of young special status plants needed to replace mortality caused by senescence.

Most of the special status plants habitat within the CRVFO planning area occurs in areas of high potential for fluid minerals, with the exception of Ute ladies'-tresses and Harrington's penstemon. None of the known occupied habitat for Ute ladies'-tresses and only approximately 7 percent of the Harrington's penstemon habitat occurs in areas of high potential for fluid minerals. As shown in Table 4.2.7-2, much of the known special status plant habitat on BLM-managed lands has already been leased for fluid minerals development and is currently being developed. In some cases, NSO stipulations for threatened and endangered species were attached to these leases.

Table 4.2.7-2
Oil and Gas Leases in Special Status Plant Habitat (as of 2012)

Special Status Species	BLM-managed known habitat (acres)	Unleased		Leased with NSO for T&E		Leased with no T&E Stipulations	
		Ac	%	Ac	%	Ac	%
Cathedral Bluffs meadowrue	40	20	50	0	0	20	50
Colorado hookless cactus	70	90	10	472	54	308	36
DeBeque phacelia	93	2	**2**	38	41	53	57
Harrington's penstemon	37,640	35,190	93	0	0	2,450	7
Naturita milkvetch	62	0	0	0	0	62	100
Parachute penstemon	182	64	35	15	8	103	57
Roan Cliffs blazing star	153	9	6	0	0	144	94
Ute ladies'-tresses orchid	16	16	100	0	0	0	0

Acronyms and Abbreviations:
BLM Bureau of Land Management
NSO no surface occupancy
T&E threatened and endangered

Federal oil and gas regulations prevent the BLM from applying new or additional lease stipulations that would be developed through this planning effort to existing leases. However, federal regulations do allow the BLM to apply other protection measures in conjunction with planning and implementing oil and gas projects. These measures include applying stipulations consistent with the most recent land use plan as terms and conditions for discretionary approvals and applying COAs to reduce impacts related to lease activities. However, COAs are often less protective than lease stipulations because COAs cannot substantially constrain valid existing rights.

Other oil and gas stipulations are in place to require the reestablishment of desirable vegetation after the mineral and fluid management actions have been completed. However, reclamation efforts often have poor success rates, with loss of species diversity, an increase in annuals, and a decrease in forbs and woody plants. In addition, permits include weed control stipulations that are effective, if enforced.

Under Alternative A, any new leases or expired leases in special status plant habitat would be issued with an NSO for listed plants and a CSU stipulation for sensitive plants, such as Harrington's penstemon. The CSU stipulation would provide some protection from oil and gas and other surface-disturbing activities; however, in areas where Harrington's penstemon habitat is extensive, it may be difficult to move operations beyond the occupied habitat and still attain the down-hole targets for natural gas. Some populations of Harrington's penstemon would likely be lost if habitat were protected with a CSU stipulation instead of an NSO. Alternative A would have more risk of impacts on special status plants than the other alternatives because fewer protective stipulations would be applied.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under the current plan, the following areas that contain special status plant habitat would be

petitioned for withdrawal from locatable mineral exploration and development: Bull Gulch, Deep Creek, and Thompson Creek ACECs and SRMAs. Withdrawing these three areas would protect several small populations of Harrington's penstemon from surface-disturbing actions related to locatable mineral development. Locatable mineral development is governed by the 1872 Mining Law and is not subject to land use planning decisions. Plan of operations-level development would be addressed in site-specific environmental analysis, but initial exploration (disturbance less than 5 acres per year) is not subject to NSO or CSU stipulations, so special status plant habitat not withdrawn from mineral development would be vulnerable to surface-disturbing actions. The degree of impacts would vary depending on the location of proposed mineral development in relation to special status plant habitat. No public lands in CRVFO would be closed to mineral materials (salables) disposal or non-energy solid leasable minerals, except WSAs if Congress designates them as wilderness. However, unlike locatable mineral development, these activities would be subject to the existing stipulations, so impacts on special status plants would be minimal. Alternative A would withdraw the least amount of habitat for special status plants of any alternative, potentially creating the most adverse impact.

Impacts from Renewable Energy Management (Wind and Solar). According to the US DOE National Renewable Energy Laboratory, the planning area has a low potential for wind and solar energy. Impacts of renewable energy development to special status plants could include direct mortality, habitat disturbance, habitat loss, introduction of invasive weeds, erosion and runoff, and fugitive dust. Under Alternative A, applications for solar and wind energy exploration and development would be considered on a case-by-case basis. Any impacts on special status plant species would depend on the location and type of project proposed. For example, the use of solar panels within a special status plant species population could block sunlight, or the surface disturbance associated with installation of wind turbines could crush or remove individual special status plants. Implementation of existing NSO stipulations would prevent impacts on federally listed or candidate threatened or endangered species. CSU stipulations on sensitive species may require relocation of the activity outside known populations but may allow these activities within unoccupied but potential habitat. Impacts would be similar across all alternatives.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, BLM would continue designation and special management of the following ACECs: Blue Hill, Bull Gulch, Deep Creek, Glenwood Springs Debris Flow Hazard Zone, Lower Colorado River, and Thompson Creek. Four of these ACECs—Blue Hill, Bull Gulch, Deep Creek, and Thompson Creek—contain small occurrences of the special status plant Harrington's penstemon. Although not designated specifically for special status plants, an NSO stipulation (GS-NSO-16) on Bull Gulch, Deep Creek, and Thompson Creek to protect the ACEC values may indirectly benefit the portions of Harrington's penstemon habitat that occur within these ACECs. However, the NSO would be designed to protect the relevant and important values for which these ACECs were designated, such as scenic qualities and geologic features. Exceptions to the NSO may be granted for activities that do not impair these values but may have impacts on other resources, such as special status plants.

These ACECs would be petitioned for withdrawal from exploration and development of locatable minerals. If these areas are withdrawn, it would protect special status plants from surface disturbances related to locatable mining activities. Protections for special status plants provided under Alternative A would be less than under the Proposed RMP and Alternative C, but more than under Alternative D.

Impacts from Wilderness Study Area Management. The Bull Gulch WSA includes several small occurrences of Harrington's penstemon. The Castle Peak WSA contains some potential habitat for

Harrington's penstemon. These areas would be closed to fluid minerals leasing. Although not officially covered by an NSO stipulation on surface-disturbing activities under the current plan, the non-impairment criteria for WSAs would preclude all or most surface-disturbing activities in the area.

Impacts from Wild and Scenic Rivers Management. Under Alternative A, all stream segments would be determined to be eligible for inclusion in the National Wild and Scenic River System. Each of these stream segments would be provided interim protection to preserve their free-flowing condition, water quality, and the ORVs for which they were deemed eligible. The interim protections would apply to lands within 0.25 mile of either side of the stream. A small amount of Harrington's penstemon habitat within the WSR corridors would indirectly benefit from these protections. Alternatives A and C would provide the most protection to special status plants by constraining surface-disturbing activities on all stream segments.

Impacts from Transportation Facilities Management. Road maintenance has had impacts on several special status plants, including Parachute penstemon, DeBeque milkvetch, and Harrington's penstemon where these species occur within old road cuts, fills, or borrow ditches, or where they colonize infrequently used roads. Blading or dozing roads has resulted in burial, uprooting, or undercutting of special status plants. Impacts on Harrington's penstemon would be negligible compared with the overall population size. Impacts on Parachute penstemon and DeBeque milkvetch could be minor to moderate because their populations within the planning area are much smaller.

Alternative B (Proposed RMP)

Impacts to special status species plants from management of other resources under the Proposed RMP would be the same as or similar to those under Alternative A, except as described below.

Impacts from Special Status Species Management—Plants. Under the Proposed RMP, fewer acres of special status plant potential habitat would be covered under NSO and CSU stipulations than under Alternative A, but nearly the same or more acres of known occupied habitat. In the past decade, extensive inventories for special status plants have been conducted and descriptions of potential habitat characteristics have been improved. Subsequent mapping has been refined to include more areas of known occupied habitat and to remove areas that do not have the characteristics of potential habitat. Although the Proposed RMP includes fewer total acres of NSO and CSU for special status plants than Alternative A, all known existing populations (and subsequent populations that are found) would be included in these stipulations.

The Proposed RMP would implement stipulation CRVFO-NSO-9 that would prohibit surface disturbing activities within 200 meters of listed plant habitat, affecting 1,100 acres of BLM surface and 200 acres of federal mineral estate. This restriction would protect occupied habitat and potential habitat adjacent to occupied habitat from new disturbances. The stipulation would apply to all known listed plant occurrences and to any newly discovered locations. Stipulation CRVFO-NSO-11 would protect suitable habitat for DeBeque phacelia with a 30-meter buffer unless it could be reliably demonstrated that the habitat is unoccupied. This would provide additional protection not found under Alternative A.

Proactive vegetation treatments, such as cheatgrass control, that are designed with special status plant habitat needs in mind could improve habitat for special status plants and maintain or increase population size. For DeBeque phacelia and Parachute penstemon, which prefer habitats with very little vegetation cover, projects that reduce or prevent weed infestations would benefit these species, provided that appropriate measures are employed to avoid herbicide impacts to these species. For the Colorado hookless cactus, habitat restoration

projects that reduce weeds, improve the cover and diversity of forbs, restore shadscale where shrubs are dead or decadent, and reduce sagebrush density and woodland encroachment would benefit the species and its habitats. For Ute ladies'-tresses, actions that reduce trampling of habitat, (by livestock or human activity), especially during the growing season, reduce weeds and other invasive species, and manage for early-to-mid-seral riparian habitat would generally benefit this species.

Four ACECs—Hardscrabble-East Eagle, Lyons Gulch, Mount Logan Foothills and Sheep Creek Uplands—would be designated specifically for special status plants, protecting 12,500 acres of core habitat. The Mount Logan Foothills ACEC encompasses all known occupied and critical habitat for DeBeque phacelia, virtually all occupied habitat for Colorado hookless cactus and Naturita milkvetch, and small occurrences of Parachute penstemon, Roan Cliffs blazing star and Cathedral Bluffs meadowrue. The ACEC would include an NSO stipulation on all acres (CRVFO-NSO-28) that would protect the occupied habitat for these federally listed and BLM sensitive plant species as well as potential habitat within the ACEC that may not be currently occupied.

Hardscrabble-East Eagle, Lyons Gulch, and Sheep Creek Uplands ACECs would protect core populations of the BLM sensitive plant, Harrington's penstemon. Sensitive plant habitat within ACECs would be protected by an NSO stipulation with a 200-meter buffer (CRVFO-NSO-10). The remaining sensitive plant habitat outside of ACECs would be provided less protection with a CSU stipulation.

The ACECs would be designated ROW avoidance areas, would be recommended for withdrawal from mineral location, would be closed to mineral materials sales, and would not be available for coal leasing. Vegetation treatments would be allowed if they were determined to maintain or enhance habitat for special status plants. The management prescription for these ACECs would allow no net increase in miles of designated routes. A number of roads that were open to full-sized vehicles under Alternative A would be limited to pedestrian and equestrian use only or would be closed altogether under the Proposed RMP to reduce fragmentation, improve habitat connectivity, and reduce risk of weed invasion for special status species habitat. The Proposed RMP would provide more benefits to special status plant conservation and management than under Alternatives A and D, but slightly less than under Alternative C.

Impacts from Soils Management. The goal of soils management in the Proposed RMP is to ensure that upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, landform, and geologic processes, and to minimize soil erosion on a landscape scale. An NSO stipulation to protect soils on steep slopes greater than 50 percent would be applied to all surface-disturbing activities, including pipelines. Several special status plant species, such as Parachute penstemon, Roan Cliffs blazing star, and Cathedral Bluffs meadowrue grow on steep talus slopes. This stipulation would complement special status plant species protections by reducing disturbances on steep slopes that could destroy potential habitat for those plants and indirectly protecting DeBeque phacelia and Colorado hookless cactus from offsite erosion where these plants occur at the base of steep slopes.

Impacts from Water Resources Management. Under the Proposed RMP, the current NSO stipulations for major river corridors and for domestic watershed areas would be maintained. These stipulations would provide protections for Ute ladies'-tresses orchid, a threatened plant species that is found in riparian and wetland habitat. In addition, an NSO with a 100-meter buffer (325 feet) around all perennial streams, water bodies and riparian areas (CRVFO-NSO-5) may provide some additional protections for the Ute lades'-tresses orchid if it occurs in drainages other than the major river corridors.

Impacts from Vegetation Management—Rangeland. The types of impacts experienced as a result of vegetation management would be similar to those described for Alternative A. Beneficial effects could result from many of these activities, which would include improved vegetation conditions, such as a reduction in pinyon-juniper encroachment into sagebrush habitat that supports Harrington's penstemon.

Vegetation treatments that dramatically increase native or non-native herbaceous cover could directly compete with special status plant species for sunlight and nutrients. Additionally, adverse effects could also result from the construction efforts associated with some vegetation treatments, as described previously for Alternative A.

Impacts from Terrestrial Wildlife Management. The Proposed RMP would prohibit surface-disturbing activities on 45,600 acres of priority wildlife habitat (CRVFO-NSO-7). Protective stipulations on important winter wildlife habitat would indirectly protect special status plants, particularly Harrington's penstemon, that depends on sagebrush habitat. These stipulations would provide greater protection for this species than would be provided by the stipulations for special status plants in this alternative. However, habitat and range improvement projects would be allowed. The types of impacts experienced as a result of habitat improvement projects for wildlife would be similar to those described under Alternative A.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. The NSOs under the Proposed RMP for protection of endangered and sensitive fish species include a 0.5-mile buffer on major river corridors and a 100-meter buffer on all water bodies, which would provide the same protection for special status plants as discussed under the Proposed RMP, Impacts from Water Management.

Impacts from Special Status Species Management—Terrestrial Wildlife. Additional protections for greater sage-grouse habitat would be implemented under the Proposed RMP and Alternatives C and D. Under the Proposed RMP, an NSO stipulation would prevent surface-disturbing activities in priority habitat for greater sage-grouse. The NSO would cover 24,700 acres of sagebrush habitat, much of which would overlap and protect habitat for Harrington's penstemon. The Proposed RMP would provide greater protection for special status plants than Alternatives A and D, and similar protection as Alternative C.

Impacts from Visual Resources Management. Bull Gulch, Deep Creek, and Thompson Creek ACECs and SRMAs would continue to be managed as VRM Class I. Under the Proposed RMP, all WSAs as well as the Blue Hill ACEC would be included under VRM Class I. VRM Class I areas would preserve or retain the existing character of the landscape with the application of an NSO. Several of these areas contain small populations of Harrington's penstemon that would be afforded additional protection from surface disturbances. All the VRM Class II management areas from Alternative A would be maintained, and some additional VRM Class II acres would be included, mostly in the SRMAs and the ACECs. A CSU stipulation would be attached to VRM Class II areas to protect the visual character. NSO and CSU restrictions on special status plant habitat under the Proposed RMP would provide greater protection than the CSU for VRM Class II.

Impacts from Managing to Protect Wilderness Characteristics. The Proposed RMP would manage five areas to protect their wilderness characteristics. Four of these areas—Deep Creek, Flat Tops Addition, Pisgah Mountain and Thompson Creek—support occupied habitat for the BLM sensitive plant, Harrington's penstemon. These areas would be closed to fluid minerals leasing and an NSO stipulation would be applied (CRV-NSO-23), which would benefit Harrington's penstemon by protecting populations within these areas from the impacts of surface disturbances. Management of these lands would allow for small-scale vegetation

treatments (e.g., weed treatments) that would enhance wilderness characteristics, but may preclude surface-disturbing vegetation treatments that might be implemented to maintain or improve habitat for Harrington's penstemon. Overall, managing for wilderness characteristics under the Proposed RMP would benefit special status plants. The Proposed RMP and Alternative C would afford the same protection for special status plants and would provide greater protection than Alternatives A and D which do not propose to manage any units for wilderness characteristics.

Impacts from Forestry Management. Under the Proposed RMP, 28,000 acres of commercial forest and woodlands would be intensively managed for harvest. None of the special status plants species in the CRVFO occur in forested areas that would be directly impacted by commercial timber harvesting. The BLM sensitive species Harrington's penstemon occurs in habitats next to suitable commercial forestlands. Construction of roads through occupied and suitable Harrington's penstemon habitat to access the timber could kill this special status plant, could cause a loss of habitat, and may reduce plant vigor by increasing dust.

Under this alternative, a total of 123,300 acres would be closed to commercial timber harvest. Several of these areas, including Thompson Creek, Hack Creek, and East Hardscrabble, provide habitat for Harrington's penstemon. Closing these areas to commercial timber harvest would protect these populations from surface disturbances associated with timber harvest.

Collection of seeds, digging up plants for commercial or private use (wildings), and removal of other plant parts are forestry management activities that could have adverse impacts on special status plants. Surface disturbance associated with digging up trees, shrubs or other plants could result in direct mortality of listed plants in the vicinity. Collection of seeds within special status plant habitat could result in loss or damage to plants. Seeds are typically gathered by thrashing the plants with tennis rackets or sweeping the foliage with nets. Motorized vehicles are used as part of the collection activity. Seed collecting permits would generally not be authorized in areas of threatened and endangered (T&E) plants unless they were targeted for the purpose of increasing seed for restoration. Collection of listed plants or plant parts would require a permit from USFWS. Potential impacts from forest and woodland harvesting or from seed and live plant collection would be avoided or mitigated during site-specific NEPA and ESA analysis for proposed projects.

The Proposed RMP would manage forest and woodland resources less intensively and actively compared with Alternative A. Alternatives C and D would manage forestry resources similarly to the Proposed RMP. Although Alternative C would close more acres to timber harvest, and Alternative D would close fewer acres than the Proposed RMP, none of these areas are known to support special status plants, so the impacts from forestry management under the Proposed RMP would be the same as Alternatives C and D.

Impacts from Livestock Grazing Management. Impacts on special status plants from livestock grazing management would be slightly less under the Proposed RMP than under Alternative A. Livestock grazing management actions would open 441,600 acres to grazing and close 63,600 acres in 48 allotments. Nine of the 48 allotments that would be closed to grazing contain known special status plant habitat: County Line, Eby Creek, Heuschkel, North McCoy, Pocket, Sheep Creek G&F, Smith Gulch, Wheatley, and Williams Hill. Closing these allotments to livestock grazing would be expected to have generally positive impacts on special status plant habitat by decreasing the risk of trampling or browsing damage or adverse changes in habitat. However, the County Line and Smith Gulch allotments are heavily infested with cheatgrass, and removing livestock grazing alone is not likely to restore the vegetation community to desired conditions. Additional vegetation treatments (weed control and seeding) may be needed to improve habitat for special status plants.

Deferring livestock grazing on disturbed areas for two growing seasons or until site-specific monitoring indicates that vegetation cover, species composition, and litter accumulation are adequate to protect watershed values, to meet vegetation objectives, and to sustain grazing use would have the same beneficial impacts as under Alternative A.

Impacts from Recreation and Visitor Services Management. The Proposed RMP would designate five SRMAs. Three of these SRMAs (Hardscrabble-East Eagle, The Crown, and the Upper Colorado River) contain populations of the special status plant, Harrington's penstemon. The SRMAs would have an NSO stipulation applied to limit ground-disturbing activities in these areas to maintain recreational settings and achieve desired recreational opportunities and outcomes. However, the Hardscrabble-East Eagle and The Crown SRMAs would emphasize accommodating or attracting higher numbers of visitors and require an expansion of recreation trails and facilities. Additional trails could cause impacts on special status plants by crushing or removing individuals, increasing dust emission in the vicinity of special status plants, which may reduce photosynthetic activity and plant vigor, reducing overall local population size below a viable level, increasing potential for weed invasion or expansion and increasing habitat fragmentation. Under the Proposed RMP, Harrington's penstemon habitat would be covered by a CSU stipulation (CRVFO-CSU-6) to allow relocation of new surface-disturbing activities or special project design measures to lessen impacts on this species. Impacts to special status plants would be mitigated with site-specific NEPA analysis. The Upper Colorado River would be managed for water-based recreation and low-density nonmotorized use, which would have minimal impact on special status plants. The Proposed RMP would result in fewer impacts on special status plants than under Alternatives A and D, but greater impacts than under Alternative C.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, no lands would remain open to cross-country travel. All motorized and mechanized travel would be limited to designated routes (464,000 acres) or closed to motorized vehicles (41,200 acres). Areas limited to designated routes would have beneficial impacts by preventing new disturbances that would further fragment special status plant habitat. Under the Proposed RMP, some routes would be closed, and other routes would be converted from full-sized vehicle use to mechanized use or designated for pedestrian and equestrian use only to benefit a variety of programs, including recreation management, wildlife, and special status species. There would be 157 miles of roads within special status plant habitat under the Proposed RMP, which would be 29 fewer miles than under Alternative A. These changes would benefit special status plant habitat by limiting the actual acres of disturbance and decreasing dust impacts. Impacts from trails and travel management actions would be less than under Alternatives A and D, but more than under Alternative C.

Impacts from Lands and Realty Management. Lands that provide habitat for listed, proposed, or candidate species would be retained for long-term management under the Proposed RMP. Other areas that would be retained in federal ownership include ACECs, SRMAs, ERMAs, lands managed for wilderness characteristics, and priority wildlife habitat. Seven ACECs, three SRMAs, three ERMAs, four land units managed for wilderness characteristics, and some priority wildlife habitats support some habitat for sensitive plant species. Retaining all these lands in federal ownership would benefit the management and protection of special status species.

Under the Proposed RMP, more areas would be managed as ROW exclusion areas than under Alternative A. The ROW exclusion areas would be applied to all WSAs, five ACECs, all VRM Class I areas, and one suitable WSR corridor. Several of these ROW exclusion areas contain habitat for Harrington's penstemon. The ROW

exclusion designation would provide greater protection for Harrington's penstemon than the CSU stipulation for Harrington's penstemon included in this alternative.

ROW avoidance would also be applied to more areas than under Alternative A. Occupied habitat for special status plants would be managed as ROW avoidance areas. Although the ROW avoidance does not preclude all ROW development, it would limit surface disturbances and give priority consideration to special status plant habitat. Impacts on special status species in these avoidance areas would be negligible. As in all alternatives, weed control measures in the ROW terms and conditions would serve to minimize impacts of any surface disturbances.

Under the Proposed RMP, more areas that contain special status plant habitat would be petitioned for withdrawal from locatable mineral entry than under Alternative A. In addition to the three ACECs and SRMAs under Alternative A, all ACECs, WSAs, SRMAs, land units managed for wilderness characteristics, municipal watersheds, and two WSR segments would be withdrawn from mineral entry. Mineral withdrawal would protect most special status plant habitats from surface disturbances associated with locatable mineral development.

The types of impacts experienced as a result of wind and solar authorizations would be similar to those described under Alternative A, except that the Proposed RMP would give greater consideration to renewable energy projects. In addition, implementation of the Proposed RMP would allow wind energy exploration and development to be considered in ACECs that are not identified as ROW exclusion areas. This development could directly impact special status plant species if wind facilities were permitted in these areas.

Under the Proposed RMP, lands and realty actions would have less impact on special status plants than under Alternatives A and D, but more than under Alternative C.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). As shown in Table 4.2.7-2, much of the known special status plant habitat is already leased and undergoing development. Impacts from fluid minerals development in currently leased areas would be similar to Alternative A.

Under the Proposed RMP, approximately 98,100 acres would be closed to fluid minerals leasing. Closure would include the following areas that contain special status plant habitat: Bull Gulch WSA, the Upper Colorado River SRMA, Blue Hill, Bull Gulch, Deep Creek, and Thompson Creek ACECs, four land units managed for wilderness characteristics, and four stream segments eligible for inclusion in the NWSRS. Operators would be required to implement additional dust-suppression measures to minimize fugitive dust emissions associated with oil and gas development. Overall, impacts from fluid minerals development under the Proposed RMP would be slightly less than under Alternative A.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The types of **i**mpacts from **l**ocatable mineral exploration and development would be similar to Alternative A. However under the Proposed RMP, more acres that contain special status plant habitat would be petitioned for withdrawal from locatable mineral exploration and development than under Alternative A. In addition to the three ACECs and SRMAs under Alternative A, four other ACECs, one WSA, the Beaver Creek municipal watershed, two SRMAs, and two WSR segments all contain special status plant habitat that would be protected with a mineral withdrawal. These areas would also be closed to mineral materials disposal

and leasing of non-energy solid minerals, protecting the special status plant from surface disturbances associated with mineral development.

The Proposed RMP would withdraw more acres from minerals development than under Alternatives A and D but less than under Alternative C. Therefore, the Proposed RMP would result in fewer impacts on special status plants than under Alternatives A and D, but more than under Alternative C.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, 11 ACECs would be designated. Mount Logan Foothills ACEC would protect known occupied habitat for three threatened and three sensitive plant species. Three ACECs (Hardscrabble-East Eagle, Lyons Gulch, and Sheep Creek Uplands) would be designated primarily to protect and enhance habitat for the BLM sensitive plant, Harrington's penstemon. These ACECs would protect many of the high-quality, core populations of this special status plant. ACECs would provide protections that would not exist in the absence of the designation, such as an NSO stipulation on all acres within the Mount Logan Foothills ACEC, and an NSO with a 200-meter buffer around occupied sensitive plant habitat within the other ACECs, withdrawal from locatable mineral entry, a ROW avoidance designation, and no net increase in designated routes. These management prescriptions would protect special status plants from surface disturbances that would directly impact plants, fragment habitat, or alter habitat composition.

Four other ACECs would protect small occurrences of Harrington's penstemon, although they would be designated for other resource values. Other protections applied to these ACECs would include ROW exclusion and withdrawal from salable and leasable minerals. ACEC designations in the Proposed RMP would provide greater protections for special status plants than under Alternatives A or D, but slightly less protection than under Alternative C.

Impacts from Wilderness Study Area Management. Bull Gulch WSA includes several small occurrences of Harrington's penstemon. Castle Peak WSA contains some potential habitat for Harrington's penstemon. These WSAs would be closed to fluid minerals leasing and would have an NSO stipulation prohibiting other surface-disturbing activities that would protect special status plants that occur in the area. Exceptions may apply if the action does not impair wilderness values. If the WSA is released by Congress for multiple uses, the areas would become open for leasing and the NSO stipulation would be waived. Impacts on special status plants would be similar to Alternative A.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, Deep Creek Segment 2 (wild) and Deep Creek Segment 3 (recreational) would be determined suitable for inclusion in the NWSRS. Colorado River Segments 6 and 7 (recreational) would be managed under decisions in this RMP revision (e.g., SRMA designation, major rivers NSO stipulation) and the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to protect their WSR eligibility classifications. The three stream segments classified as recreational would be ROW avoidance areas. Deep Creek Segment 2 would be a ROW exclusion area to protect its wild classification. These areas would receive the same protection based on their status as SRMAs and ACECs. Alternatives A and C would provide the more protection to special status plants by constraining surface-disturbing activities on all stream segments.

Alternative C

Impacts to special status plants from vegetation management, wildland fire management, coal management, and transportation facilities management would be the same as or similar to those under Alternative A.

Impacts from management of all other resources and uses would be the same as or similar to those under the Proposed RMP, except as described below.

Impacts from Special Status Species Management—Plants. Under Alternative C, all occupied special status plant habitats would be protected from surface-disturbing activities with a 200-meter buffer (CRV-NSO-19) to minimize direct and indirect impacts to special status plants and pollinator habitat. If properly implemented, the NSO for special status plants and their habitat would afford direct protection to plant populations, would minimize habitat fragmentation and loss of pollinator habitat, and would help maintain potential habitat for future population expansion. The NSO stipulation would provide a refuge for special status species that could be adversely affected by surface-disturbing activities. As under the Proposed RMP and Alternative D, suitable habitat for DeBeque phacelia would be protected with an NSO stipulation unless surveys in "reliable years" find the habitat unoccupied. Stipulation CRVFO-NSO-11 would protect the habitat and seed bank for this annual plant, which germinates only in years of favorable environmental conditions.

Under Alternative C, five ACECs would be designated specifically for the management of special status plants. The Mount Logan Foothills ACEC would protect all of the known habitat for DeBeque phacelia and Naturita milkvetch on BLM lands within the planning area, 95 percent of the known habitat for the Colorado hookless cactus on BLM lands within the planning area, approximately 40 percent of the known habitat for Parachute penstemon, and small occurrences of Roan Cliffs blazing star and Cathedral Bluffs meadowrue. An NSO stipulation would be applied to all acres within this ACEC, protecting both occupied and potential habitat from surface disturbances. Four ACECs (Hardscrabble-East Eagle, Lyons Gulch, Sheep Creek Uplands, and The Crown Ridge) would protect core habitat for Harrington's penstemon. These ACECs would include an NSO stipulation with a 200-meter buffer around occupied special status plant habitat. All five ACECs would also be designated ROW avoidance areas, recommended for withdrawal from mineral location, closed to mineral materials sales, and not available for coal leasing. These ACECs would be protected with a Class II VRM designation. Vegetation treatments would be allowed if they were determined to maintain or enhance the special status plant values. Certain routes that are potentially adversely affecting special status plant habitat under Alternative A would be closed or limited to pedestrian and equestrian traffic only under Alternative C. There would be 143 miles of designated routes within special status plant habitat under Alternative C, which is the lowest number of miles among the alternatives.

As mentioned under Alternative A, most of the special status plant habitat in the western portion of the planning area is already leased for fluid minerals development. This area includes nearly all of the Mount Logan Foothills ACEC. The designation of an ACEC and additional stipulations developed in this RMP would not affect current leases. Impacts on special status plants from oil and gas activity would be mitigated to the extent possible with COAs. The USFWS would be consulted on any activities that may affect ESA-listed plants. Alternative C would be the most beneficial for conservation of special status plants of any alternative.

Impacts from Visual Resources Management. Alternative C has nearly the same acres designated as VRM Class I as the Proposed RMP. Under Alternative C, fewer acres would be designated VRM Class II, with more acres as VRM Class III. Although VRM Class III areas would allow substantial modification of visual resources, special status plants in these areas would be protected with an NSO stipulation with a 200-meter buffer, so the reduced VRM restrictions would not directly affect special status plants. Impacts from visual resource management under Alternative C would be essentially the same as under the Proposed RMP.

Impacts from Livestock Grazing Management. Impacts from livestock grazing management would be the same as the Proposed RMP. Although approximately 8,000 fewer acres would be available for grazing and 10 additional vacant allotments would be closed to grazing under Alternative C, none of these additional allotments are known to contain occupied habitat for any special status plant species.

Impacts from Recreation and Visitor Services Management. The types of impacts from recreation management under Alternative C would be the same as described under Alternative A. Under Alternative C, only two SRMAs would be designated: Red Hill and the Upper Colorado River. Red Hill has no known special status plant populations; the Upper Colorado River SRMA includes several small populations of the special status plant, Harrington's penstemon. The Upper Colorado River would be managed for nonmotorized water-based activities, which would have negligible impacts on Harrington's penstemon, an upland species. Overall, recreation management under Alternative C would have the least impacts on special status plants of all alternatives.

Impacts from Comprehensive Trails and Travel Management. Alternative C would designate slightly more acres (43,900) as closed to travel and correspondingly fewer acres limited to designated routes as the Proposed RMP (461,300 acres). In addition, more routes within known special status plant habitat would be closed or limited to pedestrian and equestrian use than in the other alternatives. Road closures would increase habitat connectivity, would provide buffer areas from weed invasion and dust impacts, and if properly reclaimed, could increase habitat suitable for population expansion. Under all alternatives, adverse impacts from travel and recreation would be greater than beneficial impacts, but Alternative C would result in fewer adverse impacts than the other alternatives.

Impacts from Lands and Realty Management. In addition to retaining lands that provide habitat for listed, proposed, and candidate species as under the Proposed RMP, Alternative C would retain lands that include occupied habitat for sensitive species. Retaining all land with special status species habitat would benefit the management and protection of special status species. Alternative C would provide the greatest protection for special status species.

As under the Proposed RMP, occupied habitat for special status species (including plants) would be managed as ROW avoidance areas. Although the ROW avoidance does not preclude all ROW development, it would limit surface disturbances and give priority consideration to special status plant habitat. Mitigation would be applied during NEPA analysis and impacts on special status species in these avoidance areas would be negligible.

As in all alternatives, weed control measures in the ROW terms and conditions would serve to minimize impacts of any surface disturbances. Overall, lands and realty actions would have less impact on special status plants under Alternative C than under any other alternative.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). As shown in Table 4.2.7-2, much of the known special status plant habitat is already leased and undergoing development. Impacts from oil and gas development in currently leased areas would be similar to Alternative A.

Under Alternative C, approximately 179,700 acres would be closed to fluid minerals, more than any other alternative. This amount would include all the areas closed to fluid minerals leasing under the Proposed RMP,

plus the Sage-Grouse Habitat ACEC, core wildlife areas, and all 26 stream segments found suitable for inclusion in the NWSRS. The leasing closure would protect more acres of Harrington's penstemon habitat from surface-disturbing activities associated with oil and gas development than any other alternative.

Under Alternative C, there would be more ACECs designated than any other alternative. Most of these ACECs would prohibit surface-disturbing activities, such as oil and gas development. This restriction on oil and gas development would not apply to the already leased portions of the Grand Hogback and the Mount Logan Foothills ACEC. Overall, impacts from fluid minerals development under Alternative C would be slightly less than under the other alternatives.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Alternative C would recommend the following areas with special status plant habitat for closure to locatable exploration and development, closure to mineral materials (salables) disposal, and closure to non-energy leasable minerals: the same areas as under the Proposed RMP, plus The Crown Ridge ACECs, , and several additional WSR segments. Alternative C would protect the most special status plant habitat from surface disturbances associated with mining development.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, the BLM would designate five ACECs with a total of 14,200 acres primarily for special status plants: Hardscrabble-East Eagle (4,200 acres), Lyons Gulch (480 acres), Mount Logan Foothills (4,000 acres), Sheep Creek Uplands (4,500 acres), and The Crown Ridge (1,000 acres). The ACECs would include an NSO with a 200-meter buffer around occupied habitat, ROW avoidance areas, withdrawal from locatable and salable minerals, and no net increase in roads. Most of the BLM-managed lands within the Mount Logan Foothills ACEC are already leased, so no NSO can be applied to existing oil and gas leases. Rather in this ACEC, COAs would be applied to protect special status plant habitat.

Five other ACECs that contain several occurrences of the BLM sensitive plant, Harrington's penstemon, would also be designated under this alternative. ACEC designations under Alternative C would protect the greatest amount of special status plant habitat of all alternatives and have the most benefit for maintaining and improving special status plant populations and habitat.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be determined suitable for designation to the National Wild and Scenic River System. A portion of Deep Creek and Thompson Creek would receive the tentative classification of wild. An NSO stipulation and ROW exclusion area identification would be applied to stream segments classified as wild. The remaining stream segments would be classified as scenic or recreational. Surface-disturbing activities on stream segments classified as scenic would be constrained by a CSU stipulation and ROW avoidance area identification. Several small occurrences of Harrington's penstemon occur within the stream corridors and would receive indirect protection.

Alternative D

Impacts to special status plants from soils management, water resource management, riparian vegetation management, special status terrestrial wildlife management, forestry management, and WSA management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Special Status Species Management—Plants. Under Alternative D, protections for special status plants would include an NSO stipulation with a 200-meter buffer for threatened, endangered, proposed, and candidate plant habitat. This NSO would affect approximately 1,100 acres. A CSU stipulation on roughly 12,700 acres would be applied to occupied habitat for all sensitive plant species. The CSU stipulation would protect most occupied habitat for special status plants (except in the cases of large, extensive populations) but would not likely protect suitable but unoccupied habitat or habitat for pollinator species. No ACECs would be designated specifically for special status plants. This alternative would provide the least protection for special status plants of all alternatives, and would have the greatest risk of impacts on special status plants, potential habitat, and pollinators.

Impacts from Special Status Species Management-Wildlife. The 0.25-mile buffer around grouse leks under Alternative A would be replaced with a 0.60-mile buffer around active leks. This broader buffer would protect more habitats for other special status species, such as Harrington's penstemon, whose sagebrush habitat overlaps that of sage-grouse. However, the amount of habitat protected would be minimal since there are few active leks within CRVFO. Other stipulations would be the same as or similar to Alternative A, so the impacts would be similar to Alternative A.

Impacts from Visual Resources Management. Alternative D has nearly the same number of acres of VRM Class I as the Proposed RMP and Alternative C. Under Alternative D, fewer acres would be designated as VRM Class II with more acres classified as VRM Class III and IV. VRM Class III and IV areas would not provide any benefit for the protection of special status plants. This alternative would be the least beneficial for special status plants since a larger number of acres would change from Class II to Class III, which would allow for more surface disturbances in these areas.

Impacts from Livestock Grazing Management. Under Alternative D, a total of 442,200 acres would be available for livestock grazing, which is considerably more acres available for grazing than under Alternative C, and just slightly more acres than under the Proposed RMP. Seven allotments that contain special status plant habitat would be closed to grazing. Closing these allotments to livestock grazing would be expected to have generally positive impacts on special status plant habitat by decreasing the risk of trampling or browsing damage or adverse changes in habitat. Impacts on special status plants from livestock grazing management under Alternative D would be greater than under the Proposed RMP or Alternative C, but less than under Alternative A.

Impacts from Recreation and Visitor Services Management. Seven SRMAs would be designated under Alternative D. Of these, five SRMAs (Bocco Mountain, Hardscrabble/East Eagle, The Crown, Thompson Creek, and the Upper Colorado River) include occupied and potential habitat for the BLM sensitive plant, Harrington's penstemon.

Management in The Crown and the Hardscrabble SRMAs would focus on improving mountain biking opportunities and experiences. New trails would probably be built to provide a network that accommodates riders of multiple ability levels. Special status plant populations and suitable habitat could be impacted by new trail construction. Under Alternative D, a CSU stipulation (CRV-CSU-9) would be applied to sensitive plant habitat to allow relocation of new surface-disturbing activities or special project design measures to lessen impacts on this species. However, with a denser trail system and more concentrated recreational use, the risk of habitat fragmentation and loss of potential but currently unoccupied habitat is greater. Indirect and cumulative impacts on special status plants would probably increase.

Management of Thompson Creek SRMA would provide zones for hiking, rock climbing, and mountain biking. Some new trails to accommodate mountain biking may be constructed within the mountain biking zone, but trail expansion would be limited by management for lands with wilderness character. Minimal impacts on special status plants would be likely to occur, and these impacts would be reduced by site-specific mitigation.

Recreation management under Alternative D is likely to result in more adverse impacts than under the Proposed RMP and Alternative C but would be comparable to Alternative A.

Impacts from Comprehensive Trails and Travel Management. Under Alternative D, no lands would remain open to cross-country travel. A total of 40,400 acres would be closed to motorized vehicles, which is less than the other alternatives. More acres would be limited to designated routes (464,800 acres). Within known special status plant habitat, 178 miles of routes would remain open to full-sized vehicle use, which is more than under the Proposed RMP and Alternative C but less than under Alternative A. In general, impacts of trails and travel management on special status plant populations, and habitat would be less than under Alternative A but more Alternative C and nearly the same as the Proposed RMP.

Impacts from Lands and Realty Management. As under the Proposed RMP, lands that support habitat for listed, proposed, or candidate species would be retained in federal ownership. Lands that contain occupied sensitive species habitat may be considered for disposal on a case-by-case basis. Under Alternative D, fewer areas would be managed as ROW exclusion areas than the other alternatives. Small populations of Harrington's penstemon would be protected from surface-disturbing activities associated with ROWs within WSAs, Blue Hill and Bull Gulch ACECs and in VRM Class I areas. Alternative D would provide less protection for special status plants than under the Proposed RMP or Alternative C, but more than under Alternative A.

Acres of ROW avoidance areas would be less than the Proposed RMP because the fewest ACECs would be designated in Alternative D. However, occupied habitat for all special status plants would still be managed as ROW avoidance areas. Although the ROW avoidance does not preclude all ROW development, it would limit surface disturbances and give priority consideration to special status plant habitat. Impacts on special status species in these avoidance areas would be minor. As in all alternatives, BMPs and weed control measures in the ROW terms and conditions would serve to minimize impacts of any surface disturbances. Lands and realty actions under this alternative would have more impacts on special status plants than under the Proposed RMP and Alternative C, but less than under Alternative A.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). As discussed in the other alternatives, much of the known special status plant habitat is already leased and undergoing development. Impacts from oil and gas development in currently leased areas would be similar to Alternative A. Under Alternative D, approximately 52,800 acres would be closed to fluid minerals leasing which is more than Alternative A, but much less than the Proposed RMP or Alternative C. Closed areas would include the WSAs, plus the Upper Colorado SRMA and Thompson Creek, Blue Hill and Bull Gulch ACECs. Harrington's penstemon habitat in these areas would be protected from surface-disturbing activities associated with oil and gas development. Overall, impacts from fluid minerals development under Alternative D would be slightly less than under Alternative A, but more than under the Proposed RMP or Alternative C.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative D, the following areas with special status plant habitat would be petitioned for withdrawal from locatable exploration and development: Blue Hill ACEC, Bull Gulch ACEC/WSA, and five SRMAs. Only WSAs would be withdrawn from mineral materials disposal (salables) and only if Congress designates them as wilderness. However, the non-impairment criteria would minimize any surface-disturbances. Areas closed to non-energy leasable minerals would be roughly 27,800 acres, which is the same as under Alternative A. Impacts on special status plants under Alternative D would be less than under Alternative A, but greater than under the Proposed RMP or Alternative C.

Impacts from Areas of Critical Environmental Concern Management. Under this alternative, no ACECs would be designated specifically for special status plant species. Of the three ACECs included for designation in this alternative, only Blue Hill and Bull Gulch contain small occurrences of the BLM sensitive plant, Harrington's penstemon. Designation of these ACECs would provide direct benefits to Harrington's penstemon habitat by limiting surface-disturbing activities. These ACECs contain only a small amount of occupied habitat for one special status plant species and would not protect core habitat for this species or habitat for any other special status plants. Compared with the other alternatives, Alternative D would provide the least amount of protection for special status plants with ACEC designations.

Impacts from Wild and Scenic Rivers Management. All stream segments would be determined not to be suitable for inclusion in the National Wild and Scenic River System and would be released from interim management. No direct or indirect protections would be afforded to special status plant species.

Cumulative Impacts (Special Status Plants)

The cumulative impact analysis boundary for special status plants included the entire planning area plus private and public lands adjacent to the CRVFO that contain occurrences of these species. Past, present, and reasonably foreseeable future actions and conditions that could impact special status plants include oil and gas development, other energy exploration and development, utility corridors and communication sites, grazing, recreation, travel management, weed invasion and spread, prescribed and wildland fires, vegetation treatments, range development projects, insects and disease and drought. These actions would affect special status plants and their habitats mostly through construction and use of roads, well pads, and utility corridors, OHV use, and introduction and spread of invasive species.

These activities could cause direct disturbance to occupied or suitable habitat, fragmentation of habitat, or degradation of habitat quality. Elimination or fragmentation of habitat could affect population dynamics and long-term viability. All surface disturbances have the potential to increase the spread and abundance of weeds, which could degrade special status plant habitat and increase competition. Transportation corridors could increase the spread of weeds through inadvertent transport by water, wind, vehicles, livestock, humans, and wildlife.

Most documented special status plant species within the planning area occur within areas of high potential for oil and gas development, and most of their habitat has already been leased for oil and gas. While protective stipulations developed in this planning effort cannot be attached to existing leases, BLM has and would continue to apply COAs and mitigation measures to avoid direct impacts to these species. Hence, for Colorado hookless cactus, DeBeque phacelia, DeBeque milkvetch, Parachute penstemon, and Roan Cliffs blazing star, past activities appear to have had only limited effects on the amount of occupied habitat and population size. Some losses of individuals and habitat have been reported from unauthorized oil and gas

activity, utility line maintenance, OHV activity, and illegal poaching. In addition, successful reclamation of disturbed habitat has not been observed. Colorado hookless cactus, DeBeque phacelia, and Parachute penstemon are protected under the ESA, so present and future activities on federal land are unlikely to result in direct reductions in populations or habitat of these species because of the protections provided through the ESA Section 7 consultation process. Loss or degradation of habitat could occur from indirect effects, such as weed invasion or disturbances to suitable, but unoccupied, habitat, and from other causes such as unauthorized OHV use.

Private lands within and adjacent to the CRVFO also have occurrences of these special status plants and are under similar pressures from oil and gas, utilities, residential development, and OHV activity. Surface-disturbing activities on private land may contribute a disproportionate impact on special status plants because threatened or endangered plant species that occur on private lands are not specifically protected under the ESA. Likewise, the State of Colorado provides no legal protection for BLM sensitive plant species.

While most known populations of Harrington's penstemon occur on public lands, a smaller number are located on private and USFS lands. Cumulative impacts would result mainly from oil and gas development, recreation and travel management, and vegetation treatments. Only 7 percent of Harrington's penstemon habitat is currently leased, which represents all habitat within high-potential oil and gas areas. Another 30 percent of Harrington's penstemon habitat is located in moderate-potential areas, none of which has been leased. Numerous losses of Harrington's penstemon from oil and gas development have already occurred on BLM land and adjacent private lands. Future leases issued under the Proposed RMP or Alternatives A or D would include a CSU stipulation to protect Harrington's penstemon habitat outside of ACECs; however, it is difficult to route roads and pipelines to completely avoid all individuals since some populations cover an extensive area. Under Alternative C, an NSO stipulation would be attached to future leases, which would provide greater protection for occupied and potential habitat. The Proposed RMP and Alternative C would also designate several ACECs to protect core populations of Harrington's penstemon so that small losses of Harrington's penstemon populations on the edges of its range (where the high-potential oil and gas development is located) would not likely contribute to the need to list this species in the future.

Since Alternative D would emphasize more resource use and development with fewer restrictions, impacts on special status plants would be more likely to occur under this alternative. As a result, Alternative D could significantly contribute to cumulative impacts on special status species. Likewise, the travel designation in Alternative A would leave the majority of public lands in the planning area open to cross-country motorized travel. As OHV use is anticipated to increase as the regional population increases, motorized travel may lead to significant long-term impacts on special status plants. In contrast, the incremental contribution of the Proposed RMP and Alternative C to cumulative impacts on special status species is expected to be less than significant.

Climate change could affect the populations and habitat of any of the special status plant species. Changes are likely to include increased temperatures, increased potential for drought, changes in the season of precipitation, and more intense rainfall events. Climate change could affect fire ecology, erosion, and the behavior of other species, including invasive plant species. Several of the special status plant species occur on restricted habitats and would have limited or no ability to adapt to climate change by establishing new populations in new areas. The amount of change and the ultimate effects are not known at this time.

4.2.7.2 Special Status Species—Fish and other Aquatic Wildlife

Assumptions

The following assumptions apply throughout the assessment of environmental consequences of management actions and resources uses on BLM lands under the four alternatives:

- Impacts on special status fish and other aquatic species populations and habitats are not discrete, since some actions may benefit one species while having a negative or beneficial impact on another.
- Maintaining high-quality habitat conditions would have some influence on reducing the severity of outbreaks and subsequent losses from diseases, but the prevalence in the environment of various diseases could not be fully controlled, particularly at chronic levels of occurrence.
- Impacts on special status fish and aquatic species are based on the following cause and effect premise: Exposure—Stressor—Response:
    - Exposure—the likelihood that a given stressor will affect a given species.
    - Stressor—the portions of an action that may cause some sort of a reaction by the species.
    - Response—the response (negative, positive, neutral) of the species to the stressor.
- Variation of identified impacts by alternative are determined based on:
    - Risk—the likelihood or probability that an action will result in the identified effect.
    - Magnitude—the intensity and severity of the identified impact.
    - Duration—the length of time the identified impact would occur (short term or long term).
    - Scope—the spatial extent or size over which the identified impact would occur as related to the proximity of the action to the species or habitat.
- Unless otherwise noted, short-term impacts are defined as impacts expected to last 2 years or less.
- Unless otherwise noted, long-term impacts are defined as impacts expected to last longer than 2 years.
- Detailed impacts may be disclosed once under Alternative A and then referenced back in subsequent alternatives to avoid repetition.

The following primary impacts for special status aquatic species and their habitats were the focus of the effects analysis:

- Sediment and Turbidity—increased sediment loading, stress, reduced recruitment, habitat loss, reduced quality and quantity of food.
- Habitat Alteration—changes in habitat that reduce functionality for select species or make the habitat more conducive to competitive species; reduced bank and channel stability, reduced in-channel habitat structure and diversity, loss of complexity.
- Loss or Reduction of Streamside Vegetation Cover—increased temperatures, reduced productivity, reduced bank and channel stability, impacts on food webs.

- Water Quality Alteration—actions, activities, or accidents (spills, leaks) that could alter important water quality parameters (e.g., pH, dissolved oxygen, temperature, alkalinity, and turbidity); direct mortality, sublethal effects of stress, reduced recruitment, reduced quality and quantity of food.
- Water Depletions—loss of physical habitat, reduced water quality, increased sedimentation, loss of habitat structure and complexity, reduced recruitment, reduced food quality and quantity, disease, stress.
- Introduction or spread of aquatic nuisance species or disease vectors—competition for resources, displacement, predation, mortality, reduced recruitment.
- Direct Mortality—potential direct mortality of eggs, larvae, and adults of fish and amphibians fish in areas of low-water crossings.

Methods of Analysis

All NSO stipulations that would limit ground-disturbing activities would minimize potential impacts on special status aquatic species. At the beginning of each alternative discussed below is a table listing primary protective measures that would either directly or indirectly minimize or eliminate negative effects on special status aquatic species and their habitats. Impact analysis then focused on residual impacts ("those effects remaining after mitigation has been applied to the proposed action or alternative" [BLM 2008j]) anticipated or reasonably likely to occur by resource or program to the priority species and habitats identified for that specific alternative. Impacts by resource and by alternative are tied back to the detailed analysis completed once under Alternative A in the first program where that impact is identified, and are referenced or summarized noting any differences in risk, magnitude, duration, and scope specific to that alternative's program or resource prescriptions. Special status aquatic species addressed are identified in Table 4.2.7-3.

Table 4.2.7-3
Special Status Aquatic Species

Species	Scientific Name	Federal Status
Bonytail	*Gila elegans*	Endangered with critical habitat
Colorado pikeminnow	*Ptychocheilus lucius*	Endangered with critical habitat
Humpback chub	*Gila cypha*	Endangered with critical habitat
Razorback sucker	*Xyrauchen texanus*	Endangered with critical habitat
Lineage GB (Greenback) cutthroat trout	*Oncorhynchus clarkii stomias*	Threatened
Colorado River cutthroat trout	*O. c. pleuriticus*	BLM sensitive
Bluehead sucker	*Catostomus discobolus*	BLM sensitive
Flannelmouth sucker	*Catostomus latipinnis*	BLM sensitive
Roundtail chub	*Gila robusta*	BLM sensitive
Mountain sucker	*Catostomus platyrhynchus*	BLM sensitive
Great Basin spadefoot toad	*Spea intermontanus*	BLM sensitive
Boreal toad	*Anaxyrus boreas boreas*	BLM sensitive
Northern leopard frog	*Lithobates pipiens*	BLM sensitive

Acronyms and Abbreviations:
BLM Bureau of Land Management

Impacts on special status aquatic species and their habitats would result from some of the actions included under other resources and uses, including implementation level actions or activities. Programs not addressed below were deemed to have no, or only negligible, impacts on special status aquatic species or their habitats under any of the four alternatives. The impacts from WSA management are the same under all alternatives and are only discussed in Alternative A.

Select species in Table 4.2.7-3 are generally sediment-intolerant and include Colorado River cutthroat trout, greenback cutthroat trout, boreal toad, northern leopard frog, and Great Basin spadefoot toad. The remaining species are generally more sediment-tolerant and include the Colorado pikeminnow, razorback sucker, bonytail chub, humpback chub, roundtail chub, flannelmouth sucker, mountain sucker, and bluehead sucker. While this latter group is physiologically tolerant to sediment and turbidity, their habitats can be impaired by too much sediment coupled with reduced or altered flows. Sediment inputs greater than what streams and rivers can effectively move can still negatively impact these species. The bonytail and humpback chub are not found within the planning area, but are within the zone of influence particularly with regard to impacts associated with water depletions and cumulative effects. Discussion of these species is limited.

Alternative A

Current CRVFO planning documents that guide the management of public lands provide a variety of protective measures and stipulations that either directly or indirectly protect or minimize impacts on special status aquatic species and their habitats from other program activities and actions. Table 4.2.7-4 shows the primary protective measures found in current planning documents.

Table 4.2.7-4
Primary Protective Measures Found in Current Planning Documents

Stipulation	Documennt of Origin	Acres/Miles Protected	
		BLM Surface	**Federal Mineral Estate**
GS-NSO-2 riparian and wetland zones	1999 Oil and Gas Leasing ROD	3,000 acres	700 acres
GS-NSO-3 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
GS-NSO-5 Rifle Falls and Glenwood Springs Fish Hatcheries	1999 Oil and Gas Leasing ROD	9,100 acres	2,600 acres
GS-NSO-12 threatened or endangered species	1999 Oil and Gas Leasing ROD	Not mapped; would apply as needed by species	
GS-NSO-15 steep slopes	1999 Oil and Gas Leasing ROD	76,200 acres	9,900 acres
GS-CSU-2 riparian and wetland zones	1999 Oil and Gas Leasing ROD	32,900 acres	15,400 acres
GS-CSU-3 BLM sensitive species	1999 Oil and Gas Leasing ROD	Not mapped; would apply as needed by species	
GS-CSU-4 erosive soils and slopes greater than 30 percent	1999 Oil and Gas Leasing ROD	147,000 acres	25,600 acres
GS-All other NSOs combined	1999 Oil and Gas Leasing ROD	76,100 acres	17,700 acres

Acronyms and Abbreviations:
BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy
ROD record of decision

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Continued management of special status fish and other aquatic wildlife species and their habitats would have long-term benefits to these species. Stipulation GS-NSO-12 helps reduce potential impacts to lineage greenback cutthroat trout along portions of Abrams, Beaver, and Cache creeks. Stipulation GS-NSO-3 provides protections for Colorado pikeminnow and razorback sucker in the Colorado River and for the bluehead sucker, flannelmouth sucker and roundtail chub in Colorado, Eagle, and Roaring Fork rivers. Other protective

measures in Table 4.2.7-4 would directly or indirectly help minimize impacts on special status aquatic species and their habitats from other resource uses.

Actions to improve habitats for these species include, but are not limited to, barrier placements and removals, in-channel habitat enhancement structures (e.g., rock placement and backwater creation), riparian plantings, weed removal, and fencing. In select areas where active habitat management in the form of projects would occur, there is potential for site-specific, short-term impacts including loss or reduction of streamside vegetation cover and increased sediment loading and turbidity. These effects are discussed in detail below. All projects would be designed to provide long-term benefits to these species and their habitats.

Sediment and Turbidity. Actions including ground disturbance, vegetation removal (native or non-native), and roads and trails are the primary causes of erosion that can result in increased sedimentation and turbidity in streams. Natural events such as flood, fire, and drought can also result in increased erosion potential. Increased sedimentation and turbidity can impact aquatic species and their habitats in many ways. Increased sediments in the stream environment reduce dissolved oxygen, raise stream temperature, and can cover spawning and rearing areas, thereby reducing the survival of fish embryos and juveniles (US Forest Service 2000). Excessive sedimentation can also fill in important pool habitats, reducing their depth and making them less usable by fish and other aquatic organisms. Knopp (1993), in a study of 60 northwestern California streams, found that intensive land use management was correlated to loss of pool volume. High sediment transport can fill pools and cause reduction or loss of essential salmonid juvenile rearing habitat (Frissell 1992). Pool habitats are important as over-summer and over-winter thermal refuge areas and, when coupled with streamflows, are often a limiting factor in many small mountain streams.

A number of sublethal effects on resident cutthroat trout may also occur as a result of sedimentation, including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). Over the long term, increased sediment loading reduces primary production in streams (US Forest Service 2000). Reduced macroinvertebrate productivity and diversity results when excessive sediment fills in the interstitial spaces between stream substrates needed by these aquatic invertebrates. Food webs can be altered as sediment-intolerant macroinvertebrates are replaced by sediment-tolerant species. Reduction in stream productivity can disrupt the food chain and result in reduced food sources for resident fish species. Suspended sediment causes turbidity within streams, which can impact species that feed visually and need clear water, such as trout, where they can successfully capture prey. Results from a study on turbidity (Barrett et al. 1992) clearly indicated that wild rainbow trout exposed to increasing levels of suspended sediment are subject to reductions in their ability to detect prey. This reduced ability in turn may lead to reduced prey capture rates and foraging success, lowering the growth and fitness of individual fish and populations. The longer the duration of high turbidity, the more damage is likely to fish and other aquatic organisms (Newcombe and MacDonald 1991). Increased fine sediments can also create habitat more conducive to the presence of tubifex worms and, if whirling disease is present, can increase the prevalence of disease in resident cutthroat populations, resulting in likely population declines.

Where actions or activities include roads, there is high risk of sediment impacts. Roads increase surface runoff and sedimentation and, where they cross waterways, often require in-channel structures, such as culverts and bridges that remove aquatic habitat and may be barriers to fish passage (Bryant 1981; Barrett et al. 1992). Studies show that roads can contribute 50 percent to 80 percent of the sediment that enters streams (Hagans et al. 1986). Cedarholm et al. (1980) found that fine sediment in salmon spawning gravels increased by 2.6 to

4.3 times in watersheds with more than 4.1 miles of roads per square mile of land area. As sediment delivery into streams increases, the standing stock of trout decreases.

Special status amphibians that require clear ponds where they can breed can be impacted by increased sediment and turbidity. Egg masses can be covered by sediment, which impacts productivity, and tadpoles can have reduced feeding efficiency caused by prolonged turbidity. Road use can increase the risk of mortality to amphibians.

While the sediment-tolerant fishes would not be as affected by the potential for increased sedimentation and turbidity, sediment loading that is out of balance with flows because of altered flow regimes can still result in impacts. Sediment loads beyond what water volumes can effectively and efficiently move can restrict channel width, reduce side-channel formation and maintenance, and result in reduced numbers and depth of important microhabitats such as backwaters. In general, sediment loads out of balance with flow regimes can result in reduced habitat complexity and diversity and reduce habitat quality for these fish.

Loss or Reduction of Streamside Vegetation Cover. Actions including riparian weed treatments, construction of bridges, roads, pipelines, campgrounds, boat ramps, livestock grazing, and recreation activities are the primary causes of loss or reduction of streamside vegetation. Natural events such as flood, fire, and drought can also result in streamside vegetation loss or reduction. Loss or reduction of streamside riparian vegetation can alter the nutrient dynamics of the aquatic ecosystem. In areas where riparian vegetation has been depleted or lost, a shift in energy inputs from riparian organic matter to primary production by algae and vascular plants has been predicted (Minshall et al. 1989) and observed (Spencer et al. 2003). The increased solar radiation that results from the loss of streamside (or poolside) vegetation causes temperatures, light levels, and autotrophic production (plants and algae) to increase. This change in the food web of a stream can alter the composition of food and thus energy sources that are available to resident fishes and aquatic invertebrates. Terrestrial insect diversity and productivity also decreases with reductions in streamside vegetation, which also affects food availability for resident fish. Increased stream temperatures affect trout by reducing their growth efficiency and increasing their likelihood of succumbing to disease.

Prolonged and excessive utilization of streamside and riparian vegetation can also result in increased peak flows if vegetation is not sufficient in root mass, size, or abundance to sufficiently slow stream velocities. The loss of streamside vegetation reduces water percolation and infiltration, leading to unnaturally high and frequent runoff. This runoff can result in accelerated bank erosion and sloughing, increased siltation, elevated stream temperatures, widened and braided stream channels, and loss of overhanging banks, all of which are important factors affecting cutthroat trout productivity (Gardner 1950, Armour 1977, Behnke 1979, Claire and Storch 1977, Glinski 1977, Kaufman et al. 1983). A study by Gunderson (1968) indicated that the weight per acre of brown trout was 31 percent higher in unaltered stream sections. It was noted that this increased weight was attributed to there being a narrower, deeper channel system, more favorable composition and distribution of water types, and more cover in the unaltered section because the riparian vegetation had been preserved. For the sediment-tolerant fish, loss of streamside vegetation can result in reduced bank stability and increased potential for erosion and loss or reduced quality of microhabitats (e.g. backwaters and flooded bottomlands).

Loss of shoreline vegetation at amphibian breeding sites can reduce shade and increase water temperatures. Reduced food sources can also result with the loss or reduction of riparian vegetation. Reduced vegetation can allow for more sediment to enter breeding sites, as the filtering properties are reduced. Reduced cover can

also increase predation because amphibians generally occupy habitats with less hiding cover and thus are more vulnerable to predation.

Impacts described under this alternative would be similar under all alternatives with regard to proactive cutthroat or amphibian habitat projects. The Proposed RMP provides greater protective stipulations with an NSO on all water bodies and riparian areas. Alternative C would provide similar protection via an NSO on all perennial waters and known or identified breeding sites of select amphibians. Alternative D would provide limited protection only in streams that contain conservation populations of cutthroat trout and a CSU on all known or identified amphibian breeding sites.

Impacts from Soils Management. Continued soils management would benefit special status aquatic species and their habitats by protective stipulations implemented to protect fragile, sensitive, or steep soil areas. Specific stipulations include GS-NSO-14 and GS-NSO-15, and GS-CSU-4. These stipulations collectively minimize the risk for erosion and reduce the scope of sedimentation and turbidity impacts in occupied habitats. In addition, soils are subject to Land Health Standard 1 (BLM 1997a), which helps guide soil management on public lands. In areas where this standard is being met, there is minimal potential impact on special status aquatic species or their habitat from offsite erosion and increased sedimentation. In the very limited areas where this standard is not being met, the risk for sedimentation and turbidity impacts is increased. Soils management benefits special status aquatic species the same under all alternatives, as protective measures are carried forward in all alternatives.

The actions of monitoring sites that are not meeting the land health standards and identifying corrective projects, actions, or management to improve soil conditions would benefit special status species and their habitats in the long term by helping to reduce erosion, sedimentation, and turbidity at select sites. Some of the corrective actions could result in some site–specific, short-term effects but these effects would be mitigated at the time of project identification and planning.

Impacts from Water Resource Management. Current water resource management benefits all special status aquatic species by protective stipulations implemented specifically to protect water quality. These stipulations include GS-NSO-3, which limits ground-disturbing activities in habitats occupied by Colorado pikeminnow and razorback sucker in the Colorado River and for the bluehead sucker, flannelmouth sucker, and roundtail chub in Colorado, Eagle, and Roaring Fork Rivers. Other stipulations identified in Table 4.2.7-4 directly or indirectly help to protect special status aquatic species and their habitats from other resource uses. In addition to stipulations, water management is subject to Land Health Standard 5 (BLM 1997a) and Colorado State Water Quality Standards, which help guide water management on public lands. Areas where this standard and state standards are being met have minimal potential for adverse impacts on special status aquatic species or their habitat from impacts associated with alteration of water quality parameters. Water management activities are beneficial to special status aquatic species and their habitats under all alternatives.

This alternative is less protective than the Proposed RMP, which protects all water bodies and riparian areas via an NSO and all hydrological features via a CSU. Alternative C is similar, with proposed NSOs for all perennial streams and streamside management zones. Alternative D provides similar protective measures and levels of protection as this alternative.

Impacts from Vegetation—Forest and Woodland Management. Continued management of forest and woodland vegetation would have limited impacts to special status aquatic species and their habitats. The

primary objective is to manage for a healthy mix of age classes with an emphasis on areas with old growth trees or potential for old growth. Intensive management of this vegetation type and potential impacts are discussed in detail under the Impacts from Forestry Management section.

Treatments for forest and woodland include hand thinning, mechanical treatments, and prescribed fire to meat management goals and objectives. None of the protective stipulations identified in Table 4.2.7-4 applies specifically to management of forest and woodland vegetation, and forest and woodland vegetation management is not necessary constrained under existing NSOs, as some prescriptive treatments can be conducted with little or no ground disturbance in some areas. All vegetation management is subject to Land Health Standards 3 and 4 (BLM 1997a), which help guide vegetation management on public lands. Where these standards are being met, active management of forest and woodland vegetation is having minimal impact on special status aquatic species or their habitats. Impacts can be and are mitigated during site-specific analysis of individual treatment actions. The primary potential impacts on these species are increased sediment and turbidity. The effects resulting from sedimentation and turbidity are described in detail under the Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife section.

Forest and woodland vegetation management is limited in scope and application. Where management activities would occur, impacts on select streams could result. However, these impacts would generally be short term and of limited scope and intensity. Treatments are designed with long-term watershed improvement and meeting Public Land Health Standards 3 and 4 as the primary goals. In the absence of new permanent road construction for treatments, forest and woodland vegetation management has long-term benefits to special status aquatic species by improving upland watershed health and maintaining productive habitats that allow for natural water infiltration and absorption rates and limited erosion potential over time. Where permanent or long-term road construction is needed to facilitate select treatments, impacts associated with erosion, increased sedimentation, and turbidity can be chronic and long term at specific areas and can result in increased risk of identified impacts. Impacts would be similar under all alternatives.

Impacts from Vegetation Management—Rangelands. Under the current management actions, there is limited prescriptive guidance on desired condition. Vegetation management for rangelands (sagebrush and mountain shrublands) is generally guided by Land Health Standards No. 3 and 4 (BLM 1997a), which call for managing for diverse age-class structure and native productive understory grasses and forbs proper for the soil type and range site. Where these standards are being met, management of rangeland vegetation is having minimal impact on special status aquatic species or their habitats. None of the protective stipulations identified in Table 4.2.7-4 applies specifically to management of rangeland vegetation, and rangeland vegetation management is not necessarily constrained under NSO, as some prescriptive treatments to improve habitat condition can be conducted with little or no ground disturbance.

The primary impacts associated with rangeland vegetation management would result from vegetation treatments. It is possible that some treatments could have short-term sedimentation and turbidity effects, addressed in detail in the Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife section. Effects would occur only until such time as desirable vegetation reestablishes to adequately stabilize soils and reduce erosion potential.

The action of prohibiting grazing on areas that are reseeded for two growing seasons would benefit special status aquatic species and their habitats by providing for recovery of disturbed rangeland sites and allowing

vegetated ground cover to adequately stabilize soils and reduce the risk of erosion risk and impacts from sedimentation and turbidity.

Impacts from Vegetation Management—Riparian. Current riparian vegetation management would continue to be largely beneficial to all special status aquatic species and their habitats. Protective stipulations that specifically protect riparian habitats include GS-NSO-2, which prohibits surface occupancy within all riparian vegetation, and GS-NSO-3, which further protects six major rivers, including occupied special status fish habitat in the Colorado, Eagle, and Roaring Fork Rivers. GS-CSU-2 further protects riparian vegetation by controlling surface uses within 500 feet of the outer edge of riparian areas to maintain functionality and accessibility by species that rely on this limited habitat type. In addition, riparian vegetation management is subject to Land Health Standard 2 (BLM 1997a), which helps guide riparian management on public lands. Areas where this standard is being met have a reduced potential for adverse impacts on these species and their habitats from offsite erosion and increased sedimentation and turbidity. This reduced potential is a result of the buffer provided by healthy, robust riparian areas along streams, rivers, and lakes—a buffer that filters out sediments as well as any undesirable constituents adsorbed onto the particles. Vegetated buffers also help protect surface waters from inflow of adverse dissolved constituents by capturing or slowing overland runoff, increasing the amount that infiltrates into the soil, where it is filtered before reaching the water through interstitial percolation.

Vegetation treatments in riparian areas could include the use of herbicides, fire, or mechanical removal of exotic plant species such as tamarisk or Russian olive. Several actions may be initiated to improve riparian areas, including vegetation planting, exclosure fencing, and upland water developments. In select areas where active management or restoration of riparian areas would occur, there is potential for short-term negative impacts on special status aquatic species and their habitats, including habitat alteration, increased sedimentation and turbidity, and reduction or loss of streamside vegetation cover. The effects resulting from sedimentation and turbidity and loss or reduction of streamside vegetation cover are described in detail under the Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife section. The impacts from habitat alteration are addressed in detail below.

Habitat Alteration. Actions including riparian weed treatments, large ground-disturbing activities, construction of bridges, roads, pipelines, culverts, campgrounds, boat ramps, livestock grazing, large-scale vegetation treatments, and recreation activities are the primary causes of habitat alteration. Natural events such as flood, fire, and drought can also result in habitat alteration. Stream channel and streambank alterations can affect special status aquatic species in many ways. Mechanisms for impact on stream channels include channel relocation, channel constriction, channel braiding, diking, riprapping, and fine sediment input at levels greater than the stream can efficiently or effectively convey. Actions that affect streambanks can result in soil compaction, increased erosion, and widening or constriction of stream channels. Both stream widening and constriction can result in losses of habitat complexity and diversity and reduced water depths, which can reduce available habitat and cause increased stream temperatures. Increased temperatures can affect fish by increasing physiological stress, reducing feeding, and increasing susceptibility to disease. Streambank alteration also exposes bare soils, which provide for points of invasion by weedy species, and increases the risk of further erosion of weakened streambanks. Actions that increase the amount of soil exposed to the erosive effects of water will increase sediment loading and turbidity. This increase can alter feeding by fish that require clear water to forage and capture prey. Actions that cause soil compaction result in decreased vegetation cover, less vigorous root systems, and more exposure of the soil surface to erosion (Burton et al.

2008). Habitat alteration coupled with reduced flows can result in buildup of sediment and alter channels by narrowing them and reducing habitat complexity for some species.

Special status amphibians can be impacted by alteration of limited breeding pond habitats and overwinter habitats. Many species aestivate (burrow into streambank, pond, or soil substrates). Activities that disturb ground have the potential to disrupt amphibians and result in direct mortality. Breeding ponds can be drained or lowered in volume or their shorelines can be altered, which can impact breeding sites and limit productivity. Amphibians, particularly northern leopard frogs and boreal toads, require clear water ponds where they can breed and lay egg masses. Shoreline vegetation helps to buffer sediment impacts and moderate water temperatures. Activities such as livestock grazing and road construction and use in and near occupied habitats can alter habitats by reduction or loss of vegetation cover and increased sediment and turbidity. Roads and road use can disrupt spring migrations of these species from overwintering sites to breeding ponds.

This alternative protects riparian areas with an NSO stipulation and a complementary CSU protection 500 feet beyond the edge of riparian. The Proposed RMP and Alternatives C provide similar protective measures. Alternative D is less protective and would provide only a CSU versus NSO level protection. The impacts of active riparian management would be generally the same under all alternatives.

Impacts from Vegetation Management—Weeds. Continued weed management would be largely beneficial for special status aquatic species and their habitats. Weed management is conducted under the recently completed CRVFO *Integrated Weed Management Plan and Programmatic Environmental Assessment* (BLM 2009f), which is tiered to the *Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007i). Analysis of special status aquatic species and their habitats was addressed in both documents and each set the sideboards on treatment of weeds within and near aquatic habitats. Depending on the type of weed treatment and exception criteria, some of the NSOs identified in Table 4.2.7-4 would special status aquatic species from identified impact. Weed management is subject to Land Health Standards 2, 3, and 4 (BLM 1997a), which help guide vegetation management on public lands. In areas where these standards are being met, there is reduced potential impact on fish and other aquatic wildlife from offsite erosion and increased sedimentation associated with degraded weed infested habitats. Weed management would be the same under each alternative.

Actions including promoting weed awareness, prioritizing treatment areas, and using integrated treatment methods to treat weed infestations would all have limited impact on special status aquatic species and their habitats. Management for noxious and invasive weeds includes herbicide use, biological controls, and mechanical or manual treatments in weed infested areas. In areas where active weed management in the form of treatments are occurring or would occur, there is potential for short-term negative impacts to special status aquatic species including, loss or reduction of streamside vegetation cover (where tamarisk, Russian olive, or other treatments occur to weedy riparian vegetation), and increased sedimentation and turbidity from loss of vegetation before reestablishment of desirable species. These impacts are addressed in detail in the Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife section. All weed treatments would have long-term benefits to special status aquatic species and their habitats, as native vegetation would be restored, improving watershed health. In addition, weed treatments would improve streambank stability, water quantity, and habitat diversity. Effects of selective weed treatments would be mitigated at the time of project identification and planning.

Impacts from Fisheries and Aquatic Wildlife Management. Continued fisheries and aquatic wildlife management would be largely beneficial to special status aquatic species and their habitats. This alternative contains only one specific protective measure for aquatic species: GS-NSO-5 for the Rifle Falls and Glenwood Springs Fish Hatcheries. The general GS-NSO-12 would help reduce impacts on portions of Abrams Creek, Beaver Creek, and Cache Creek, which contain the only currently known populations of lineage greenback cutthroat trout in the planning area, and along small segments of the Colorado River that provide habitat for the endangered Colorado pikeminnow and razorback sucker as well as bluehead sucker, flannelmouth sucker, and roundtail chub. Actions to improve habitat could include such things as barrier placements and removals, in-channel habitat enhancement structures (e.g., rocks and logs), riparian plantings, and fencing. In select areas where active fish habitat management in the form of projects would occur, there is potential for site-specific, short-term impacts including sedimentation and turbidity and loss or reduction of streamside vegetation cover. Depending on the type of fisheries project or action and stipulation exception criteria, some of the protective measures identified in Table 4.2.7-4 would eliminate or reduce impacts associated with active fish and other aquatic wildlife management. In addition, fisheries and aquatic wildlife habitat management is subject to Land Health Standards 2, 3, 4, and 5 (BLM 1997a), which help guide habitat management on public lands. In areas where these standards are being met, there is reduced potential impact on fish and other aquatic wildlife from loss or reduction of streamside vegetation and offsite erosion and increased sedimentation and turbidity associated with select projects and actions.

This alternative would provide little protection specific to aquatic species. The Proposed RMP would provide greater protection via the combined fish, water, and riparian NSO. Alternative C is similar to the Proposed RMP and would provide protections by an NSO on all perennial waters. Alternative D would be similar to this alternative and would provide no specific protective measures for general aquatic species and their habitats.

Implementation actions under this alternative associated with the management of fish and aquatic wildlife habitat management discussed allowing the introduction, translocation, transplantation, restocking, augmentation, and reestablishment of native and naturalized fish and wildlife species in cooperation with CPW and/or USFWS. This action should have minimal impact on special status aquatic species and their habitats. Stocking of fish is primarily a state action.

Impacts from Terrestrial Wildlife Management. Continued wildlife habitat management would be largely beneficial to special status aquatic species and their habitats in the long term. Several species-specific wildlife NSOs collectively limit ground-disturbing activities from primarily upland habitat, which indirectly helps to minimize impacts on special status aquatic species and their habitats from other resource uses. Wildlife habitat management is subject to Land Health Standards 2, 3, and 4 (BLM 1997a), which help guide habitat management on public lands. In areas where these standards are being met, there is reduced potential impact on special status aquatic species.

Habitat manipulations, such as prescribed burns, mechanical vegetation treatments, and chemical controls, are typically used to improve habitat for wildlife. These projects often result in some vegetation reduction or removal intended to stimulate regrowth, change species composition or diversity, and improve upland watershed health. In some cases, ground disturbance is minimal; in others, more substantial. In the short term, increased sedimentation and turbidity would result until desired vegetation is established in treated areas. Over the long term, improved watershed health would benefit special status aquatic species as vegetation cover is improved, soil stability is increased, erosion potential is reduced, and water absorption and

infiltration rates are improved. The detailed effects are addressed in the section on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife.

Impacts associated with active wildlife habitat treatments would be generally the same under all alternatives. The Proposed RMP and Alternative C would provide more substantial indirect protection to special status aquatic species and their habitats by limiting ground disturbance by an NSO on more acres from other resource uses. Alternative D would provide more limited protection for wildlife and therefore less indirect protection to special status aquatic species.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Continued management of special status plants and terrestrial wildlife species and their habitats would largely benefit special status aquatic species. This alternative contains several NSOs for specific special status plants and terrestrial wildlife that would help to indirectly protect special status aquatic species and their habitats from other resource. The Proposed RMP and Alternative C are similar and contain more protective measures covering greater acreages that would indirectly help protect a greater amount of special status aquatic species habitat. Alternative D would provide less protection to special status plant and terrestrial species and hence less indirect protection to these special status aquatic species.

The action of implementing applicable conservation and restoration measures identified in the *Canada Lynx Conservation Assessment and Strategy* (Ruediger et al. 2000), would have limited impact on special status aquatic species or their habitats. Limited lynx habitat exists in the planning area, and select treatments would be small and site-specific with long-term benefits associated with improved watershed conditions. Select vegetation and forestry treatments could result in some short-term, site-specific impacts including sedimentation and turbidity, but these effects would be mitigated at the time of project identification and planning.

Impacts from Wildland Fire Management. The GSFO FMP manages fire as outlined in the current RMP. The FMP contains in-depth analysis of potential impacts to special status aquatic species as well as minimization and mitigation measures required for fire management to reduce potential impacts. This analysis and associated mitigations are incorporated by reference as addressed in the FMP and are the same for all alternatives. Fire suppression actions could result in loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, water quality alteration, and water depletions. The detailed effects of loss or reduction of streamside vegetation cover and sedimentation and turbidity are addressed in the Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife section. Detailed effects of habitat alteration are addressed in the Vegetation Management – Riparian section. The detailed effects of water quality alteration and water depletions are addressed below.

Water Depletions. Stream and river flows and reservoir and pond volumes are generally climate dependent, but water diversions and impoundments play a substantial role with regard to localized flow regimes and water volumes of streams, rivers, and ponds. The primary actions and activities that result in water depletions include construction of water developments (stock ponds, reservoirs, and springs), water diversions for agricultural and domestic uses, water use associated with energy development, ROWs, and wildland fire suppression. Reduced water flow or volume directly correlates to a loss of wetted habitat for special status aquatic species.

Reduced water volumes can result in increased water temperatures, reduced food supplies, reduced habitat complexity and diversity, and a loss of species carrying capacity. When coupled with stable or increasing

sediment loading, some systems can be overwhelmed with more sediment than can effectively be moved because of the reduced flow volumes. This sedimentation can result in reduced habitat complexity and loss of habitat diversity, including important microhabitats such us spawning bars, backwaters, pools, eddies, side channels, and flooded bottomlands. Reduced flows especially peak spring flows can affect riparian vegetation maintenance and recruitment of young plants. Reduced flows can result in habitat fragmentation and limit movement of cutthroat trout between preferred habitats. Holding habitats (pools) can be reduced in size and become less useable by fish or amphibians. Fish that congregate in limited pool habitats for long periods can incur increased stress and susceptibility to disease.

The four endangered Colorado River fishes are particularly affected by reduced flows. The "15-Mile Reach" located in Grand Junction, Colorado, along the Colorado River is a known congregation area for spawning Colorado pikeminnow. Reduced flows can reduce spawning habitat and impair reproduction and recruitment. Reduced flow volumes unable to effectively or efficiently move sediment can result in reduced spawning habitat and impact reproduction and recruitment. Important micro-habitats such as backwaters can be dewatered or reduced in volume or lost because of the reduced flows. The frequency of periodic flooding of bottomlands located adjacent to the river can be reduced. Flooded bottomlands are important for riparian regeneration and maintenance and for razorback sucker recruitment. Bonytail and humpback chub populations farther downstream require sufficient flows to effectively reproduce as well.

Breeding ponds that lose water volume can become unusable by amphibian species. Increased predation can result, as less wetted habitat exists where they can hide from predators. Reduced pond volumes can cause increased risk of anoxia for northern leopard frogs. Bradford (1983) observed that anoxia was more severe in shallow lakes or ponds (less than 4 meters deep), and nearly all adult frogs died in these bodies of water in some winters.

Water Quality Alteration. The primary activities that have the potential to result in water quality alteration include select fire suppression actions, post-fire run-off events, livestock grazing, spills or leaks of hazardous substances, select agricultural practices, hard rock mining, and energy development. The effects of changes in water quality are well documented on cutthroat trout and similar salmonid species. Cutthroats prefer cold water, neutral pH, and high dissolved oxygen levels to thrive.

Grazing by livestock can result increased nutrient loading. Eutrophication can result in small streams with limited flow. In this condition, the increase of mineral and organic nutrients has reduced the dissolved oxygen levels within the stream, producing an environment that favors plant life over animal life. In other words, the mineral and organic nutrient levels being inputted into these streams are greater than the stream flows can dilute or carry through the system. The symptoms of this condition are often seen as large algae blooms that form dense patches within a stream. These blooms further deplete oxygen levels and reduce habitat quality for resident fish. Studies have reported the effects of livestock grazing on water quality (Buckhouse and Gifford 1976), water chemistry (Jefferies and Klopatek 1987), and water temperature (Van Velson 1979). The changes are subtle over time (Elmore and Beschta 1987) but tend to have a profound effect on aquatic ecosystems (Kauffman and Krueger 1984). Proper livestock grazing would reduce the risk of these impacts.

Selenium is a natural trace element that is a component of certain sedimentary deposited soils, primarily Mancos shale, a common formation in parts of western Colorado, and is a known water quality problem for the four Colorado River endangered fishes and the three BLM sensitive fish species. Stipulations help to eliminate and reduce potential impacts. Selenium becomes an issue when after it is saturated, it leaches into

water. In larger rivers, it becomes concentrated and accumulates in low to zero velocity habitats and enters the food chain. Historical agricultural practices in particular have caused the Colorado River to contain higher than desired levels of selenium. Selenium concentrations of 4.9-7.0 micrograms per gram (µg/g) dry weight in whole body fish from the Colorado River basin have been among the highest in the nation (Hamilton et al. 2002). Selenium bioaccumulates in fish tissue primarily via the consumption of food resources that contain elevated levels of the compound. All of the warm-water special status fish species are at increased risk because they are all long-lived species, which increases bioaccumulation potential. Colorado pikeminnow are especially at risk given their piscivorous (fish eating) nature and status as the top predator. High selenium levels can affect reproduction and recruitment (Lemly 2002; Sorensen 1991). Tissue samples taken from Colorado pikeminnow in the Colorado River near Grand Junction, Colorado, showed selenium levels to be above the recommended toxicity threshold of 4 parts per million in the majority of fish (Osmundson et al. 2000).

Activities such as energy development, road use, active pipeline ROWs, and other construction activities can alter water quality by way of spills, leaks, or vehicular accidents. Impacts can range from sublethal (stress, reduced feeding behavior, and reduced breeding success and recruitment), to direct mortality of individuals or populations of special status aquatic species. These activities are of particular concern regarding cutthroat trout populations or known breeding sites for sensitive amphibians. Within the planning area, cutthroat trout are generally restricted to small discrete streams, and amphibian breeding sites are generally small and site-specific pond locations. Given the nature of energy development, numerous vehicles carrying varying substances traverse roads located near and often adjacent to perennial streams on a daily basis. In addition, numerous pipelines exist and transport various chemicals. Spills, leaks, and other accidents can occur and there is potential for negative effects to aquatic species. In select areas, entire populations of cutthroat trout could be at risk, depending on the location and timing of spill and the substances involved. Specific BMPs, including spill prevention and contingency plans, closed loop drilling, collocated facilities and pipelines, automatic shut-off valves, and notification protocols all help to reduce the risk of accidental spills.

Use of chemicals for weed treatments, fire suppression, or other vegetation management could impact aquatic species and their habitats by overspray and drift to non-target areas and habitats. These chemicals can result in effects ranging from sublethal (reduced feeding, loss or reductions of prey species, and habitat avoidance) to direct mortality. Following protocols for fire suppression and weed treatments would substantially reduce the risk of these impacts.

The actions of utilizing the full range of wildland fire management options and suppression tactics and minimizing costs and loss of property and natural resources while maximizing resource benefits from fire would have limited impact on special status aquatic species or their habitats. Fire is a natural component of the ecosystem and, when managed for resource benefit, is an important restoration tool that improves watershed health. Given current fuel loads and the potential for larger, more catastrophic fires, there is some potential for impacts to select special status aquatic species and their habitats, including sedimentation and turbidity and water quality alteration in the event some fires are managed and allowed to grow large. Potential impacts would be mitigated in coordination with the fire Resource Advisor at the time of a particular fire event.

Impacts from Forestry Management. Continued forestry management would have limited impact on special status aquatic species and their habitats. The CRVFO contains limited commercial forestland habitat. Commercial forestry (e.g., timber harvests and sales) provides for a variety of prescriptive silvicultural applications. These activities could include the use of heavy equipment, helicopters, chemical applications,

road construction, and tree removal. Depending on the type of treatment and the need for road construction, many of the protective stipulations in Table 4.2.7-4 would help to reduce impacts on special status aquatic species and their habitats. However, some forest management practices result in minimal ground disturbance and would not necessarily be encumbered by the NSOs identified. All vegetation management is subject to Land Health Standards 3 and 4 (BLM 1997a), which help guide vegetation management on public lands. Where these standards are being met, active forestry management would have minimal impact on special status aquatic species.

Forest management is limited in scope and application, and a limited number of timber treatments have occurred to date. With the ever-increasing pine beetle issue, it is likely that select treatments will increase. Where timber management would occur, there is the potential for impacts including habitat alteration and increased sediment loading and turbidity. These effects are discussed in detail in the Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, and Vegetation Management – Riparian sections. In the absence of new road construction, these impacts would be generally short term and of limited scope and intensity. Where new road construction would be associated with select treatments, impacts associated with erosion and sedimentation and turbidity would be chronic and long term at specific areas and would result in increased risk of identified impacts to special status aquatic species. In addition, increased risk of direct mortality on northern leopard frogs and boreal toads would result where road density and use increase. New roads could also fragment habitat and limit connectivity between preferred and limited breeding habitats for these amphibian species.

Treatments are designed with the goal of accomplishing long-term watershed improvement and meeting Land Health Standards 3 and 4. Prescriptive treatments would have long-term benefits to special status aquatic species by improving upland watershed health and maintaining productive habitats that allow for natural water infiltration and absorption rates, improved vegetation ground cover, and limited erosion potential.

Alternative A actively manages the most acres of forestland and woodlands. The Proposed RMP and Alternatives C and D would apply intensive management to fewer acres of commercial forestland and limited management to remaining forest and woodland habitats. Impacts would be similar under each alternative.

Periodic stand exams and regeneration surveys, and select forest stand treatments and prescriptions could result in some short- and long-term potential effects including sediment loading and turbidity and habitat alteration. However, proper forestry management would result in improved watershed conditions in the long term. Treatments would help to reduce catastrophic fire risk and improve water infiltration rates. Potential impacts associated with select treatments would be mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. Under current management, none of the protective stipulations identified in Table 4.2.7-4 applies specifically to livestock grazing. Under Alternative A, a combined 488,300 acres of BLM land would be open and available for livestock grazing providing for 39,200 AUMs. Livestock grazing is subject to land health standards (BLM 1997a), which help guide grazing management on public lands. Where the guidelines are being followed and the standards are being met, livestock grazing is having minimal impact on special status aquatic species or their habitats. Where improper grazing occurs, potential impacts include habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, and increased sediment loading and turbidity. These impacts are discussed in detail in the sections on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts

from Vegetation Management – Riparian, and Impacts from Wildland Fire Management. In areas where range improvements associated with livestock management are constructed, such as fencing, cattle guards, and upland water developments, there would be potential for short-term negative impacts on aquatic species, including habitat alteration, increased sediment loading and turbidity, and water depletions. Where new road construction is needed to access range improvements, these new roads can create chronic long-term point sources for increased sedimentation and turbidity. Stock ponds are often designed to capture water that would otherwise feed streams, which would result in water depletion impacts. Upland water developments also tend to concentrate livestock use, which can negatively impact northern leopard frogs and boreal toads as sedimentation and turbidity increase and shoreline vegetation is lost. However, many of the these range improvements would have long-term benefits to special status aquatic species as livestock distribution would be improved, utilization would be reduced along streams, and in some cases amphibian habitat would be created by stock pond construction.

Impacts under this alternative would be slightly increased in scope and intensity compared with the Proposed RMP and Alternatives C and D, given the higher number of acres and AUMs provided.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to special status aquatic species and their habitats. Proper management and monitoring would help to ensure the land health standards are met across the planning area. Meeting these standards would help to improve watershed conditions in the long term. Some vegetation treatments to improve forage condition and productivity could result in some short-term, site-specific impacts associated with increased sedimentation and turbidity. These effects would be mitigated at the time of project identification and planning.

Impacts from Recreation and Visitor Service Management. Under current management, recreation impacts special status aquatic species and their habitats in many ways. In the eight SRMAs, recreation is the primary driver regarding current management of these lands. Areas are managed to provide specific activities and meet desired outcomes and include mountain biking, hiking, and motorized recreation, among others. In other SRMAs, current management emphasizes solitude and nonmotorized activities. In SRMAs where current management emphasizes increased use and development, it is likely that more routes would be created to meet user demand and desired experiences. Increases in miles of travel routes, as well as use, would result in increased and long-term sedimentation and turbidity and habitat alteration impacts to some special status aquatic habitats. In other SRMAs, continued management would result in no new routes and would continue to be compatible with special status aquatic habitat management. Remaining lands are managed as RMAs or ERMAs. Stipulations associated with these areas include GS-NSO-16, which limits large surface-disturbing activities in five of the SRMAs, and GS-NSO-17, which limits large surface-disturbing activities within eight RMAs. These provide some indirect protections to special status aquatic species and their habitats, however; the creation of more recreation amenities (routes, infrastructure) would not be precluded. In addition, the protective measures in Table 4.2.7-4 either directly or indirectly protect special status aquatic species and their habitats by limiting ground-disturbing activities from other resource uses.

Recreation activities are often associated with and occurs within or near water sources such as rivers, streams, lakes, and reservoirs. Human activity near and within these habitats can result in habitat alteration, reduced or loss of riparian vegetation cover, increased sedimentation and turbidity, spread of nuisance aquatic species and disease vectors, and water quality alteration. Disturbed areas serve as niches where invasive weedy vegetation can take hold. Humans can serve as dispersal mechanisms for some weed species and help spread weeds to new areas. The spread of weeds reduces watershed health and results in poor soil retention, increased runoff,

and poor water infiltration and absorption. The potential spread of aquatic nuisance species and disease vectors is discussed in detail below. The remaining impacts are discussed in detail in the sections on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management.

Aquatic Nuisance Species and Disease. Water-based recreation activities, including fishing and float and motor boating, provide the primary means by which aquatic nuisance species and disease vectors can be spread among aquatic habitats. Primary nuisance species of concern include quagga mussels, New Zealand mud snails, zebra mussels, and rusty crayfish. All of these non-native species compete with native species for habitat, food, and other vital resources, and tend to displace native species over time. Spread of disease vectors is also occur of concern and includes chytrid fungus and whirling disease. Chytrid fungus affects amphibian species and can reduce population size and long-term persistence. Whirling disease can affect native cutthroat trout, and limits recruitment and long-term population persistence. To minimize impacts associated with managed recreational activities, BMPs included in Appendix G are in place to help reduce or eliminate the spread. Select activities may have stipulations requiring adherence to specific protocols to limit the risk of spread.

User-created travel routes, road and OHV use, camping, fishing, hunting, mountain biking, hiking, wildlife watching, and boating, among many other activities, can result in some or all of the identified impacts. The majority of the SRMAs are not located in close proximity to many special status aquatic species habitats. Many of the impacts would be indirect and occur later downstream from the areas or primary activity. In addition to managed recreation, BLM lands are open to numerous dispersed recreation activities that are not actively managed but result in the same impacts as have been identified.

Visitor demand and use are expected to increase within the planning area under all alternatives. All of the identified impacts associated with recreation are expected to increase in scope and intensity. Under current management, more intensively managed recreation opportunity is provided within the SRMAs where specific recreational pursuits are identified and managed. However, these areas are not managed to the exclusion of other recreational uses. ERMAs are the more traditional dispersed recreational areas where no one use is necessarily favored or targeted over another and BLM management is largely custodial with no specific recreation prescriptions identified. In areas where motorized use is emphasized or would increase, impacts including sediment and turbidity, habitat alteration, loss or reduction of riparian vegetation cover, and water quality alteration would be long term and chronic. These impacts would be more acute where road and trail density and use are high near occupied cutthroat streams and amphibian concentration areas. Impacts from managed recreation can be mitigated during site-specific analysis of individual actions, primarily by issuing special recreation permits, which are used to control some visitor use and reduce resource conflicts and impacts.

Current management stipulation associated with the SRMAs protects a similar amount of acreage from large ground-disturbing activities via NSO as the Proposed RMP and Alternative D. Alternative C protects less than half as much less acreage via two SRMAs. These protections indirectly help protect special status aquatic species and their habitats from some impacts associated with other resource uses. Where motorized recreation is emphasized and more routes could be constructed, indirect protections would be more limited.

Implementation actions identified for R&VS management would result in minimal impacts regarding potential fees and SRPs for select activities. These actions would help to more effectively manage recreation activities

by potentially providing a funding source and managing select activities. These actions would help to reduce the recreational impacts identified above.

Impacts from Comprehensive Trails and Travel Management. Under the current management actions, a total of 295,900 acres is open to year-round off-road travel. 44,000 acres are closed to motorized use, and the remaining acres are limited to existing routes or designated routes. Travel management under this alternative allows for substantial proliferation of user-created routes and increased risk, scope, and intensity of impacts, including habitat alteration, loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, and water quality alteration. These impacts are discussed in detail in the sections called Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management. In known OHV concentration areas and other areas with high road and trail densities, impacts on occupied native cutthroat trout and amphibians and their habitats are intensified. The protective stipulations in Table 4.2.7-4 either directly or indirectly protect special status aquatic species and their habitats from some road- or trail-related impacts, but these have limited utility as they apply to managed activities and not dispersed activities.

Roads increase surface runoff and sedimentation and, where they cross waterways, often require in-channel structures, such as culverts and bridges that remove aquatic habitat and may create barriers to fish passage (Bryant 1981; Barrett et al. 1992). Studies show that roads can contribute 50 to 80 percent of the sediment that enters streams (Hagans et al. 1986). Cedarholm et al. (1980) found that fine sediment in salmon spawning gravels increased by 2.6 to 4.3 times in watersheds with more than 4.1 miles of roads per square mile of land area. Matthews (1999) linked increased road densities to increased sediment yield in the Noyo River.

Roads and trails provide means of water conveyance, which accelerates flow velocities and increases erosion and offsite soil movement and ultimately sedimentation and turbidity. They also compact soils, which reduces water absorption and infiltration rates and increases peak flows. Disturbed areas resulting from off-route travel use serve as niches where invasive weedy vegetation can take hold. Vehicles can move weed seeds and aid in dispersal and establishment of new populations. Weeds reduce watershed health and result in poor soil retention, increased runoff, and poor water infiltration and absorption. Where motorized and, in some cases, mechanized use are high or increasing, erosion potential is increased. These impacts are amplified where user-created routes and OHV use are occurring or increasing. In areas of high road and trail density with high use, there is increased risk of direct mortality to northern leopard frogs, boreal toads, and Great Basin spadefoot toads, especially during peak movement periods during breeding seasons. These routes can also increase sedimentation and habitat fragmentation and limit connectivity between limited breeding pond habitats for these amphibians.

Visitor use and demand are expected to increase within the planning area under all alternatives. Under Alternative A, it is likely that increases in miles of new user-created routes would result. All of the identified impacts associated with trail and road management would be expected to increase in scope and intensity as well. In areas where off-route vehicle use is occurring or would increase, impacts—including increases in sediment and turbidity, soil compaction, loss of riparian vegetation and cover, habitat alteration, and water quality changes—would be long-term and chronic.

As compared with the Proposed RMP and Alternatives C and D, which would restrict travel to designated routes, this alternative would have the greatest risk, magnitude, and intensity of identified impacts on special

status aquatic species and their habitats, primarily because of the allowance of off-route vehicular use and closure of only limited numbers of select roads and routes.

Impacts from Lands and Realty Management. The current RMP identifies parcels of public land as not suitable for disposal, and any disposal or acquisition of lands could result in a loss or gain of aquatic habitat. This requirement could result in either benefits or potential impacts to these species. Under the current plan, 494,400 surface acres of lands are identified as not suitable for disposal. Under the current management actions, 34,500 acres would be petitioned for withdrawal from locatable mineral exploration and development. This amount is far less than the other three alternatives. Current management actions would allow the most potential impact from locatable mineral exploration and development. This increased impact would increase the risk of habitat alteration, alteration of water quality, and increased sediment loading and turbidity impacts, as well as the scope and intensity of these impacts.

Construction and maintenance associated with ROWs or other land use authorizations (such as permits, leases, and easements) can result in impacts to special status aquatic species and their habitats, including habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, increased sediment loading and turbidity, and water depletions. These impacts are discussed in detail in the sections on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management.. Specifically, activities that result in ground disturbance and remove native vegetation for construction of ROWs can have short-term or long-term negative effects. Collectively, all of these activities have the potential to provide for the offsite movement of soils and increase sediment loading and turbidity in nearby water bodies. In addition, disturbed areas serve as niches where invasive weedy vegetation can take hold. Weeds reduce watershed health and result in poor soil retention, increased runoff, and poor water infiltration and absorption. Increased miles and densities of roads are a concern, because they are a long-term chronic source of erosion and sedimentation, serving as water collection and conveyance corridors to live streams and ephemeral drainages that ultimately feed live streams. Where these activities would occur within or near occupied cutthroat trout habitat, impacts would be more acute. These routes can also impact amphibians, which can be killed by vehicles and by reduced habitat connectivity to limited breeding pond habitats.

This alternative contains 101,300 acres of avoidance areas and 20,800 acres of exclusion areas for communication facilities and utilities. The exclusion areas occur primarily in WSAs. Identified impacts under this alternative would be greater in scope and intensity compared with the Proposed RMP or Alternative C, which would increase acres of avoidance and exclusion. Alternative D would result in a scope and intensity of identified impacts similar to this alternative.

Impacts from Coal Management. Current management identifies 28,500 acres of the federal mineral estate as open to further consideration for coal leasing. All of the identified coal resources within CRVFO are located along the Grand Hogback between Rio Blanco Hill and Glenwood Springs. Of that amount, 1,600 acres were found to be unacceptable for coal leasing based on multiple use conflicts. This alternative contains one protective stipulation, GS-NSO-1, on surface coal mining areas that would exclude surface occupancy associated with other resource uses within the area of an approved surface coal mine.

Development of coal resources could impact special status aquatic species and their habitats in many ways. Coal mining would likely result in habitat alteration, increased sedimentation and turbidity, water quality alteration, and water depletions. Disturbed areas could serve as niches where invasive weedy vegetation can

take hold. This vegetation reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption. These impacts are discussed in detail in the sections on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management. Large-scale coal mining is not currently being conducted. If activity were to increase under current management, the impacts discussed above would occur at site-specific locations. Site specific planning would help to mitigate and reduce negative impacts on special status aquatic species and their habitats. This alternative would have the most potential impact on special status aquatic species and their habitats. The Proposed RMP and Alternatives C and D identify no lands as being available for coal leasing or development.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Current management of fluid minerals is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is located. It is estimated that 99 percent of future drilling activity will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the 147,500 acres of BLM mineral estate in this high-potential area that is not within the Roan Plateau planning area, 88 percent has been leased and currently is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling activity is predicted in the areas identified as no known potential.

Each phase of oil and gas development—from exploration and construction through operation and abandonment—has a specific combination of impact type, intensity, and duration.

- Exploration and Construction—The initial phase of development typically lasts for 25 to 40 days, depending on depth, and is very equipment intensive. Associated activities include blading an access road and pad (with an average combined area of 3.4 acres per well) and nearly continuous operation of a drill rig and other specialized heavy equipment. On average, 580 round trips by heavy trucks and pickups are associated with each new well.
- Operation and Production—This phase typically involves minimal personnel in the field except at compressor stations and water disposal facilities, with periodic traffic to each well for monitoring and maintenance. Reclamation of temporarily disturbed areas begins on completion of construction. Successful reclamation for weed and erosion control is expected to occur within 3 to 5 years after disturbance.
- Abandonment—The final phase of an oil or gas well occurs at the end of its productive life, typically ranging from 20 to 40 years. During abandonment, surface facilities are removed, wells are plugged, and access roads are reclaimed unless deemed necessary for resource management or if requested by the landowner. These activities involve a short-term increase in workers and vehicles in the project areas. Abandonment and reclamation require approximately three days per well and four days per mile of access road, for a crew of four people.
- Reclamation—Restoration of temporarily disturbed areas at the well pad and along the access road begins when construction is complete, and aim to attain reclamation standards in 3 to 5 years after planting. Areas of long-term disturbance, which are occupied by surface facilities and ongoing human activity throughout the life of the well, are reclaimed after they are abandoned.

Throughout this and all alternatives, 88 percent of the high-potential area has already been leased for natural gas development. Depending on the time of lease, any number of protective stipulations may apply to specific lease parcels. Where lands have been leased since the Supplemental 1999 Oil and Gas Leasing EIS was completed, the stipulations in Table 4.2.7-4 would apply and help reduce impacts to special status aquatic species.

The primary potential impacts on special status aquatic species and their habitats include water quality alteration, water depletions, habitat alteration, and increased sedimentation and turbidity. These impacts are discussed in detail in the sections on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management. Specifically, of primary concern are activities that result in ground disturbance and removal of native vegetation for construction of well pads, roads, pipelines, compressor and relay stations, settling ponds, geophysical seismic exploration, and various assorted infrastructure. Collectively, all of these activities have the potential to provide for the offsite movement of soils and increase sediment loading and turbidity into nearby water bodies. In addition, disturbed areas serve as niches where invasive weedy vegetation can take hold. This vegetation reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption. Increased numbers and densities of roads are a concern, as they are long-term chronic point sources of sediment input. Impacts are amplified and more acute in areas where natural gas development is occurring in small discrete watersheds that contain native cutthroat trout and amphibians.

Generally, risk of erosion and impacts from sedimentation and turbidity are reduced where proper and timely reclamation is occurring at well pad and pipeline sites and where proper road and drainage structure construction and maintenance are occurring. The sedimentation and turbidity impacts are greater in intensity where reclamation and road maintenance practices have been poor or neglected.

Under Alternative A, a total of 672,500 acres would be open for leasing and development. This alternative would allow for the most activity and most acres of disturbance. The Proposed RMP and Alternative C would have reduced acreages open to leasing and development, and Alternative D would allow development at similar levels as this alternative. Given the protective measure in place on a given lease, the identified impacts may be reduced at specific locations. BMPs identified in Appendix G would help to further reduce negative effects.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under current management, the protective stipulations in Table 4.2.7-4 apply to all of these activities, except locatable minerals activities that are subject to federal laws and regulations under the General Mining Law of 1872. Under this alternative, a total of 34,500 acres would be petitioned for withdrawal from entry for mineral exploration and development. The remaining acres would be open, subject to site-specific analysis. Locatable and salable mineral management could impact special status aquatic species and their habitats in many ways, including habitat alteration, increases in sediment load and turbidity, loss of riparian vegetation cover, and water quality alteration. These impacts are discussed in detail in the sections on Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife, Impacts from Vegetation Management – Riparian, and Impacts from Wildland Fire Management. In particular, gravel pits near occupied habitats would pose a higher risk to these species and their habitats. Water quality is a major concern with certain mineral materials mining practices and, depending on location and scope, could have site-specific direct negative impacts over the long term.

This alternative and Alternative D would have the greatest risk to special status aquatic species and their habitats, as the fewest acres would be withdrawn from consideration of these activities compared with the Proposed RMP and Alternative C.

Implementation actions associated with disposal of salable minerals and mineral materials would have limited impact on special status aquatic species and their habitats. Disposal of mineral materials would be limited and site-specific, and any potential impacts would be mitigated at the time of project identification and planning.

Impacts from Renewable Energy Management. According to the US DOE National Renewable Energy Laboratory, the planning area has a low potential for wind and solar energy. Special status aquatic species were addressed in the *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005b). In summary, these impacts fit into the categories of habitat alteration and increased sedimentation and turbidity. Under Alternative A, applications for solar and wind energy exploration and development would be considered on a case-by-case basis. Any impacts on special status aquatic species would depend on the location and type of project proposed. Protective measures included in Table 4.2.7-4 would help reduce potential impacts. Impacts would be the same across all alternatives.

Impacts from Areas of Critical Environmental Concern Management. Under current management actions, six ACECs exist. The existing stipulations associated with the management of these areas generally benefits special status aquatic species and their habitats, especially where these designations overlap or are within watersheds occupied by these species. Although managed with an emphasis on select resource values, the existing ACECs limit ground disturbances from other resource uses and activities, which reduces the risk of erosion and sedimentation and turbidity. The Glenwood Springs Debris Hazard Zone ACEC helps to indirectly protect a pure population of cutthroat trout in Mitchell Creek, and the Lower Colorado River ACEC helps indirectly protect small BLM parcels along the Colorado River in habitat occupied by Colorado pikeminnow, razorback sucker, bluehead sucker, flannelmouth sucker, and roundtail chub.

Current management, provides fewer ACECs and reduced acreage amounts compared with the Proposed RMP and Alternative C, and is similar to Alternative D.

Impacts from Wilderness Study Area Management. The current management of four WSAs benefits special status aquatic species and their habitats where occupied habitat is located within WSAs. WSAs managed under BLM Manual 6330 – *Management of Wilderness Study Areas* would limit land uses and constrain ground disturbance to the indirect benefit of special status aquatic species and their habitats. BLM Manual 6330 allows stocking of native fish species within their historical ranges or exotics that were being stocked before October 21, 1976, and introductions of threatened, endangered, or other special status species native to North America within their historical ranges. Permanent installations could be permitted to maintain or improve conditions for fish, if the benefiting native species enhance wilderness values. All proposed actions must be scrutinized to determine if the action is necessary to protect the physical, biological, and cultural resources, as well as the quality of the wilderness experience.

WSA management is the same under all alternatives and would benefit special status aquatic species the same. The exception is that the Proposed RMP and Alternatives C and D have additional prescriptive management should Congress release any of the existing WSAs from wilderness consideration.

Impacts from Wild and Scenic Rivers Management. Under Alternative A, all stream segments determined to be eligible would be managed under interim protections to preserve the free-flowing condition, water quality, ORVs, and tentative classification. Select cutthroat and amphibian populations, some of which are identified ORVs, would benefit from continuing these protections because surface-disturbing activities from other resource uses would be limited along these streams. However, in many cases, the protections afforded aquatic species under WSR interim management would be additive to existing protective measures identified in Table 4.2.7-4, except that WSR protections would be longer term until such time as new planning efforts were initiated or Congress would officially act on these eligible stream segments.

This interim protections would result in similar on-the-ground benefits for special status aquatic wildlife as making suitability decisions in Alternative C. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the ORVs while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Based on the number of stream segments determined to be eligible and managed under interim protection or found to be suitable, Alternatives A and C offer more benefit for aquatic wildlife from WSR designations than the Proposed RMP, or Alternative D, which does not determine any eligible segment as suitable for inclusion into the NWSRS.

Alternative B (Proposed RMP)

This is BLM's Proposed RMP and includes a variety of protective stipulations that either directly or indirectly protect or benefit special status aquatic species and priority habitats. This alternative contains fisheries-specific stipulations and multiple resource stipulations as well as other resource stipulations that either directly or indirectly help to protect special status aquatic species and their habitats. In general, any NSO that limits ground-disturbing activity is beneficial to aquatic species. However, not all ground-disturbing activities are bad or result in negative effects, as mitigation measures and BMPs can be used to effectively mitigate site-specific impacts at the time of project identification and planning.

Table 4.2.7-5 shows the primary protective measures and stipulations under this alternative that would provide protections and reduce or minimize negative effects on special status aquatic species and their habitats under this alternative.

Impacts to special status fish and other aquatic wildlife from management of WSAs, soils, and renewable energy would be the same as or similar to those under Alternative A. Impacts from management of all other resources and uses would be as described below.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under the Proposed RMP, management of special status aquatic species and their habitats would benefit these species. Protective stipulations include CRVFO-NSO-4, which limits surface occupancy along occupied specials status aquatic species habitat in the Colorado, Eagle, and Roaring Fork Rivers. CRVFO-NSO-5 provides protection to all water bodies and riparian areas. CRVFO-NSO-9 provides additional protections for federally listed species, and CRVFO-CSU-8 provides additional protection to BLM sensitive aquatic species. CRVFO-CSU-5 is specific to special status amphibians and protects identified breeding sites. CRVFO-TL-1 protects select special status fish during spawning periods. This alternative includes impacts associated with proactive project

Table 4.2.7-5
Primary Protective Measures/Stipulations under the Proposed RMP (Alternative B)

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	Federal Mineral Estate
CRVFO-NSO-2 steep slopes greater than 50 percent	Newly proposed	76,200 acres	9,900 acres
CRVFO-NSO-4 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
CRVFO-NSO-5 perennial streams, water bodies, riparian areas, and aquatic dependent species	Newly proposed	35,900 acres	13,400 acres
CRVFO-NSO-6 fish hatcheries	Newly proposed	4,500 acres	3,300 acres
CRVFO-NSO-9 endangered or threatened species (including candidate species)	1999 Oil and Gas Leasing	Not mapped; would apply as needed by species	
CRVFO-CSU-1 slopes greater than 30 percent and Fragile/Saline Soils	Newly proposed	338,100 acres	119,700 acres
CRVFO-CSU-8 BLM sensitive aquatic and terrestrial wildlife species and significant natural plant communities	1999 Oil and Gas Leasing ROD	Not mapped; would apply as needed by species	
CRVFO-CSU-3 intermittent and ephemeral streams	Newly proposed	44,900 acres	4,300 acres
CRVFO-CSU-5 sensitive amphibians	Newly proposed	4,100 acres	200 acres
CRVFO-TL-1 salmonid and native, non-salmonid fishes	Newly proposed	165 miles	65 miles
CRVFO-All Other NSOs combined	Existing and proposed	163,100 acres	42,000 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
NSO no surface occupancy
ROD record of decision

work that would result in short-term negative effects, including habitat alteration, loss or reduction of streamside vegetation cover, and increased sediment and turbidity. These impacts are discussed in detail in Alternative A.

Management of special status aquatic species and their habitats under the Proposed RMP would provide greater protection and reduce risk and scope of identified impacts compared with Alternatives A and D, but less protection to amphibians than Alternative C, which includes an NSO instead of CSU at known or identified breeding sites.

Implementation actions associated with the active management of special status aquatic species and their habitats would all be intended to provide long-term benefits to these species. It is possible that some short-term impacts associated with some activities and projects could result, including site-specific sedimentation and turbidity, loss or reduction of streamside vegetation cover, and habitat alteration. These impacts are discussed in detail in Alternative A. These impacts would be site-specific, short term, and mitigated at the time of project identification and planning.

Impacts from Water Resource Management. Proposed water management would benefit special status aquatic species and their habitats similarly as addressed under Alternative A, except that the Proposed RMP

would include additional stipulations specifically to protect water quality, such as CRVFO-NSO-3 for municipal watersheds and the combined resources stipulation CRVFO-NSO-5 for all water bodies and riparian areas. CRVFO-CSU-3 provides protections to intermittent and ephemeral streams that may be used seasonally by bluehead sucker, flannelmouth sucker, and roundtail chub. In addition, other stipulations identified in Table 4.2.7-5 would directly or indirectly protect special status aquatic species and their habitats from other resource uses.

Proposed management provides similar protection as Alternative C. Alternative A is less protective and could allow for more water quality alteration particularly in ephemeral and intermittent drainages. Alternative D is similar to Alternative A and provides limited protective measures.

Implementation actions associated with the Proposed RMP for water resources would benefit special status aquatic species and their habitats. Monitoring and subsequent improvements would provide long-term benefits to these species that require high-quality water to thrive. Select improvement measures could result in some site–specific, short-term impacts, primarily sedimentation and turbidity, which are discussed in detail in Alternative A, but would be mitigated at the time of project identification and planning.

Impacts from Vegetation—Forest and Woodland Management. The Proposed RMP would have limited impact on special status aquatic species and their habitats. Managing for old growth woodlands and aspen regeneration and sprouting would improve upland habitats. Impacts would be the same as discussed under Alternative A, and are the same for all alternatives. Impacts from implementation actions are discussed below.

The identification of areas with or potential for old growth trees regarding management of forest and woodland vegetation would have negligible impacts to special status aquatic species and their habitats. Prescriptive treatments and silviculture actions to improve stand conditions could result in some short-term impacts, including sedimentation and turbidity and habitat alteration. These impacts are discussed in detail in Alternative A.

Impacts from Vegetation Management—Rangelands. The Proposed RMP would have limited impact on special status aquatic species and their habitats. Implementation impacts are addressed below and are the same under each alternative.

Implementation actions for management of rangeland vegetation could have limited short-term effects, primarily site-specific increases in sedimentation and turbidity. These potential effects would be mitigated at the time of specific project implementation. These actions would have long-term benefits to special status aquatic species and their habitats, as upland habitats would be improved, which would improve watershed health

Impacts from Vegetation Management—Riparian. Riparian vegetation management under the Proposed RMP would be largely beneficial to special status aquatic species and their habitats. Riparian vegetation is protected by the combined resource stipulation CRVFO-NSO-5 for all water bodies and riparian areas. In addition, CRVFO-CSU-4 further protects riparian vegetation up to 500 feet beyond the outer edge. This level is similar to protections in Alternatives A and C. Alternative D would provide less protection with a CSU versus the NSO.

In select areas where active restoration of riparian areas would occur, impacts would include alteration of water quality, habitat alteration, increased sediment loading and turbidity, and reduction or loss of streamside vegetation and cover. These impacts would generally be short term and site-specific and are discussed in detail in Alternative A. Active management or restoration of riparian areas would be designed for long-term benefits to riparian vegetation and species that depend on this vegetation.

Impacts from Vegetation Management—Weeds. Benefits and impacts of proposed management are the same as those addressed under Alternative A. In areas where active weed management in the form of treatments would occur, impacts would include short-term loss or reduction of streamside vegetation cover (where tamarisk, Russian olive, or other treatments occur to weedy riparian vegetation), increased sediment loading and turbidity, and possible water quality alteration. These impacts are addressed in detail in Alternative A. Weed management benefits and impacts would be generally the same under all alternatives.

Implementation actions associated with management of weedy vegetation would benefit special status aquatic species and their habitats in the long term. Healthy upland and riparian habitats are important to the overall health of watersheds. Short-term effects associated with select weed treatments could include sedimentation and reduced water quality. These potential effects would be mitigated at the time of project identification and planning.

Impacts from Fisheries and Aquatic Wildlife Management. Proposed fisheries and aquatic wildlife management would be largely beneficial to special status aquatic species and their habitats. The combined resource stipulation CRVFO-NSO-5 protects all water bodies and riparian areas. CRVFO-NSO-6 protects select state fish hatcheries, CRVFO-CSU-3 protects ephemeral and intermittent drainages that are often used seasonally by special status aquatic species, and CRVFO-TL-1 protects spawning fish. Depending on the type of fisheries project or action and stipulation exception criteria, the remaining protective measures identified in Table 4.2.7-5 would help to limit impacts on these species from select activities.

In areas where active fish habitat management in the form of projects or treatments would occur, impacts could include site-specific and short-term habitat alteration, loss or reduction of streamside vegetation cover, and short-term increases in sedimentation and turbidity. These impacts are addressed in detail in Alternative A. The Proposed RMP provides more protection than Alternatives A and D and is similar to Alternative C.

Implementation actions associated with management of fish and aquatic wildlife habitats would be beneficial to special status aquatic species in the long term. It is possible that some treatments and projects would result in site-–specific, short-term impacts, including habitat alteration, loss or reduction of streamside vegetation cover, and sedimentation and turbidity. These potential effects would be mitigated at the time of project identification and planning.

Impacts from Terrestrial Wildlife Management. Proposed wildlife habitat management would be largely beneficial to special status aquatic species and their habitats. The plan contains several wildlife species-specific NSOs, which collectively protect large tracts of important terrestrial habitat from surface-disturbing activities. These NSOs would indirectly help protect aquatic habitats from offsite sedimentation and turbidity from other resource uses, especially where these NSOs overlap with occupied watersheds containing these special status aquatic species.

In areas where active wildlife habitat management in the form of vegetation treatments or projects would occur, impacts would include site-–specific, short-term increases in sedimentation and turbidity. These impacts are addressed in detail under Alternative A. Proposed wildlife habitat management would provide more protective measures than Alternatives A and D and is similar to Alternative C.

The implementation action for associated with proper power line construction to eliminate electrocution risk to raptors would have no impact to special status aquatic species or their habitats.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Proposed management of special status plants and terrestrial wildlife species and their habitats would be largely beneficial to special status aquatic species and their habitats. The Proposed RMP contains several species specific plant and animal NSOs, which would collectively protect upland habitats. Active management in the form of vegetation projects or treatments could result in some short-term, site-specific impacts, including sedimentation and turbidity, as addressed in Alternative A. Alternatives A and D would provide less indirect protection to special status aquatic species and their habitats, and Alternative C is similar to the Proposed RMP.

Actions to stockpile topsoil in special status plant areas, close select transportation routes in special status species habitats, and implementation of select projects, treatments, and actions for Canada lynx would have limited impact on special status aquatic species or their habitats. Select route closures would benefit aquatic species by reducing erosion and sedimentation and turbidity effects. It is possible that some vegetation treatments for lynx could result in some site–specific, short-term impacts associated with sedimentation and turbidity, but in the long term watershed conditions would be improved. Potential impacts to special status aquatic species would be site-specific, short term, and mitigated at the time of project identification and planning.

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP, five areas totaling 34,500 acres would be managed for wilderness characteristics and protected with an NSO stipulation and would be closed to fluid minerals leasing. Management of these lands would benefit special status aquatic species and their habitats indirectly where special status aquatic species reside downstream. Proposed management stipulations would provide greater protection than Alternatives A and D, which do not identify these lands for protection, and slightly less protection than Alternative C that includes an additional 11,400 acres.

The protection of wilderness character via select actions identified in Appendix F would largely benefit special status aquatic species and their habitats. Preservation of ecosystems and habitats would limit ground-disturbing activities and eliminate effects associated with those types of actions and activities. Active management of select special status aquatic species habitat could be limited depending on the type of action or project identified. This limited management could result in reduced ability to improve some habitats but would be minimal in scope for special status aquatic species.

Impacts from Forestry Management. Proposed forestry management would impact special status aquatic species and their habitats generally the same as discussed in Alternative A except that Alternative A has the most acreage identified for management, and the short-term impacts would be reduced in scope, as the Proposed RMP would less intensively and actively manage forest and woodland resources compared with Alternative A. Alternatives C and D would manage forestry resources similarly to the Proposed RMP.

Impacts associated with management actions for forestry resources and select forest stand treatments and prescriptions include potential for sediment loading and turbidity and habitat alteration. Some of these effects could be longer term. However, proper forestry management would result in improved watershed conditions in the long term. Treatments would help to reduce catastrophic fire risk and improve water infiltration. Potential impacts associated with select treatments would be site-specific and mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. None of the protective stipulations identified in Table 4.2.7-5 applies specifically to livestock grazing. Under the Proposed RMP, a total of 441,600 acres of BLM land would be open and available for livestock grazing, providing for approximately 35,500 AUMs. This amount is more acres than Alternative C, similar to Alternative D, and less than Alternative A, but similar AUMs as the other alternatives. Impacts include sedimentation and turbidity, habitat alteration, water quality alteration, water depletions, and loss or reduction of streamside vegetation cover. These impacts are addressed in detail in Alternative A. Impacts would be similar in scope and intensity as Alternative D, given the relatively small number of differences in acreage and AUMs between the two alternatives. Alternative A would increase the scope of identified impacts with increased acreage and AUMs, while Alternative C would reduce the scope of impacts with reduced acreage open to grazing but slightly increase the intensity of impacts, as similar AUMs would be provided on less acreage.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to special status aquatic species and their habitats. Proper management and monitoring would help to ensure the meeting of the land health standards across the planning area. Meeting these standards would help to improve watershed conditions in the long term. Some vegetation treatments to improve forage condition and productivity could result in some short-term, site-specific impacts associated with increased sedimentation and turbidity. These effects would be mitigated at the time of project identification and planning.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP, five SRMAs, and six ERMAs would be designated. In SRMAs, where the predominant land use focus is recreation and visitor services, aquatic species would be at greater risk for negative impacts such as sedimentation and turbidity. Generally, the greatest impact to aquatic species and their habitats would occur in SRMAs that (1) emphasize accommodating or attracting higher numbers of visitors increasing the risk, and intensity of identified impacts, or (2) require an expansion of recreation trails and facilities that would increase erosion potential and increased sedimentation and turbidity, and habitat alteration in aquatic habitats. Each area would have specific recreation objectives and provide select user experiences. The SRMAs have CRVFO-NSO-25 to limit ground disturbing activities in these areas to maintain recreational settings and achieve desired recreational opportunities and outcomes. However, where travel routes provide the primary recreation activities, it is likely that new routes would be constructed including single track and two track routes during the life of the plan. ERMAs are protected by CRVFO-CSU-11 to help minimize other activities impacts on recreation. These protective stipulations and those identified in Table 4.2.7-5 help to indirectly limit impacts on special status aquatic species and their habitats from other uses.

The impacts on special status aquatic species and their habitats include habitat alteration, reduction or loss of streamside vegetation cover, water quality alteration, spread of aquatic nuisance species and disease, and increased sedimentation and turbidity. These impacts are addressed in detail under Alternative A. Proposed management would provide similar protection as Alternatives A and D but more than Alternative C.

Proposed implementation actions identified for R&VS management would result in minimal impacts to special status aquatic species and their habitats. The potential collection of fees and discretionary issuance of special recreation permits for select activities would help to more effectively manage recreation activities. These actions would help to reduce recreational impacts identified above.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, trail and travel management would impact special status aquatic species and their habitats via habitat alteration, water quality alteration, and increased sedimentation and turbidity. These impacts are addressed in detail under Alternative A. In the Proposed RMP, the intensity and scope of impacts would be substantially reduced compared with Alternative A, as no off-route use would be allowed and travel would be restricted to designated routes. These restrictions would help to curtail the creation of user-created routes and would reduce the risk and intensity of identified impacts across large portions of the planning area.

Under the Proposed RMP, travel would be managed via a designated route system with 41,200 acres closed to other than foot and horse travel. This amount is similar to Alternatives C and D, as both call for designated routes and similar closed acreage figures. The protective stipulations in Table 4.2.7-5 would directly and indirectly protect special status aquatic species and their habitats from new road and trail-related impacts and other resource uses by limiting and managing ground-disturbing activities including new routes.

The Proposed RMP calls for the decommissioning and obliteration of 50 miles of existing routes, compared with 0 miles in Alternative A, 205 miles under Alternative C, and 30 miles under Alternative D. This alternative would close select routes that were identified for resource conflicts but is not as beneficial to aquatic species as compared with Alternative C. The decommissioning of select routes would decrease erosion potential and sedimentation and turbidity impacts and would reduce the risk, magnitude, and intensity of identified impacts.

Proposed implementation of travel management would have both short- and long-term impacts, as well as long-term benefits to special status aquatic species and their habitats. Moving to a system of designated routes would help to eliminate cross-country travel and user-created routes. Decommissioning and obliterating select routes would be help to reduce chronic sediment loading and turbidity impacts. Conversely, in areas such as SRMAs where recreation would be emphasized, the construction of new routes would result in long-term risk of erosion and sedimentation and turbidity impacts to special status aquatic species and their habitats. However, when properly designed and constructed, these routes would reduce impacts compared with many of the user-created routes currently in existence. Closing and rerouting unsustainable routes would reduce erosion potential. Impacts associated with new route construction would be minimized at the time of project identification and planning.

Impacts from Lands and Realty Management. Proposed management of realty and lands actions and authorizations would impact special status aquatic species and their habitats by sedimentation and turbidity, reduction or loss of streamside vegetation cover, water quality alteration, habitat alteration, and water depletions. These impacts would be associated primarily with ROWs that disturb ground such as new roads, pipelines, and power lines. These effects are addressed in detail in Alternative A. The Proposed RMP proposes more ROW avoidance acreage than Alternatives A and D and slightly less than C. This acreage would reduce the scope and intensity of identified impacts. The Proposed RMP is similar to Alternatives C and D regarding ROW exclusion acreages an nearly double what current management (Alternative A) provides. Effects would be similar in scope and intensity across the three action alternatives. Land tenure

adjustments, including sale or exchange of public lands, could result in a loss or gain of aquatic habitat. These adjustments could result in either benefits or impacts on special status aquatic species and their habitats, depending on proposed uses of the lands in question. These activities would be evaluated at the time of project identification and planning and special status aquatic species would be considered appropriately.

Under the Proposed RMP, 181,200 acres would be petitioned for withdrawal from mineral entry for locatable exploration or development. This acreage is more protective than Alternatives A or D but slightly less than Alternative C. Withdrawal would limit the scope and intensity of identified impacts on special status aquatic species. Under the Proposed RMP, the protective stipulations included in Table 4.2.7-5 would apply to most ROW actions, which would limit identified impacts.

Implementation-level actions associated with the management of lands and realty management would be largely beneficial to special status aquatic species and their habitats. Collocating facilities would reduce new disturbances and reduce potential sedimentation and turbidity impacts. Encouragement of wind energy and any other new ground-disturbing ROWs would likely result in some impacts, including sedimentation and turbidity. These impacts would be mitigated at the time of project identification and planning.

Impacts from Coal Management. Proposed management of coal resources would have no impacts to special status aquatic species or their habitats because no lands within the planning area are identified as having potential for coal leasing and development. This is the same under Alternatives C and D. Alternative A would consider 28,500 acres as open to consideration of leasing.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under the Proposed RMP, the primary impacts on special status aquatic species and their habitats would be habitat alteration, water quality alteration, water depletions, and increased sediment loading and turbidity. These impacts are addressed in detail under Alternative A.

The Proposed RMP identifies 603,100 acres of federal mineral estate as open to leasing and development. This amount is substantially less acreage than Alternatives A and D and slightly more than Alternative C. Given the protective measures in place on a given lease, the impacts identified may be reduced at specific locations but would still occur over a broad area. Conditions of approval and select BMPs identified in Appendix G would help reduce the intensity of identified impacts. Identified impacts would be long term and chronic in areas where extensive road construction and use would occur associated with these activities. Approximately 99 percent of all of the proposed activity would continue to occur in the high-potential areas where there is current activity in the western quarter of the planning area. Thus, despite the variance in acres open to consideration, the scope of impacts is not expected to vary among alternatives, but the intensity of impacts could vary.

Implementation actions associated with using select resource objectives for guiding future reclamation of disturbed sites would benefit special status aquatic species and their habitats by reducing erosion and sedimentation and turbidity impacts.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Proposed RMP contains the stipulations in Table 4.2.7-5, which would apply to all of these activities, except locatable minerals activities, which are subject to federal law and regulations under the General Mining Law of 1872. Withdrawal of acres from consideration of these activities is the primary means

to reduce the scope of impacts. Locatable and salable mineral management could impact special status aquatic species and their habitats by habitat alteration, sedimentation and turbidity, loss of streamside vegetation cover, and water quality alteration. These impacts are discussed in detail under Alternative A. In particular, development of gravel pits near rivers and streams occupying these species would have a higher risk of identified impacts. Water quality is a concern with certain mineral materials mining practices and, depending on location and scope, could have site-specific direct negative impacts over the long term.

Under the Proposed RMP, 342,700 acres would be open to salable or mineral materials disposal, slightly more than Alternative C but substantially less than Alternatives A and D. Thus, the scope and intensity of identified impacts would be reduced under the Proposed RMP.

Proposed implementation actions associated with disposal of salable minerals and mineral materials would have limited impact on special status aquatic species and their habitats. Disposal of mineral materials would be limited and site-specific, and any potential impacts would be mitigated at the time of project identification and planning.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, 11 ACECs would be designated, totaling 46,400 acres. The prescriptions and stipulations associated with the management of these ACECs would have limited impact and would largely benefit special status aquatic species and their habitats by providing indirect protection from some ground disturbing actions and activities. This alternative provides indirect protection to these species from identified impacts from other resource uses.

The Proposed RMP and stipulations associated with ACEC designation would provide indirect protection on more acres than Alternatives A and D but less than C. In addition, overlapping stipulations would protect portions of these areas, and select protective measures in Table 4.2.7-5 would further limit and reduce impacts on these species and their habitats from other resource uses.

The actions of treating weeds, monitoring the relevant and important values, use of selective vegetation treatments, and select wildland fire suppression techniques in ACECs would be beneficial to special status aquatic species and their habitats. These actions would maintain or improve habitats in select areas. Some treatments could result in short-term sedimentation and turbidity impacts addressed in detail in Alternative A. However, treatments would provide long-term improvement of watershed conditions, and impacts would be mitigated during project identification and planning.

Impacts from Wild and Scenic Rivers Management. The Proposed RMP determines Deep Creek Segments 2 and 3 as suitable for inclusion in the NWSRS. It also proposes to adopt the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to protect the free-flowing condition, water quality, ORVs, and tentative classifications for Colorado River Segments 6 and 7. Suitability determinations would be deferred on these two river segments and monitoring the ORVs would determine whether suitability determinations would be perused in the future on the two Colorado River segments. Eligibility determinations for the Colorado River would remain in place until a suitability determination is made. The Proposed RMP would help protect some habitat occupied by bluehead sucker, flannelmouth sucker, and roundtail chub in the Colorado River. Select amphibian species could benefit directly from the protections provided by the four stream segments. Other protective measures included in Table 4.2.7-5 would still provide overlapping protections for these species.

Based on the number of stream segments determined to be eligible and managed under interim protection or found to be suitable, WSR decisions included in the Proposed RMP would be less beneficial than either Alternative A or Alternative C ORVs. Alternative D would be the least protective, as none of the 26 eligible segments would be determined suitable.

Alternative C

This alternative includes a variety of protective stipulations that either directly or indirectly protect and benefit special status aquatic species and priority habitats. This alternative contains special status aquatic species and other fisheries-specific stipulations as well as other resource stipulations. In general, any NSO that limits ground-disturbing activity is beneficial to special status aquatic species and their habitats. Table 4.2.7-6 shows the primary protective measures and stipulations included for this alternative that would provide protections and reduce or minimize negative effects on special status aquatic species and their habitats under this alternative.

Impacts and benefits to special status aquatic species and their habitats from soils management, vegetation management, wildland fire management, wilderness study area management, and renewable energy management would be the same as or similar to those under Alternative A.

Table 4.2.7-6
Primary Protective Measures/Stipulations under Alternative C

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	**Federal Mineral Estate**
CRV-NSO-2 steep slopes greater than 50 percent	Newly proposed	76,200 acres	9,900 acres
CRV-NSO-3 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
CRV-NSO-5 streamside management zones	Newly proposed	28,500 acres	9,900 acres
CRV-NSO-6 riparian and wetland zones	1999 Oil and Gas Leasing ROD	3,000 acres	700 acres
CRV-NSO-16 perennial waters	Newly proposed	13,700 acres	8,900 acres
CRV-NSO-17 fish hatcheries	Newly proposed	9,100 acres	2,600 acres
CRV-NSO-32 endangered big-river fishes	Newly proposed	85 acres	0 acres
CRV-NSO-33 sensitive big-river fishes	Newly proposed	3,700 acres	400 acres
CRV-NSO-34 sensitive amphibian species	Newly proposed	4,100 acres	200 acres
CRV-CSU-1 slopes greater than 30 percent	Newly proposed	338,100 acres	119,700 acres
CRV-CSU-2 hydrologic features	Newly proposed	51,500 acres	17,900 acres
CRV-CSU-3 Riparian/wetland vegetation zones	1999 Oil and Gas Leasing ROD	45,700 acres	14,200 acres
CRV-TL-7 coldwater sport and native fish spawning	Newly proposed	190 miles	60 miles
CRV-TL-18 occupied cutthroat trout waters	Newly proposed	45 miles 20	20 miles
CRV all other NSOs combined	Existing and newly proposed	92,615 acres	9,700 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy
ROD record of decision
TL timing limitation (seasonal restriction)

Impacts and benefits to special status aquatic species and their habitats from special status plants and terrestrial wildlife management and from fluid minerals management (oil and gas, oil shale, and geothermal resources) would be the same or similar as under the Proposed RMP.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Benefits and short-term identified impacts (sedimentation and turbidity, loss or reduction of streamside vegetation cover, and habitat alteration**)** would be the same as addressed under Alternative A and the Proposed RMP, except that the CSU level protection for amphibians would be replaced by CRV-NSO-34 for the same known or identified breeding sites. This alternative contains several overlapping and duplicative protective stipulations (NSOs). Some of these are species- or habitat-specific but the target areas are protected by more than one NSO.

Management of special status aquatic species and their habitats under this alternative would provide similar protections and reduce the risk and scope of identified impacts as the Proposed RMP. It is more protective than Alternatives A and D. Implementation actions associated with management of special status aquatic species and their habitats would all be intended to provide long-term benefits to these species. It is possible that some short-term impacts associated with some activities and projects could result, including site-specific sedimentation and habitat alteration. These impacts would be site-specific, short term, and mitigated at the time of project identification and planning.

Impact from Water Management. Under Alternative C, water management would benefit special status aquatic species and their habitats similar to the Proposed RMP. This alternative provides slightly less protection to ephemeral and intermittent systems based on buffer distance (50 feet vs. 100 feet) but slightly greater acreage amounts via CRV-CSU-2 for all hydrologic features. This alternative is more protective than Alternatives A and D.

The action of improving dysfunctional stream via treatments, projects, or management changes would provide long-term benefits to special status aquatic species and their habitats. These species require high-quality water to thrive. Select improvement measures could result in some site–specific, short-term impacts, primarily sedimentation and turbidity, but would be mitigated at the time of project identification and planning.

Impacts from Fisheries and Aquatic Wildlife Management. Fisheries and aquatic wildlife management would be mostly beneficial to special status aquatic species and their habitats, similar to the Proposed RMP, as all perennial waters would be protected via CRV-NSO-16. CRV-TL-7 would apply to all coldwater sport and native fish species to protect fish during spawning. Depending on the type of fisheries project or action and the stipulation exception criteria, the remaining protective measures identified in Table 4.2.7-6 would help to protect habitat for fish and other aquatic species from some activities.

In select areas where active fish habitat management in the form of projects would occur, impacts could include short-term loss or reduction of streamside vegetation cover, habitat alteration, and increased sedimentation and turbidity. These impacts are addressed in detail under Alternative A. This alternative would provide more protection from other resource uses than Alternatives A and D.

Implementation actions associated with management of fish and aquatic wildlife habitats would be beneficial to special status aquatic species in the long term. It is possible that some treatments and projects would result

in site–specific, short-term impacts, including sedimentation and habitat alteration. These potential effects would be mitigated at the time of project identification and planning.

Impacts from Terrestrial Wildlife Management. Benefits and short-term impacts to special status aquatic species and their habitats would be generally the same as addressed under the Proposed RMP. This alternative includes several wildlife NSOs, including CRV-NSO-8 for core wildlife areas, which would collectively limit ground-disturbing activities from large expanses of primarily upland habitats. These protective measures would directly and indirectly reduce the risk and scope of identified impacts by limiting ground-disturbing activities from other resource uses. Similar to the Proposed RMP, active management actions or projects could result in short-term impacts including sedimentation and turbidity. This alternative would provide similar indirect protection as the Proposed RMP and more than under Alternatives A or D.

In areas where active wildlife habitat management in the form of vegetation treatments or projects would occur, impacts could include site-specific short-term increases in sedimentation and turbidity. These impacts are addressed in detail in Alternative A. Proposed wildlife habitat management would provide more protective measures than Alternatives A and D, and would be similar to but slightly more protective than the Proposed RMP.

The implementation action associated with proper power line construction to eliminate electrocution risk to raptors would have no impact to special status aquatic species or their habitats.

Impacts from Managing to Protect Wilderness Characteristics. Under this alternative, six units totaling 45,800 acres would be managed for wilderness characteristics. These units would be protected with an NSO stipulation, and would be closed to fluid minerals leasing. Management of these lands would benefit special status aquatic species and their habitats directly where these lands overlap occupied habitats, and indirectly where special status aquatic species reside downstream. Proposed management provides greater protection than Alternatives A and D, which do not identify these lands for protection, and more protection than the Proposed RMP that does not include the Grand Hogback (11,400 acres).

The protection of wilderness character via select actions identified in Appendix F would largely benefit special status aquatic species and their habitats. Preservation of ecosystems and habitats would limit ground-disturbing activities and eliminate effects associated with those types of actions and activities. Active management of select special status aquatic species habitat could be limited, depending on the type of action or project identified. This limited management could result in reduced ability to improve some habitats but would be minimal in scope for special status aquatic species.

Impacts from Forestry Management. Under Alternative C, identified impacts and long-term benefits associated with forestry management would be the same as addressed in detail in Alternative A. Forestry management under this alternative is similar to the Proposed RMP. However, the short-term impacts could be increased in scope, as this alternative would seek to actively manage more acres of forest and woodland habitat, compared with Alternative A. The Proposed RMP and Alternative D would actively manage similar numbers of acres as this alternative. However, this alternative has more protective measures than the other alternatives and would limit the scope and intensity of identified impacts from forest treatments.

Impacts associated with management actions for forestry resources and select forest stand treatments and prescriptions include the potential for sediment loading and turbidity and habitat alteration. Some of these

effects could be longer term. However, proper forestry management would result in improved watershed conditions in the long term. Treatments would help to reduce catastrophic fire risk and improve water infiltration and absorption. Potential impacts associated with select treatments would be mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. None of the protective stipulations identified in Table 4.2.7-6 applies specifically to livestock grazing. Under this alternative, a total of 427,800 acres of BLM land would be open and available for livestock grazing, providing for approximately 35,500 AUMs. This amount totals fewer acres but has the same or similar AUMs as the other alternatives. Impacts include sedimentation and turbidity, habitat alteration, water quality alteration, water depletions, and loss or reduction of streamside vegetation cover. These impacts are addressed in detail in Alternative A. The scope of impacts would be slightly reduced given the reduced acres open to grazing, but given the similar AUMs, the intensity of impacts would be increased since forage demands would be met on reduced acres. Impacts would be generally the same under all the alternatives given the similar AUM figures.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to special status aquatic species and their habitats. Proper management and monitoring and subsequent changes in grazing practices based on monitoring would help to ensure the meeting of the land health standards across the planning area. Meeting these standards would help to improve watershed conditions and reduce identified impacts in the long term.

Impacts from Recreation and Visitor Services Management. Under this alternative, a total of 23,800 acres of land would be managed in two SRMAs, and 71,400 acres would be managed in nine ERMAs. The primary protective stipulation is CRV-NSO-46, which limits ground-disturbing activities within the two SRMAs. However, these protections would be for recreation and would not preclude increased recreation and visitor service amenities such as new routes and infrastructure. CRV-CSU-18 helps to reduce impacts in the ERMAs from other uses but does not preclude increased recreational amenities. The stipulations in Table 4.2.7-6 would directly and indirectly protect special status aquatic species and their habitats from ground-disturbing activities from other resource uses.

Identified impacts would be the same as identified and discussed in detail in Alternative A and include habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, spread of aquatic nuisance species and disease vectors, and increased sedimentation and turbidity. Recreation impacts are generally the same in intensity and scope under all alternatives especially with regard to unmanaged dispersed activities.

Implementation actions identified for R&VS management would result in minimal impacts to special status aquatic species and their habitats. The potential collection of fees and discretionary use of SRPs for select activities would help to more effectively manage recreation activities. These actions would help to reduce identified recreational impacts to special status aquatic species and their habitats.

Impacts from Comprehensive Trails and Travel Management. Under this alternative, no land would be open to off-road travel, compared with 295,900 acres open to year-round off-road travel and 4,300 acres open seasonally to off-road travel under Alternative A. A total of 461,300 acres would be limited to designated routes and 43,900 acres would be closed to all but foot and horse travel. The protective stipulations in Table 4.2.7-6 would directly and indirectly protect special status aquatic species and their habitats from new road- and trail-related impacts, including habitat alteration and increased sedimentation and turbidity. These impacts

are addressed in detail under Alternative A. The intensity and scope of impacts would be substantially reduced under this alternative compared with Alternative A. Impacts would be similar to the Proposed RMP and Alternative D.

This alternative would decommission and obliterate 205 miles of existing routes, compared with 50 miles under the Proposed RMP and 30 miles under Alternative D. This alternative would also close the most acres to use and would allow for the least amount of full-size vehicle use, which would decrease erosion risk and sedimentation and turbidity impacts on a larger scope and reduce the magnitude and intensity of identified impacts.

Implementation of travel management would have both short- and long-term impacts, as well as long-term benefits to special status aquatic species and their habitats. Moving to a designated route system would eliminate cross-country travel and new user-created routes. Decommissioning and rehabilitating select routes would be help to reduce chronic sediment loading and turbidity impacts. Conversely, in areas such as SRMAs where recreation would be emphasized, the construction of new routes would result in long-term erosion and sedimentation and turbidity impacts to special status aquatic species and their habitats. However, when properly designed and constructed, these routes would provide reduced impacts versus many of the user-created routes currently in existence. Closing and rerouting unsustainable routes would reduce erosion potential. Impacts associated with new route construction would be minimized as practical at the time of project identification and planning.

Impacts from Lands and Realty Management. Under this alternative, management of realty and lands actions and authorizations would impact special status aquatic species and their habitats by sedimentation and turbidity, reduction or loss of streamside vegetation cover, water quality alteration, habitat alteration, and water depletions. These impacts are the same as identified and discussed in detail in Alternative A and would be associated primarily with ROWs that disturb ground such as new roads, pipelines, and power lines. This alternative calls for more ROW avoidance acreage than the other alternatives, which would reduce the scope and intensity of identified impacts. This alternative is similar to the Proposed RMP and Alternative D regarding ROW exclusion acreages and nearly double what current management (Alternative A) provides. Land tenure adjustments including sale or exchange of public lands could result in a loss or gain of aquatic habitat. These adjustments could result in either benefits or impacts on special status aquatic species and their habitats, depending on proposed uses of the lands in question. These activities would be evaluated at the time of project identification and planning and special status aquatic species would be considered appropriately.

Under this alternative, 179,400 acres would be petitioned for withdrawal from mineral entry for locatable exploration or development. This amount would be more protective than the other alternatives but similar to the Proposed RMP. Withdrawal would limit the scope and intensity of identified impacts on special status aquatic species. Under this alternative, the protective stipulations included in Table 4.2.7-6 would apply to most ROW actions, which would reduce the intensity of identified impacts.

Implementation actions associated with the management of Lands and Realty Management would be largely beneficial to special status aquatic species and their habitats. Collocating facilities would reduce new disturbances and reduce potential sedimentation and turbidity impacts. Encouragement of wind and solar energy projects and any other new ground disturbing ROWs would likely result in some impacts, including sedimentation and turbidity. These impacts would be mitigated at the time of project identification and planning.

Impacts from Coal Management. Under this alternative, no lands are identified for leasing or development of coal resources, similar to the Proposed RMP and Alternative and D. No impacts to special status aquatic species or their habitats would result. Alternative A identifies 28,500 acres as open to consideration and would have the greatest potential for impacts disclosed in Alternative A.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under this alternative, impacts would be the same as addressed under the Proposed RMP, with the exception that under this alternative more overlapping protective measures identified in Table 4.2.7-6 would apply to these activities except locatable minerals activities, which are subject to federal law and regulations under the General Mining Law of 1872. Withdrawal of acres from consideration of these activities is the primary means these impacts would be reduced in scope. Locatable and salable mineral management could impact special status aquatic species and their habitats by habitat alteration, sedimentation and turbidity, loss of streamside vegetation cover, and water quality alteration. These impacts are discussed in detail under Alternative A.

Under this alternative, 323,100 acres would be open to salable and mineral materials disposal, slightly fewer than the Proposed RMP and substantially fewer than Alternatives A and D. The scope and intensity of identified impacts would be reduced under this alternative.

Implementation actions associated with the disposal of salable minerals and mineral materials would have limited impact on special status aquatic species and their habitats. Disposal of mineral materials would be limited and site-specific and any potential impacts would be mitigated at the time of project identification and planning.

Impacts from Areas of Critical Environmental Concern Management. Under this alternative, 16 ACECs would be designated totaling 79,800 acres. The stipulations associated with the management of these ACECs would benefit special status aquatic species and their habitats indirectly within watersheds that contain special status aquatic species. The proposed Abrams Creek ACEC in this alternative would specifically provide additional but overlapping and duplicative protection to Lineage GB cutthroat trout located in the creek. Although managed for select resource values, the 16 ACECs would indirectly protect habitat by limiting ground disturbance through a protective NSO stipulation. This stipulation would provide additional protection to these species from identified impacts from other resource uses. This alternative would have the greatest number of ACECs and the most acres protected for select resource values compared with the other alternatives.

The actions of treating weeds, monitoring the relevant and important values, use of selective vegetation treatments, and select wildland fire suppression techniques in ACECs would be beneficial to special status aquatic species and their habitats. These actions would maintain or improve habitats in select areas. Some vegetation treatments could result in short-term effects from sedimentation and turbidity, but long-term improvement of watershed conditions would help improve special status aquatic species habitats. Potential impacts associated with proposed treatments would be mitigated at the time of project identification and planning.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include

specific allowable use and management actions to ensure the ORVs are protected. Benefits would occur where stream segments overlap occupied habitats or where protections are within watersheds containing these. Alternative C is the most beneficial to special status aquatic species based on the number of streams found to be suitable.

Alternative D

This alternative includes several protective stipulations that either directly or indirectly protect or benefit special status aquatic species and their habitats, including limited species-specific protective measures as well as other resource stipulations.. In general, any NSO that limits ground-disturbing activity is beneficial to special status aquatic species and their habitats. Table 4.2.7-7 shows the primary protective measures and stipulations proposed for this alternative that would provide protections and reduce or minimize negative effects on special status aquatic species and their habitats under this alternative.

Table 4.2.7-7
Primary Protective Measures/Stipulations under Alternative D

Stipulation	Document of Origin	Acres/Miles Protected	
		BLM Surface	Federal Mineral Estate
CRV-NSO-2 steep slopes greater than 50 percent	Newly proposed	76,200 acres	9,900 acres
CRV-NSO-3 major river corridors	1999 Oil and Gas Leasing ROD	40,200 acres	5,900 acres
CRV-NSO-17 fish hatcheries	newly proposed	9,100 acres	2,600 acres
CRV-NSO-31 conservation populations of cutthroat trout	newly proposed	1,100 acres	800 acres
CRV-NSO-32 endangered big-river fishes	Newly proposed	85 acres	0 acres
CRV-NSO-33 sensitive big-river fishes	Newly proposed	3,700 acres	400 acres
CRV-CSU-1 slopes greater than 30 percent	Newly proposed	338,100 acres	119,700 acres
CRV-CSU-6 trout-bearing streams	Newly proposed	11,000 acres	5,000 acres
CRV-CSU-15 amphibian breeding sites	Newly proposed	4,100 acres	200 acres
CRV-CSU-7 BLM sensitive species	1999 Oil and Gas Leasing ROD	Not mapped; would apply as needed by species	
CRV-TL-7 coldwater sport and native fish spawning	Newly proposed	190 miles	60 miles
CRV-TL-19 conservation and core conservation populations of cutthroat trout	Newly proposed	14 miles	9 miles
CRV-All other NSOs combined	Existing and newly proposed	82,815 acres	12,500 acres

Acronyms and Abbreviations:

BLM Bureau of Land Management
CSU controlled surface use
NSO no surface occupancy
ROD record of decision
TL timing limitation (seasonal restriction)

Impacts and benefits to special status aquatic species and their habitats from locatable minerals, mineral materials, non-energy leasable minerals, fluid minerals management (oil and gas, oil shale, and geothermal resources), water management, terrestrial wildlife management, coal management, forestry management, and WSAs would be the same as or similar to those addressed in Alternative A or the Proposed RMP. Impacts from management of all other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under this alternative, CRV-NSOs 31, 32, and 33 and CRV-CSU-15 would protect small tracts along the Colorado River that contain Colorado pikeminnow and razorback sucker bluehead sucker, flannelmouth sucker, and roundtail chub, portions of some of the larger tributary streams used by some of these fish, conservation and core conservation populations of Colorado River cutthroat and greenback cutthroat trout, and amphibian breeding sites by limiting and managing ground-disturbing activities. Some of these NSOs are overlapping and duplicative. CRV-TL-19 would protect cutthroat trout during the spring spawning season.

Special status fish and other aquatic wildlife management under this alternative would provide greater protection and reduce risk and scope of identified impacts compared with Alternative A and similar protection as the Proposed RMP and Alternative C.

Implementation actions associated with management of special status aquatic species and their habitats would all be intended to provide long-term benefits to these species. It is possible that some short-term impacts associated with some activities and projects could result, including site-specific sedimentation and habitat alteration. These impacts would be site-specific, short term, and mitigated at the time of project identification and planning.

Impacts from Vegetation Management—Riparian. Under Alternative D, riparian vegetation management would be beneficial to special status aquatic species and their habitats. However, under this alternative, riparian vegetation is protected by a CRV-CSU-3 vs. an NSO, which would allow for more potential disturbance to riparian and aquatic habitats from ground-disturbing activities and increase identified impacts from other resource uses. The Proposed RMP protects all water bodies and riparian areas with an NSO similar to Alternatives A and C. Under this alternative, riparian vegetation management would still be subject to Land Health Standard 2 (BLM 1997a), which helps guide riparian management on public lands.

In select areas where active restoration of riparian areas would occur, impacts could include short-term loss or reduction of streamside vegetation cover, water quality alteration, and increased sedimentation and turbidity. These impacts are the same as addressed in detail under Alternative A.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative D, no land units would be managed for wilderness characteristics and protected with an NSO stipulation. No indirect benefits would result for special status aquatic species and their habitats from managing for wilderness characteristics.

Impacts from Fisheries and Aquatic Wildlife Management. Under Alternative D, benefits and short-term impacts to special status aquatic species and their habitats are similar as addressed under Alternative A. Under this alternative, CRV-NSO-17 would protect portions of the watersheds for the Rifle Falls and Glenwood Springs State Fish Hatcheries. CRV-CSU-6 would help to manage ground-disturbing activities near occupied habitats containing trout species, which would help protect Colorado River and greenback cutthroat trout from other resource uses. CRV-TL-7 would help protect select special status fish during the spring spawning seasons. In select areas where active fish habitat management in the form of projects would occur, impacts would include loss or reduction of streamside vegetation cover, habitat alteration, and increased sediment loading and turbidity. These impacts are addressed in detail under Alternative A. This alternative would provide increased protection to special status aquatic species compared with Alternative A, but would be less protection than the Proposed RMP or Alternative C, which provide NSO protections on all water

bodies and riparian areas (Proposed RMP) and all perennial waters (Alternative C) as well as known or identified amphibian breeding sites.

Implementation actions associated with management of fish and aquatic wildlife habitats would be beneficial to special status aquatic species in the long term. It is possible that some treatments and projects would result in site–specific, short-term impacts, including sedimentation and habitat alteration. These potential effects would be mitigated at the time of project identification and planning.

Impacts from Special Status Plants and Terrestrial Wildlife Management. Under Alternative D, management of special status plants and terrestrial wildlife species and their habitats would benefit and impact special status aquatic species (short-term increases in sedimentation and turbidity) and their habitats the same as previously described in Alternative A. This alternative contains select NSOs to protect plant and animal species. In addition, several of the protective measures in Table 4.2.7-7 would limit ground-disturbing activities, which would limit the risk and magnitude of identified impacts on special status aquatic species and their habitats. Protective measures aimed specifically at reducing impacts on special status plants and special status terrestrial wildlife are more limited under this alternative compared with Alternatives A and C and the Proposed RMP. This alternative would provide less indirect protection to special status aquatic species and their habitats from other resource uses.

Actions to stockpile topsoil in special status plant areas, close select transportation routes in special status species habitats, and implementation of select projects, treatments, and actions for Canada lynx would have limited impact on special status aquatic species or their habitats. Select route closures would benefit aquatic species by reducing erosion potential and sedimentation and turbidity effects. It is possible that some vegetation treatments for lynx could result in some site-specific, short-term impacts associated with sedimentation and turbidity, but in the long term watershed conditions would be improved. Potential impacts to specials status aquatic species would be mitigated at the time of project identification and planning.

Impacts from Livestock Grazing Management. None of the protective stipulations identified in Table 4.2.7-6 applies specifically to livestock grazing. Under this alternative, a total of 442,200 acres of BLM land would be open to and available for livestock grazing, providing for approximately 36,500 AUMs. This amount is more acres and AUMs than Alternative C and the Proposed RMP but less than Alternative A. Impacts to special status aquatic species and their habitats include sedimentation and turbidity, habitat alteration, water quality alteration, water depletions, and loss or reduction of streamside vegetation cover. These impacts are addressed in detail in Alternative A. The scope of impacts would be slightly increased in light of the increased acres open to grazing, but given the similar AUMs, the intensity of impacts would be the same or slightly decreased since forage demands would be met on increased acres and use would be spread out. Impacts would generally be the same under all the alternatives given the similar AUM figures.

Implementation actions planned as part of management of livestock grazing would be largely beneficial to special status aquatic species and their habitats. Proper management and monitoring and subsequent changes in grazing practices based on monitoring would help to ensure the land health standards are met across the planning area. Meeting these standards would help to improve watershed conditions in the long-term.

Impacts from Recreation and Visitor Services Management. Under Alternative D, a total of 63,600 acres of land would be managed in seven SRMAs. A total of 33,000 acres would be managed in five ERMAs. The primary protective stipulation is CRV-NSO-46, which would protect lands by limiting large ground-disturbing

activities within select SRMAs. This stipulation would not preclude increased recreation developments identified as the emphasis for select SRMAs. In addition, the protective measures in Table 4.2.7-7 would help to directly and indirectly protect special status aquatic species and their habitats by limiting ground-disturbing activities.

In SRMAs, where recreation and visitor use increases are emphasized, impacts on special status aquatic species and their habitats include habitat alteration, loss or reduction of streamside vegetation cover, water quality alteration, spread of aquatic nuisance species and disease vectors, and increased sediment loading and turbidity. These impacts are addressed in detail under Alternative A. In other SRMAs where solitude and nonmotorized use is emphasized, aquatic habitat management would be balanced with recreation and impacts and conflicts would be limited. This alternative would provide similar acreage protection as Alternatives A and C and the Proposed RMP, but far more than Alternative C. These would provide limited indirect protection of special status aquatic habitats.

Implementation actions identified for R&VS management could result in some increased impacts to special status aquatic species and their habitats. The emphasis on issuing SRPs for various activities could result in more recreation impacts discussed above. Potential fee collections would help to better manage recreation across the planning area. Potential impacts associated with select activities authorized via SRPs would be mitigated at the time of permit processing and planning.

Impacts from Comprehensive Trails and Travel Management. Under Alternative D, no land would be open to off-road travel, compared with 295,900 acres open to year-round off-road travel and 4,300 acres open seasonally to off-road travel under Alternative A. A total of 464,000 acres would be limited to designated routes, and 40,400 acres would be closed to all but foot and horse travel. The stipulations in Table 4.2.7-6 would directly and indirectly protect special status aquatic species and their habitats from new road and trail impacts, including habitat alteration and increased sedimentation and turbidity. These impacts are addressed in detail in Alternative A. The intensity and scope of impacts from OHV route designations would be substantially reduced under the Proposed RMP and Alternatives C and D compared with Alternative A.

This alternative would decommission and obliterate 30 miles of existing routes, compared with 50 miles under the Proposed RMP and 205 miles under Alternative C. Alternative D proposes the second most miles of full-size vehicle routes, which would increase erosion risk and sedimentation and turbidity impacts on a larger scope and increase the magnitude and intensity of identified impacts. Impacts from implementation actions are the same as were addressed in Alternative C.

Impacts from Lands and Realty Management. Under this alternative, management of realty and lands actions and authorizations would impact special status aquatic species and their habitats by sedimentation and turbidity, reduction or loss of streamside vegetation cover, water quality alteration, habitat alteration, and water depletions. These impacts are the same as identified and discussed in detail in Alternative A and would be associated primarily with ROWs that disturb ground such as new roads, pipelines, and power lines. This alternative calls for less ROW avoidance acreage than the Proposed RMP or Alternative C and is similar to Alternative A, which would increase the scope and intensity of identified impacts. This alternative is similar to the Proposed RMP and Alternative C regarding ROW exclusion acreages and nearly double what current management (Alternative A) provides. Land tenure adjustments including sale or exchange of public lands could result in a loss or gain of aquatic habitat. These adjustments could result in either benefits or impacts on special status aquatic species and their habitats, depending on proposed uses of the lands in question. These

activities would be evaluated at the time of project identification and planning and special status aquatic species would be considered appropriately.

Under this alternative, 132,700 acres would be petitioned for withdrawal from mineral entry for locatable exploration or development. This amount is less protective than the Proposed RMP and Alternative C but more protective than Alternative A and would increase the scope and intensity of identified impacts on special status aquatic species. Under this alternative, the protective stipulations included in Table 4.2.7-6 would apply to most ROW actions which would reduce the intensity of identified impacts.

Implementation actions associated with the management of Lands and Realty Management under this alternative could result in some site-specific impacts to special status aquatic species and their habitats. Less emphasis on collocating facilities could allow for increased ground disturbance and result in potential sedimentation and turbidity impacts. Encouragement of ROWs for wind and solar energy project would likely result in some impacts including sedimentation and turbidity. These impacts would be mitigated at the time of project identification and planning.

Impact from Areas of Critical Environmental Concern Management. Under Alternative D, three ACECs would be designated totaling 20,200 acres. The prescriptions/stipulations associated with the management of these ACECs under this alternative would provide some indirect benefit to special status aquatic species primarily cutthroat trout located in Mitchell Creek within the Glenwood Springs Debris Flow Hazard Zones ACEC. The Bull Gulch and Blue Hill ACECs would provide some indirect protection to portions of the Colorado River where bluehead sucker, flannelmouth sucker, and roundtail chub occur. Although managed for select resource values, the three ACECs would help protect special status aquatic habitat by limiting ground disturbance through a protective NSO stipulation. This stipulation would provide additional protection to these species from identified impacts from other resource uses. This alternative would have the least number of ACECs and the least acres protected for select resource values compared with the other alternatives and the Proposed RMP.

The implementation actions of treating weeds, monitoring the relevant and important values, use of selective vegetation treatments, and select wildland fire suppression techniques in ACECs would be beneficial to special status aquatic species and their habitats. However, under this alternative, these actions would occur on much less acreage then in the Proposed RMP or Alternative C. These actions would maintain or improve habitats in select areas. Some vegetation treatments could result in short-term effects from sedimentation and turbidity but long-term improvement of watershed health.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. As compared with the other alternatives, special status aquatic species and their habitats would not benefit from WSR determinations or the associated management action and allowable use decisions. Only protective measures listed in Table 4.2.7-7 would be proposed to help reduce land use impacts on special status aquatic wildlife.

Cumulative Impacts (Special Status Fish and Aquatic Wildlife)

As pertains to NEPA, cumulative effects are defined as "the effect that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." For this plan, cumulative effects address the impact of implementing any one of the RMP alternatives in combination with

other actions outside the scope of this RMP, either within the planning area or adjacent to it. For information on the current and baseline condition of special status aquatic species and their habitats, refer to Chapter 3, Affected Environment. The scope of analysis for cumulative impacts for special status aquatic wildlife takes in the entire mainstem Colorado River basin and its tributaries downstream to the Colorado-Utah state line. This area includes private, state, and other federal lands to account primarily for cumulative effects on Colorado pikeminnow, razorback sucker, bonytail, humpback chub, flannelmouth sucker, bluehead sucker, and roundtail chub associated with water depletions.

Declines in the abundance or range of many special status aquatic species have been attributed to various human activities on federal, state, and private lands. These activities include human population expansion and associated infrastructure development; construction and operation of dams along major waterways; water retention, diversion, or dewatering of springs, wetlands, or streams; recreation, including ORV activity; expansion of agricultural or grazing activities, including alteration or clearing of native habitats for domestic animals or crops; and introductions of non-native plant, wildlife, or aquatic species. All of these can activities alternative habitats. When non-native fish are introduced, the introduced fish can prey on young native species or outcompete the natives for space, optimal habitats, and food. Many of these activities are expected to continue on lands within the range of the various special status aquatic species and could contribute to cumulative effects on these species within the planning area. Species with small population sizes, endemic locations, or slow reproductive rates or species that primarily occur on nonfederal lands would generally be highly susceptible to cumulative effects.

Past Actions. A variety of past actions have incrementally impacted special status aquatic species and their habitats within the planning area on BLM, USFS, state, private, and other federal lands. Water diversions began when the first settlers to the region began to manage water for human uses, including irrigation for crops, livestock, and domestic uses. As population centers within the planning area and beyond, such as Denver, continued to grow and expand, water demand increased. Western Colorado is considered "water rich" compared with the Front Range population center of Colorado, where water is more limited. Several dams and reservoirs and large trans-mountain and basin water diversions were constructed to take water from headwater streams within the Colorado River Basin and move it through the Continental Divide to Front Range municipalities. Many of these water diversions and water rights are still in place today and have resulted in impacts on native stream and river flows, including the Colorado River. These activities have impacted all of the special status aquatic species and their habitats by reducing wetted physical habitat, sediment aggradations, habitat alteration, reduced overall sediment input, reduction of streamside vegetation cover, and reduced habitat complexity and diversity.

Introductions of non-native fishes were common in the late 1800s and throughout the 1900s. Several species were stocked as sport fish and for food production, including rainbow trout, brown trout, brook trout, and Snake River and Yellowstone cutthroat trout. In addition, purposefully or by accident, other species, such as fathead minnows, white suckers, longnose suckers, channel catfish, and smallmouth bass, have made their way to the west slope of Colorado. Non-native species often outcompete native species where they commingle. These species can also prey on native fishes, and in other cases, non-native fishes of the same genus or subspecies can hybridize with native species, reducing their genetic integrity and fitness. Hybridization is particularly common within native cutthroat trout subspecies and the native sucker species.

Land management actions and activities have been ongoing since the settling of the west. Fire suppression, logging, livestock grazing, mining, natural gas development, conversion of native rangeland to agriculture,

road construction, pipelines, power lines, railroads, and ever-increasing urban sprawl have all resulted in cumulative impacts within watersheds that contain aquatic species, including habitat alteration, reduction of streamside vegetation cover, water quantity and quality impacts, and site specific increases in sediment and turbidity. Many of these actions resulted in select species having been designated as "special status" as populations have declined and habitats for these species have been degraded. Protective actions and designations, such as wilderness areas on lands administered by the USFS and WSAs on BLM lands, have protected some areas from impacts and helped reduce cumulative effects.

Present Actions. Many of the actions addressed in the past actions section continue today. Urban sprawl continues, as does the demand for limited water supplies, water diversions, and impoundments. New large-scale water developments are limited but select projects are in the works, and new projects are being considered. Large-scale mining is all but gone, but potential still exists in some specific areas. Livestock grazing continues, as do agriculture uses. Natural gas development has increased in recent years, along with road construction. Logging has been largely replaced by prescriptive treatments aimed at managing forests and other vegetation types for other uses (wildlife, watershed improvement, and fuel reduction). Beetle-killed pine is a large and ever-increasing concern in the forested habitats within the planning area and has the potential to increase the risk of large-scale, severe fire in the near term. Non-native fish stocking is much more limited today as emphasis has shifted to native species management. Recreation has emerged as an ever-increasing pursuit within the planning area and is expected to grow as rafting, boating, hunting, fishing, hiking, camping, skiing, rock climbing, mountain biking, and four-wheeling, among other pursuits, are all popular and common within the planning area on BLM lands and lands administered by the USFS. Natural gas development is occurring in concentrated portions of the western quarter of the planning area, primarily on private and BLM lands. All of these activities are resulting in cumulative impacts, including site-specific sediment loading and turbidity, habitat alteration, and water quality and quantity impacts. Restoration and reclamation actions are more common today as impacts are mitigated and degraded habitats are improved.

Reasonably Foreseeable Future Actions. It is likely that many of these past actions and present actions identified in previous sections will continue into the future. Urban sprawl and development is ever increasing as human populations increase within the planning area and outside. At the same time, water consumption and demand are increasing concurrently.

Expansion and sprawled development in the Eagle, Roaring Fork, and Upper Colorado River Valleys is anticipated to have impacts on stream and river flows. The major potential water project is the Homestake Project, which is jointly operated by the cities of Aurora and Colorado Springs. Phase I of the project was completed in 1968, and Phase II has been granted the necessary federal and state permits and approvals for construction, including a ROD under NEPA by the USFS. If Segments 1 or 2 of the Colorado River are designated as Wild and Scenic and instream flow prescriptions are put into place, these actions could have an impact on Phase II development of the Homestake Project. The Clinton Ditch and Reservoir Company is the owner and operator of Clinton Gulch Reservoir in Summit County, which has a decreed water right of approximately 4,250 acre-feet of storage. Shareholders represent the major water users and providers in Summit County, as well as the largest ski resort in Grand County. Colorado Springs Utilities plans to develop conditional water storage rights associated with the Continental-Hoosier System, which diverts water from the headwaters of the Blue River, upstream of the study river segments. The Moffat Firming project would divert more water out of headwater streams in Grand County for conveyance to Front Range areas. Irrigation rights are expected to continue being bought and sold in the future, with some new property owners informally changing how the right was historically used. As a result of population growth and land sales, more

agricultural water rights may be converted to municipal and industrial uses. Reduced water flows will continue to impact the Colorado pikeminnow, razorback sucker, bonytail, humpback chub, flannelmouth sucker, bluehead sucker, and roundtail chub by habitat alteration, sediment aggradations, reduced spawning habitat, reduced habitat complexity and diversity, and loss of important microhabitats including backwaters, flooded bottomlands, and side channels.

Recreation demand is expected to continue to increase as western Colorado is a destination area for outdoor pursuits. Natural gas development is expected to continue as is livestock grazing, agriculture, and irrigation. One emerging issue is the potential for some level of oil shale development within and adjacent to the planning area. This development could result in large amounts of water use and could affect stream and river flows as well as increase sediment and turbidity and cause habitat alteration.

Another emerging issue is the effects of a changing climate. Climate change has the potential to impact special status aquatic species and their habitats by reducing suitable habitat, changing distributions, altering food webs, and altering water quality (temperatures). Species at increased risk of impact are Colorado River and greenback cutthroat trout which are both coldwater species. Scientists (Isaak et al. 2010, Hakk et al. 2010, Rieman and Isaak, 2010, Wenger et al. 2011) predict that there will be an increase in the severity and frequency of droughts, floods, and wildfires, as well as changes in the timing of snowmelt and peak flows. The primary potential effect of climate change is reductions in suitable habitat. Limited research on this effect to fish exists but it has been studied and documented by Hari et al. (2006) and Winfield et al. (2010). Reductions in suitable habitat would result in reduced miles of occupied streams and reduced population size. Changes in timing of peak flows could also affect spawning times and breeding and recruitment success. Reduced population numbers and size would make cutthroat trout more susceptible to and increase the risk of localized extirpation from natural events such as floods and large wildfires. Amphibians that rely on ephemeral breeding ponds could be affected by increased drought frequencies. As new information emerges, impacts on other special status aquatic species could come to light. Local effects of a changing climate will vary in intensity and duration because of differences in habitat quality, distance from coastal areas, and elevation and topography of the watershed.. Increasing human demand for water will place additional stressors on watersheds and will amplify the negative impacts of climate change on special status aquatic species and their habitats. Identified NSO buffers on water bodies and riparian areas will help to protect these habitats and managing for late seral stage riparian habitats at maximum potential will help to provide stream cover and shade, which will help to reduce the effects of increased stream temperatures, particularly for cutthroat trout.

Among the alternatives analyzed, Alternative D would have the greatest potential for direct and indirect effects on aquatic species and their habitats and, subsequently, more cumulative impacts when added to the numerous actions, activities, and land management practices occurring on other federal, state, and private lands within the scope of analysis. The Proposed RMP and Alternative C would provide greater protections from BLM-initiated or -authorized activities and actions and would result in reduced direct and indirect effects and subsequently would have reduced cumulative effects. Protective measures under the Proposed RMP are both targeted and broad in scope. Alternative A is similar to Alternative D, both of which would have greater potential for cumulative impacts on special status aquatic species and their habitats. Two programs in particular—Trails and Travel Management and Fluid Minerals Management—would allow for substantial cumulative effects under Alternative A, because off-route travel would continue to be allowed largely unabated across large portions of the planning area, and natural gas development and associated road

construction would continue to occur on large expanses of private and BLM lands in the western quarter of the planning area. Roads are one of the biggest issues with regard to aquatic habitat quality.

4.2.7.3 Special Status Species—Terrestrial Wildlife

Assumptions

Impact analyses and conclusions were based on interdisciplinary team knowledge of resources and relevant data, on a literature review, and on the professional judgment of experts within and outside BLM. Spatial data analysis was conducted using ESRI ArcGIS desktop computer software. Impacts were quantified where possible and, in the absence of quantitative data, best professional judgment was used. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if quantitative data were not necessary or available.

The following assumptions were used in the analysis of impacts on special status terrestrial wildlife:

- Impacts on special status wildlife populations and habitat are not discrete since actions may benefit one species while having an adverse or beneficial impact on another.
- Maintaining high-quality habitat conditions would have some influence on reducing the severity of outbreaks and subsequent losses from diseases, but the prevalence in the environment of various diseases cannot be fully controlled, particularly at chronic levels of occurrence.
- Significant modifications to habitat suitability can affect the survivability and viability of populations (e.g., higher winter mortality and reduced reproductive success).
- Impacts on special status terrestrial wildlife from displacement depend on the location, extent, timing, or intensity of the disruptive activity.
- Impacts from displacement of wildlife would be greater for special status species that have limited habitat or a low tolerance for disturbance.
- In the context of this analysis, the term "avoidance by wildlife" means reduced use not absence of use by wildlife.
- CPW would continue to manage wildlife populations.
- The BLM would continue to manage wildlife habitat in coordination with the CPW. BLM is not restricted from making reasonable land management decisions within the framework of multiple use management, applicable laws, policy, and supplemental guidance.
- Federal oil and gas regulations prevent the BLM from being able to apply new or additional lease stipulations to existing leases. However, federal regulations allow the BLM to apply other protection measures in conjunction with planning and implementing oil and gas projects. These measures include applying stipulations consistent with the most recent land use plan as terms and conditions for discretionary approvals (e.g., ROW actions) and applying COAs to augment protections related to lease activities. The latter include applying a TL of up to 60 days and requiring that a project component be relocated by up to 200 meters (or more than 200 meters for areas with CSU stipulations) to protect a sensitive resource value. Examples of additional regulatory protections that BLM applies to existing leases include requirements of adequate reclamation, weed control, erosion control, and dust abatement.

Methods

Impacts to special status wildlife species and their habitat would be considered significant if the following were to occur:

- Disturbance or loss of aquatic and terrestrial habitat, food supplies, cover, breeding areas, and other habitat components to a degree considered essential for population maintenance.
- Disturbance or loss of seasonally important habitat, such as critical for overwintering or successful breeding, to the degree considered essential for maintenance of the local population.
- Interference with the movement patterns of a species to the extent that it decreases the ability of the species to breed or overwinter successfully to a degree considered essential for maintenance of the local population.
- Special status species objectives are not achieved.

Impacts on special status wildlife resources from implementation of the RMP are summarized by alternative in the following subsections. These resources include federally listed, proposed, or candidate threatened or endangered species (Table 4.2.7-8), BLM sensitive species (Table 4.2.7-9), and state-listed threatened, endangered, or special concern species. These impacts would be direct or indirect and would result from proposed land use objectives, management actions, and allowable uses.

Table 4.2.7-8
Federally Listed, Proposed, or Candidate Terrestrial Wildlife Species

Species	Habitat/Range	Potential of Occurrence
Canada lynx (*Lynx canadensis*)	Threatened species found in mesic forests of lodgepole pine, subalpine fir, Engelmann spruce, and quaking aspen in the upper montane and subalpine zones, generally between 8,000 and 12,000 feet in elevation.	Present
Greater sage-grouse (*Centrocercus urophasianus*)	Candidate species found in shrub-steppe and meadow-steppe habitats. Typically found in areas with low rolling hills adjacent to valleys. Prefer medium-density sagebrush mixed with a variety of other plants.	Present
Black-footed ferret (*Mustela nigripes*)	Endangered species with potential habitat in Colorado including the eastern plains, mountain parks, and western valleys, specifically grasslands or sparse shrublands that support prairie dogs, the ferret's primary prey.	Unlikely
Mexican spotted owl (*Strix occidentalis lucida*)	Threatened species that inhabits mature montane forests, shady canyons, and steep canyons. The key components in montane forests are common to old-growth forests: uneven-age stands with high canopy closure and tree density, fallen logs and snags.	Undocumented
Yellow-billed cuckoo (*Coccyzus americanus*)	Candidate species that inhabits mature riparian forests of cottonwoods and large deciduous trees with a well-developed understory of tall riparian shrubs. Uncommon summer resident of Colorado.	Undocumented

Table 4.2.7-9
BLM Sensitive Terrestrial Wildlife Species

Species	Habitat/Range	Potential of Occurrence
	Mammals	
Townsend's big-eared bat (*Corynorhinus townsendii*) and fringed myotis (*Myotis thysanodes*)	Occur as scattered populations at moderate elevations on the Western Slope, along the foothills of the Front Range and the mesas of southeastern Colorado. Maximum elevation is 7,500 feet. Breeds and roosts in caves, trees, mines, and buildings; hunts over pinyon-juniper, montane conifer, and semidesert shrub land habitats. Known occurrences—Potential in caves, mines, or trees.	Present
White-tailed prairie dog (*Cynomys leucurus*)	Found in semidesert open shrublands, grasslands and mountain valleys in the lower elevations.	Present
	Birds	
Northern goshawk (*Accipiter gentilis*)	Resident in mountains and occasional in migration and winter at lower elevations. Primarily uses mature stands of aspen and conifers in the montane and subalpine zones.	Present
White-faced ibis (*Plegadis chihi*)	Inhabits wet meadows, marsh edges, and reservoir shorelines. Very rare, non-breeding, summer migrant in western Colorado valleys and mountain lakes. Main breeding area is in the San Luis Valley.	Unlikely
Bald eagle (*Haliaeetus leucocephalus*)	Nests and roosts in mature cottonwood forests along rivers, large streams, and lakes.	Present
American peregrine falcon (*Falco peregrinus anatum*)	Inhabits open habitats usually associated with high cliffs and bluffs overlooking rivers.	Present
Brewer's sparrow (*Spizella breweri*)	Sagebrush shrublands at middle elevations, including mountain parks; rarely found in alpine willow stands.	Present
	Reptiles	
Midget faded rattlesnake (*Crotalus oreganus concolor*)	Occurs in cold desert dominated by sagebrush and with an abundance of rock outcrops and exposed canyon walls.	Present

Environmental Consequences

Impacts on special status terrestrial wildlife would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on special status terrestrial wildlife under any of the four alternatives.

Alternative A

Impacts from Special Status Species Management—Terrestrial Wildlife. Under all alternatives, no decision would be approved in this RMP revision or authorized on BLM lands that would jeopardize the continued existence of plant and terrestrial wildlife species that are listed, officially proposed, or candidates for listing as threatened and endangered. The proposed land use plan decisions are directed at preventing the need for listing proposed, candidate, and sensitive species under the ESA, protecting special status species, and improving habitats for special status species to a point where their special status recognition is no longer warranted (i.e., Land Health Standard 4).

The application of NSO stipulations for special status species and their habitats (i.e., American white pelican, bald eagle, ferruginous hawk, peregrine falcon, greater sage-grouse, Columbian sharp-tailed grouse, Mexican spotted owl, and special status bat species) would afford direct protection of special status species habitat and conservation of their habitats. The size of the NSO stipulation varies by species. NSO stipulations in Alternative A would be less protective than the NSO stipulations in the action alternatives for ferruginous

hawk, greater sage-grouse, Columbian sharp-tailed grouse, Mexican spotted owl, and special status bat species. NSO stipulations in Alternative A would be the same or similar to the NSO stipulations in the action alternatives for the bald eagle and peregrine falcon.

TLs for special status species and their habitats (i.e., American white pelican, bald eagle, ferruginous hawk, peregrine falcon, greater sage-grouse, Columbian sharp-tailed grouse, greater sandhill crane, Mexican spotted owl, and special status bat species) would prevent surface occupancy and surface-disturbing activities that could interfere with habitat function or compromise animal condition. The TLs help to alleviate human-induced impacts such as displacement of raptors, nest abandonment, or other human caused stresses. The duration of the TL would vary by species and theme of the alternative. TLs in Alternative A would be less protective than the TLs in the action alternatives for bald eagle, ferruginous hawk, and special status bat species. TLs in Alternative A would be the same or similar to the TLs in the action alternatives for the American white pelican, peregrine falcon, greater sage-grouse, Columbian sharp-tailed grouse and greater sandhill crane.

Exceptions to stipulations protecting special status species could be granted if the action is intended to improve special status species habitat or if the activity, by its nature, must be done within the area covered by the stipulation. Seasonal closures of habitats for special status species would provide direct protection from disruptive activities during biologically sensitive periods, that is, nesting, courtship, fledging, spawning, and hatching.

Impacts from Soils Management. Activities conducted under the soil management program are limited to monitoring, support activities, providing information for other BLM programs, and recommending appropriate mitigation. Typical activities implemented under the soil resource program would include mapping soils, maintaining soil databases, identifying timing stipulations, and recommending protective measures for critical soils.

For example, implementation of timing stipulations would reduce surface disturbance in areas with high seasonal erosion potential. As a result, special status species would benefit from a decrease in erosion and sedimentation, thereby generally maintaining or improving habitat.

Across all alternatives, an NSO stipulation would be placed on the debris flow hazard zone around the town of Glenwood Springs. In all alternatives, NSO stipulations would prohibit surface occupancy and surface-disturbing activities on slopes greater than 50 percent. CSU stipulations would be applied as appropriate to require special design measures for construction on erosive soils and slopes greater than 30 percent. The intent of these stipulations is to apply the similar measures to other public land activities to reduce erosion and maintain soil site stability. The language under Alternative A for soils stipulations was adapted from oil and gas stipulations, unlike those under the Proposed RMP and Alternatives C and D that address all surface-disturbing activities.

Impacts from Water Resource Management. All decisions would be consistent with applicable state and federal water quality standards. Under all alternatives, implementation actions would comply with Land Health Standard 5 for water quality (Appendix J). Therefore, the goals and objectives for water resource management under all alternatives would benefit terrestrial wildlife.

Implementation of water quality- and quantity-related actions would guide or advise other program actions and activities in a manner conducive to maintaining or improving surface water quality. These actions would be consistent with existing and anticipated uses and applicable state and federal water -quality standards. Beneficial impacts on special status species include improved habitat for fish and wildlife and their associated prey. Maintaining or improving habitat associated with aquatic systems would provide long-term benefits for bald eagle, northern goshawk, and western yellow-billed cuckoo and their potential habitats. Alternative A prohibits surface occupancy within 0.5 mile on both sides of the high water mark of six major rivers as well as in the domestic watersheds for the communities of Rifle and New Castle.

Impacts from Vegetation—General Management. Vegetation management would be implemented to some degree under all alternatives. These management actions would most often benefit special status wildlife species and their potential habitat. For example, vegetation treatments would increase plant diversity and variety in age classes, improve pollinator habitat, control weeds, stabilize soil, and promote a more natural fire regime. Vegetation management includes fencing, weed treatment, timber harvest, prescribed fires, mechanical treatments, and seeding of disturbed or weed treatment areas.

In the short term, vegetation treatments would cause disruption or direct removal of vegetation, which would disrupt potential habitat and expose soils, making indirect impacts, such as erosion and weed invasion, more likely. The use of herbicides or pesticides in occupied habitat could render the habitat unsuitable for use by some species.

Removing vegetation with heavy equipment could temporarily reduce potential breeding and nesting habitats. Human disturbance and noise associated with the use of heavy equipment could also temporarily displace special status bird species from foraging and nesting habitats.

Chemical treatments and prescribed burning could also disturb nesting special status bird species from smoke or chemical spray inadvertently drifting into occupied habitat. These activities have the potential to remove suitable habitat or other desirable vegetation.

In the long term, special status wildlife species would benefit from most vegetation treatments through an increase in vegetation productivity, which would provide additional forage, cover, and prey base.

Vegetation treatments that are not designed to meet special status wildlife species objectives could have adverse impacts if they were to result in weed infestations or remove habitat necessary for special status species. Under all alternatives, beneficial impacts from vegetation management would be greater than the adverse impacts.

Impacts from Vegetation—Forest and Woodlands Management. Alternative A would provide intensive management on forestlands growing commercial species (lodgepole pine, Engelmann spruce, or Douglas-fir) on productive growing sites (producing 20 cubic feet of wood fiber per acre per year) on lands not withdrawn for other resource needs. It would also provide limited management on woodlands or non-commercial species (pinyon-juniper, ponderosa pine, subalpine fir, or aspen) or on sites producing less than 20 cubic feet of wood fiber per acre per year. This type of management could have a more significant impact on forest-dwelling species such as the Canada lynx. Forest management practices, such as thinning, commercial harvest, road construction, and post-harvest treatments, all influence habitats for lynx and prey. Snowshoe hares, the

primary prey for lynx, may reach highest densities in young dense coniferous or coniferous-deciduous forests or in mature forests with a dense understory of shrubs, aspen, and conifers.

Forest management practices could also affect special status wildlife species by direct removal of vegetation and displacement or disruption of special status wildlife, particularly during biologically sensitive periods. Erosion, sedimentation, trampling, soil compaction, and habitat fragmentation are also possible impacts on special status species. There are possible long-term benefits to special status species. For example, removal of encroaching pinyon pine and juniper trees in sagebrush habitats can benefit the greater sage-grouse by eliminating raptor perches and therefore reducing predation. Altering the structure of forested lands could result in adverse or beneficial impacts, depending on the species in the affected area and their habitat requirements and preferences (Table 4.2.7-8).

Impacts from Vegetation—Rangeland Management. Rangeland management would have a long-term beneficial impact on special status wildlife species. Improving the overall condition of rangelands through prescribed fire, weed control, and mechanical treatments would improve forage, nesting habitats, cover, and habitat quality in the long term. There are possible short-term impacts, such as temporarily reducing potential breeding and nesting habitats as well as cover and forage. Human disturbance and noise associated with the use of heavy equipment could also temporarily displace special status wildlife.

Impacts from Vegetation Management—Riparian. Although riparian lands occupy a small proportion of the landscape, they frequently support a higher diversity of plants and animals than the surrounding landscape and therefore are regarded as high-value habitat (Lynch et al. 1985). In addition to providing important dwelling habitat for wildlife, riparian areas provide vital vegetation corridors that enable wildlife to move between patches of remnant vegetation.

Several special status wildlife species rely on healthy riparian communities. Bald eagles nest in riparian areas within the CRVFO and are susceptible to nest abandonment with increased human disturbance. In Colorado, bald eagles are often found near rivers and reservoirs, especially where fish are abundant. In addition to fish (self-caught or stolen from other birds), bald eagles eat sick and injured waterfowl, muskrats, squirrels, rabbits, prairie dogs, and often eat carrion and road-killed animals. Nests can be 7 to 8 feet across, usually in tall trees high above the ground. Bald eagles often choose dead limbs in tall trees.

Canada lynx also benefit in the protection of riparian vegetation. Riparian and wetland shrub communities (for example, willow, alder, and serviceberry) found in valleys, drainages, wet meadows, and moist timberline locations may support important prey resources for lynx (Noss and Cooperrider 1994). Lynx transplanted to Colorado in 1999 are frequently located in well-developed riparian and valley wetland shrub habitats of the upper montane and subalpine zones (Ruggiero et al. 2000).

Alternative A and C prohibit surface-disturbing activities within riparian vegetation, which applies to both riparian areas and wetland zones. In addition, a CSU stipulation applied within 500 feet of the outer edge of riparian vegetation will require special design, construction, and implementation measures, including relocation of operations beyond 200 meters, as appropriate to protect resource values.

Impacts from Vegetation Management—Weeds. Noxious and invasive weed management includes herbicide use, biological controls, and mechanical treatments in weed infested areas. Actions conducted in areas near special status wildlife species habitat could benefit these species by removal of species that would

compete with native species for available space and resources. Adverse impacts could result from mechanical vegetation treatments requiring the use of heavy equipment, disturbing special status species. Short-term habitat and forage loss for some special status species could also result. Adverse direct impacts could also result from accidental chemical drift from herbicide use in nearby areas.

Impacts from Fisheries and Aquatic Wildlife Management. Under all alternatives, management actions and allowable use decisions would comply with Land Health Standard 4 (BLM 1997a). Management actions and allowable use decisions to protect fish hatcheries under all alternatives would benefit special status wildlife species and their habitat from surface-disturbing activities that might degrade habitat or disturb populations or individuals. Other management actions and allowable use decisions vary slightly across alternatives, with Alternative C being the most restrictive, followed by the Proposed RMP. Since aquatic wildlife habitat indirectly provides food, forage, shelter, breeding, and nesting opportunities for a variety of special status wildlife species, the most restrictive alternatives would be the most beneficial to special status wildlife species. As opposed to Alternatives A or D, the decisions under the Proposed RMP and Alternative C would offer the most benefit to special status species.

Alternative A would provide a stipulation for no surface occupancy within a 2-mile radius around the Rifle Falls and Glenwood Springs State Fish Hatcheries.

Impacts from Terrestrial Wildlife Management. Wildlife habitat management is largely beneficial to special status wildlife species. Depending on the type of wildlife project or action, protective measures are identified that would help to protect special status wildlife species. Wildlife-specific NSO stipulations collectively limit ground-disturbing activities in upland habitats, which directly helps to minimize impacts on special status wildlife species and their habitats. In addition, wildlife habitat management is subject to Land Health Standard 2, 3, and 4 (BLM 1997a), which help guide habitat management on public lands. Areas where these standards are being met have a lower potential for adverse impacts on special status wildlife species. Active wildlife habitat management in the form of vegetation treatments or projects have some potential for short-term adverse impacts on special status wildlife species, including loss or reduction in cover, forage, and breeding habitat, but would be an overall benefit.

The objective of Alternative A, continuation of existing management, can be found in the existing RMP (BLM 1988). The objectives are to provide approximately 57,933 AUMs of big game forage (the amount to meet CPW big game population goals in 1988), to improve existing wildlife habitat, and to increase wildlife species diversity. RMP amendments and species-specific plans have helped define this objective.

All alternatives allow for the introduction, translocation, transplantation, restocking, augmentation, and reestablishment of native and naturalized fish and wildlife species in cooperation with CPW and USFWS, subject to the guidance provided by BLM Manual 1745 policy and by memorandums of understanding with CPW.

All alternatives will require biological inventories as a lease notice in areas of known or suspected habitat of species of interest (e.g., raptor nests) before surface-disturbing operations will be approved. The implementation-level inventory would be used to prepare mitigating measures to reduce the impacts of surface disturbance on the affected species or their habitats.

All alternatives will require energy companies to establish a set of reasonable operating procedures for employees and contractors working in important wildlife habitats. These procedures would be designed to inform employees and contractors of ways to minimize the effect of their presence on wildlife and wildlife habitats. Procedures might address such items as working in bear country, controlling dogs, and understanding and abiding by hunting and firearms regulations.

Under Alternative A and the Proposed RMP, the Garfield Creek, Basalt, and West Rifle Creek SWAs would have an NSO stipulation applied to protect wildlife habitat values from unnecessary surface occupancy and surface-disturbing activities. These areas were acquired by the state not only to protect wildlife habitat but also to provide the public with opportunities to hunt, fish, and watch wildlife (CPW 2010g). However, a total of 7,400 acres of the Garfield Creek SWA is leased and is being developed with seasonal drilling restrictions.

Currently, the CRVFO closes important winter ranges to motorized travel from December 1 to April 30 to protect wintering big game from potential disturbance caused by public motorized use. Under all alternatives, the last 60 days of the seasonal limitation period may be suspended during mild winter conditions after consultation with CPW. Under severe winter conditions, the limitation period may be extended if requested by the CPW. Severity of the winter would be determined based on snow depth, snow crusting, daily mean temperatures, and whether animals are concentrated on the winter range during winter. These winter closures are beneficial to special status wildlife species that winter in pinyon pine and sagebrush habitats (Table 4.2.7-8 and Table 4.2.7-9). Alternative A would have the smallest area (74,700 acres) of big game winter closures, followed by Alternative D (87,300), then the Proposed RMP (131,600), with Alternative C having the largest (147,400 acres).

As opposed to the Proposed RMP and Alternative C and D, Alternative A would not contain a specific action to close areas to human activity and dogs during severe winter weather conditions, as defined by such factors as snow depth, snow crusting, long periods of daily low mean temperatures, and concentrations of animals, if requested by the CPW. However, human activity and dogs could be restricted through emergency closure orders established under the authority of 43 CFR 8364.1.

The CRVFO 1999 Oil and Gas Leasing and Development Record of Decision and RMP Amendment identified an NSO stipulation for wildlife seclusion areas. The NSO stipulation prohibits surface occupancy and surface-disturbing activities within the following seclusion areas that provide high wildlife value: Starkey Gulch, Riley Gulch, Crawford Gulch, Paradise Creek, Coal Ridge, Lower Garfield, Jackson Gulch, Bald Mountain, and Battlement Mesa, totaling approximately 37,839 acres (Refer to Appendix B and the Alternative A; All NSO figures in Appendix A). These areas provide several unique qualities, such as an optimum mix of quality forage, cover, and water; proximity to natural migration corridors; birthing areas; topographic features that moderate severe winter conditions; and seclusion from humans. Exceptions may be granted based on approval by BLM of a mitigation plan that suitably addresses the wildlife seclusion values at risk. Wildlife seclusion areas have been difficult to manage because they do not apply to lands that were leased before 1999, when the stipulation took effect (BLM 1999b).

Impacts from Special Status Fish and Other Aquatic Wildlife Management. Management of special status fish and other aquatic wildlife species and their habitats would affect special status wildlife species in generally the same way and extent as described in the section on Impacts from Fisheries and Other Aquatic Wildlife (Section 4.2.5). Select habitat treatments that target special status fish and other aquatic wildlife species could impair or reduce habitats for non-target special status wildlife species.

Alternative A would not provide any stipulations that are specifically for special status fish and other aquatic wildlife. However, the NSO stipulation protections are in place on habitats for federally listed, proposed, or candidate threatened or endangered species and state-listed species (BLM 1999b).

Impacts from Cultural Resource Management. Cultural resource actions could occur within occupied or potential habitat of special status wildlife species. These actions could include developing interpretive sites, identifying cultural resources, establishing temporary camping areas, building fences, and stabilizing deteriorating buildings. Human activities in habitats for special status bird species could disrupt nesting and foraging behaviors and cause the species to leave the area or abandon nests. Interpretive sites placed near nests or within home ranges of bird pairs could disturb nesting behavior on a long-term basis. This activity could lead to individual nest failure and reduced reproductive success.

The development of interpretive sites located within special status wildlife species habitat could also increase human activity in an area, resulting in crushing and trampling vegetation and habitat degradation over the long term. If a cultural resource project is conducted within special status wildlife species habitat, the actions described could adversely affect special status animal species, such as greater sage-grouse, through habitat degradation. These actions could result in surface disturbance, increased human presence, and noise that would disturb or displace special status wildlife species. Additionally, excavation within occupied habitat could cause direct mortality to the species. Human activities could disrupt foraging behaviors and could cause species to abandon habitat. Interpretive sites within or near occupied habitat could disturb species' natural behavior on a long-term basis because of increased human presence.

Management actions that would be implemented to protect cultural resources include an NSO stipulation surrounding eligible historic properties. This restriction would protect any special status wildlife species and habitat within these areas from surface-disturbing activities. For example, greater sage-grouse habitat overlaps many of these protected areas; thus, Alternative A would reduce adverse impacts in greater sage-grouse habitat.

Impacts from Visual Resources Management. In general, VRM class designations would limit or allow surface-disturbing activities in certain areas, thereby affecting special status wildlife species. VRM Classes I and II, which preserve or retain the existing character of the landscape, would protect special status wildlife species by restricting ground-disturbing activities and retaining existing vegetation. VRM Classes III and IV would provide less protection by allowing more changes to the landscape and because they are less restrictive of ground-disturbing activities. Areas managed as VRM Class III or IV would be subject to actions that allow for greater landscape modification and therefore greater surface disturbance. These areas could be subject to such actions as complete vegetation removal, which would drastically alter (at least in the short term) the habitat for special status wildlife species. See the Table 4.2.7-10 below for a summary of the VRM acres in each alternative.

Management actions under Alternative A would benefit special status wildlife species by prohibiting surface occupancy within certain areas. These areas are the Deep Creek ACEC/SRMA, Deep Creek cave area, Bull Gulch ACEC/SRMA, Thompson Creek ACEC/SRMA, Hack Lake SRMA, and Rifle Mountain Park and on slopes more than 30 percent with high visual sensitivity in the Interstate 70 viewshed. These actions also would restrict areas in VRM Class II.

Table 4.2.7-10
Acres of VRM Class by Alternative

VRM Class	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
VRM Class I	22,700	35,600	35,800	35,200
VRM Class II	227,800	268,900	256,900	217,900
VRM Class III	112,900	84,200	96,200	113,100
VRM Class IV	141,800	116,500	116,300	139,000

Acronyms and Abbreviations:
VRM visual resource management

Impacts from Wildland Fire Management. Increased human activity and noise associated with wildland fire suppression and prescribed fire in areas occupied by special status bird species would affect nesting, foraging, or roosting behavior. Foraging, nesting, and communal winter roosting habitats could be lost because of the use of heavy equipment, hand tools, and noise associated with intensive human activity. Some snags used for perching, roosting, or nesting could be lost because of suppression operations. However, these snags could be replaced as new snags result from fire mortality. The effects from wildland fire suppression could become long term, depending on the severity and extent of the activities conducted during a particular fire suppression operation. A large fire that would require extensive suppression operations, such as extensive staging areas and fire-line construction, could result in long-term adverse effects on special status bird species and their habitats. However, smaller fires that would require less extensive suppression operations would generally avoid these long-term adverse effects.

Fire suppression could adversely affect special status animal species, such as the Canada lynx and greater sage-grouse, and could cause immediate post-fire alteration or damage of occupied or suitable habitats. Large-scale, severe wildland fires caused by excessive fuel loading from previous fire suppression could reduce vegetation cover across large expanses, which could permanently displace many wildlife species.

Suppression operations could result in harassment, displacement, injury, or mortality during staging, fire-line construction, backburning, noise, or other human-caused disturbance. Any direct adverse effects would generally be short term, ending when or shortly after suppression actions are concluded. However, surface-disturbing operations conducted during fire suppression would result in a reduction or loss in the quantity and quality of cover and forage habitat in both the forest and sagebrush habitats. These activities would reduce forage availability, damage or destroy nests, and remove the sagebrush and other shrubs that provide aboveground vegetation cover. Despite the immediate initial loss of forage and shrub cover, some suppression tactics (e.g., backburning) or emergency restoration would stimulate vigorous regrowth of forb species and young trees in the growing seasons that follow. This regrowth would benefit special status wildlife species through improved forage quality and quantity.

Under all alternatives, prescribed fires would be used to reduce hazardous fuels within the planning area. As stated above, prescribed fires could adversely affect special status wildlife species. However, habitat manipulations resulting from the use of fire would also benefit special status wildlife species over the long term by improving vegetation conditions.

Stabilization and rehabilitation efforts would benefit special status wildlife species over the long term by decreasing erosion and restoring or improving habitat conditions after a fire, although there could be short-term adverse impacts. Planting non-native species that could outcompete native plant species used by special

status wildlife species would alter habitat conditions and would make them less favorable. Increased human activity during construction could cause special status bird species to alter foraging, nesting, and roosting behaviors.

Impacts from Cave and Karst Resource Management. Caves provide escape for terrestrial wildlife (e.g., reptiles, owls, bats, and small mammals), shelter from cold temperatures and snow during the winter, refuge from daytime heat in the summer, and water sources. While the CRVFO does not market, publish, or release information regarding cave locations to the public, cave use has the potential to damage fragile and sensitive resources. Under all alternatives, cave and karst resources would be managed under specific cave management objectives and setting prescriptions that allow for appropriate access while addressing issues and concerns relating to preservation of the cave's pristine and fragile resources, wildlife values, scientific and research values, and visitor safety and rescue issues. The cave management objectives and setting prescriptions would retain the current physical, social, and operational qualities of caves. If caves are found to be significant, they would be managed in accordance with the Federal Cave Resources Protection Act. An NSO stipulation for the protection of the Deep Creek cave area would prohibit surface occupancy and surface-disturbing activities in that area. The NSO extends to 5,000 feet below the surface. The NSO area encompasses the cave openings and portions of the subsurface features and watersheds immediately above the caves. Proposed management under Alternatives A and D would directly benefit terrestrial wildlife species that use the Deep Creek cave area, such as special status bats that use caves for roosting, maternity colonies, or hibernation.

Impacts from Forestry Management. Forestry and woodland management actions include harvesting firewood, poles, Christmas trees, and timber. Commercial forestry (e.g., timber harvests and sales) are restricted to upland forests. These activities could include the use of heavy equipment, helicopters, chemical applications, road construction, and culvert installation and typically would result in increased traffic, noise, and human presence.

Implementation of forestry management actions that reduce pinyon-juniper woodland invasion would benefit special status wildlife species that require open space. These species include greater sage-grouse and Brewer's sparrow. Clearing old, dense, relatively less productive woodlands could open up more productive areas for special status wildlife.

Potential adverse impacts on special status bird species and Canada lynx could include loss of habitat, increased human access to remote habitats because of new road construction, increased noise, increased human activity, and culvert installation or waterbar construction, all of which could alter riparian function. These activities could result in habitat loss or fragmentation, displacement of individuals, reduction in special status bird species' prey base, or direct mortality of individuals. Human activities associated with forestry and woodland actions could increase noise and visual stimulants in habitats. These factors could disrupt nesting and foraging behaviors, could result in the species leaving the area or abandoning nests, or could lead to individual nest failure and reduced reproductive success. A significant alteration of habitat could render suitable habitat uninhabitable for special status wildlife species.

Construction of roads through viable and occupied habitat of special status wildlife species to access the timber could also adversely affect special status wildlife species.

Under Alternative A, managing 17,900 acres as commercial forest and 82,400 acres as woodland could increase disturbance to habitats and could disturb special status wildlife species sensitive to these activities. It

should be noted that, although these acres have been identified for potential commercial harvest, they have never actually been managed for any significant commercial harvest.

Impacts from Livestock Grazing Management. Livestock use could cause direct competition to special status wildlife species and their habitat. Indirect impacts from livestock use likely include habitat disturbance or destruction, soil compaction, erosion, sedimentation, and increased potential for weed invasion and spread, which could subsequently reduce the health and vigor of vegetation, as well as alter the natural fire regime. To minimize impacts, however, the BLM would continue to improve grazing systems under all alternatives by requiring rotation of use and prohibiting grazing on disturbed areas, where feasible. Furthermore, livestock grazing permits have mitigation measures, BMPs, and stipulations to prevent weed invasion and impacts on vegetation and soils. Livestock grazing in the fall or early spring would remove the residual herbaceous understory, reducing its vertical structure, which in turn reduces the visual security for upland nesting birds, which could lead to increased predation and lower nesting success.

Livestock grazing could benefit special status wildlife species. Well-designed water developments for livestock use and associated riparian vegetation create nesting, feeding, and brood-rearing habitat for waterfowl, greater sage-grouse, and other migratory birds. Development of water sources in dry regions would allow special status wildlife species to expand into habitats that previously were used only seasonally. Range improvements for livestock would disperse the impact of livestock on the land, which would prevent disturbance, spread of weeds, and soil compaction in any one area.

Under Alternative A, livestock grazing would be open on 488,600 acres for 56,900 AUMs in the CRVFO, causing impacts in areas where potential and occupied special status species habitat occurs (Table 4.2.7-11). Although this alternative makes the highest amount of AUMs available for livestock grazing, 55 allotments are currently vacant and would probably remain vacant. Colorado Land Health Standards would be achieved under all alternatives. Where current livestock grazing is the reason the standards are not achieved, changes will be made in grazing to make significant progress in meeting those standards.

Table 4.2.7-11
Livestock Grazing By Alternative

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Acres open to grazing	488,300	441,600	427,800	442,200
Number of AUMs	39,200	35,500	35,500	36,500

Acronyms and Abbreviations:
AUM animal-unit month

Impacts from Recreation and Visitor Services Management. In all alternatives the most determinative land use plan decision for recreation and visitor services is whether to designate an area as an RMA or not. Alternative A would continue managing eight areas as SRMAs (Bocco Mountain, Bull Gulch, Deep Creek, Gypsum Hills, Hack Lake, Red Hill, Thompson Creek, and the Upper Colorado River). An NSO stipulation has been applied to all but Gypsum Hills and Bocco Mountain SRMAs to retain the existing physical recreation setting characteristics (RSCs). Seven areas would continue to be managed as RMAs with an NSO stipulation to protect nonmotorized recreation opportunities. Nonmotorized recreation opportunities were further described as those areas where the visitor can generally expect to see fewer people, largely because

access is more difficult or challenging, and can enjoy a mostly natural setting with a high degree of solitude and tranquility. Also, refer to Section 4.3.3 Recreation and Visitor Services, Section 4.3.4 Comprehensive Trails and Travel Management, and Appendix K, Recreation and Visitor Services Management Framework for SRMAs and ERMAs, for specific recreation and travel proposals and analysis.

A secondary consideration was the type of activities being emphasized, the anticipated use levels, and the amount of recreation infrastructure necessary to accommodate the recreation demand. To fully understand the impacts of these factors, they were considered in combination with each other.

In all alternatives, recreation would take place on BLM lands unless the lands are closed to human entry. Recreation activities and use would be unevenly dispersed and distributed by location, intensity, activity type, infrastructure, season, and time on BLM lands. Activities that create the most adverse effects either alter habitat or affect an animal's behavior. The severity of the response depends on the species involved and the characteristics of the disturbance. Birthing, nesting, and wintering areas are normally the most sensitive to human use and development because these areas are usually restricted geographically.

In the CRVFO, recreation use peaks during the summer in locations such as the Colorado and Eagle Rivers, on weekends and evenings on BLM lands adjacent to communities or within easy access of communities, and during the fall big game hunting seasons when many resident and out-of-town hunters add to the mix of recreation. Areas managed for lower recreation use levels (total, group size, and contact) in undeveloped landscapes are considered less impacting to terrestrial wildlife, regardless of the identification or amount of acres of recreation designation. It is important to note that some aspects that affect recreation use and, indirectly, wildlife are outside the parameters of this plan and BLM, such as urban growth and development, promotional marketing, the location of destination resorts, decisions made by other land and wildlife managing agencies, and new technology.

Developed recreation sites, within or outside RMAs, would be small localized points of high use. Roads and trails would be linear corridors of high use. In all alternatives, recreation development (e.g., trails, trailheads, river access, and campgrounds) would likely increase disturbances, modify habitat, reduce connectivity, reduce habitat effectiveness, increase habitat fragmentation, and increase habitat avoidance. This development can change and interfere with movement patterns.

Recreation actions must be mitigated so as not to contribute to the need to list any special status species under the provisions of the ESA. Therefore, it is unlikely that any recreation implementation-level action would be authorized when an environmental analysis concluded an adverse impact to special status species would result. Therefore, the most important consideration in the land use plan for special status wildlife species and their habitat is whether adequate mitigation is proposed to avoid or alleviate potential negative impacts from future recreation use and development.

Alternatives A and D lack the number and extent of special status terrestrial wildlife mitigation in the form of management actions and stipulations that would be included under the Proposed RMP and Alternative C. Alternative A also lacks the limitations on recreation use (e.g., camping closures and firearm use restriction) included under the Proposed RMP and Alternatives C and D, respectively. The risk to special status terrestrial wildlife species and their habit from inappropriate or increasing recreation use would be higher under Alternatives A and D.

Under all alternatives, land use plan decisions and implementation actions for recreation would comply with *Recreation Guidelines to Meet Public Land Health Standards on Bureau of Land Management Managed Lands in Colorado* (BLM 2000c). This guidance specifies that recreation use on BLM lands is to be managed to promote the survival and health of native wildlife, to protect wildlife habitat by preserving connectivity and avoiding fragmentation, and to minimize wildlife disturbances by limiting recreational use by type, season, intensity, distribution, or duration when necessary.

Impacts from Comprehensive Trails and Travel Management. Roads that provide access for the public can reduce the quality of habitats for many wildlife species through spread of weeds, collision mortality, behavior changes, disturbance, and habitat fragmentation. Trails have effects that are much harder to describe but have been linked to disturbance and displacement of some wildlife species. The impacts of travel decisions (OHV area and route decisions) on special status wildlife species and their habitat would primarily depend on the number of acres open and closed to OHV use under each alternative, the specific routes open and closed for public use, the type of travel permitted, and the application of limitations (time or season of use). Cross-country travel in open travel areas would continue to create new unplanned routes into sensitive wildlife habitats and increase habitat fragmentation. Disruptive activities would probably move animals into less desirable habitat and increase competition for available resources with other species. Chronic or continuous disturbance during harsh winters would probably reduce animal fitness and reproductive potential.

No alternative prescribes road densities that limit the number of roads or trails or the spatial distribution of routes resulting from management through time. However, BLM would manage public travel for areas designated as limited according to the route designations included under each alternative. Through the life of the plan, site-specific travel management issues would cause some routes to be rerouted, closed, or seasonally limited. It is also likely that some additional trails would be created for public use to connect regional trails systems, to support local community trail systems, and to meet the recreation objectives in some SRMAs and ERMAs.

Foot travel is not limited under any alternative, and horse travel is limited only on the Storm King Trail. As opposed to the Proposed RMP and Alternatives C and D, Alternative A would have area travel designations of "open" and "limited to existing routes," which have allowed an unplanned expansion of routes, and over time would cause the most direct and indirect impacts on wildlife populations and habitats. Seasonal limitations (e.g., wintering big game closures from December 1 to April 30, Red Hill SRMA from December 1 to March 31) would benefit special status wildlife species by limiting disturbance and avoidance caused by motorized travel during the critical winter months.

BLM lands are currently closed in many areas to over-snow travel to reduce stress on wintering wildlife. Snowmobiles can raise physiological stress hormones in animals (Conservation Magazine 2011). Land use restrictions on snowmobiles in lynx conservation areas may be appropriate to reduce interference or exploitation competition by coyotes using packed trails (Bunnell et al. 2006). The Castle Peak and State Bridge Canada lynx linkage areas are largely closed to over-snow travel BLM lands on King Mountain in the Egeria Canada lynx linkage area are closed to over-snow travel except for a few short designated routes. BLM lands in the Glenwood Canada lynx linkage area are open to over-snow travel. In greater sage-grouse winter habitat, recreation and travel activities should be dramatically reduced or at least be confined to established and approved roads and trails (CPW 2010e). Winter habitat for sage-grouse is only partially protected by over-snow closures and limitations in Alternative A.

Inappropriate and unplanned travel allowed by the current travel designations under Alternative A would have the most potential to impact the number, density, and composition of terrestrial wildlife species and the quality and connectivity of terrestrial wildlife habitat through the life of the plan.

Impacts from Lands and Realty Management. Lands and realty management actions, including ROWs and land disposals, could increase habitat fragmentation and could allow for direct removal of habitat, conversion of habitat to other habitat types, and weed invasion. Weed control measures in the ROW terms and conditions would minimize impacts. Benefits to special status wildlife species would result from withdrawing lands from locatable mineral development and by avoiding known habitat for special status species. These actions would protect special status species from removal, mortality, displacement, or disturbance, would prevent weed invasion or spread in these areas, and would reduce overall habitat fragmentation. Land acquisitions would protect special status species and their habitats by managing them under BLM guidelines and regulations. Under all alternatives, adverse impacts from lands and realty actions would be greater than benefits to special status wildlife species. However, implementation of mitigation measures would lessen the adverse impacts.

The effects of land tenure adjustments on special status wildlife species would be evaluated through site-specific environmental analysis for any proposed land disposals. Under Alternative A, all acres in the CRVFO would be considered on a case-by-case basis for disposal. Generally, lands that contain listed plant and animal species habitat would not be considered for disposal. BLM could acquire lands that contain special status wildlife species habitat. Doing so would benefit special status wildlife species by providing protections that would not be afforded by nonfederal ownership.

Implementation of Alternative A would include recommending the following areas for mineral withdrawal: Bull Gulch ACEC/SRMA, Deep Creek ACEC/SRMA, Thompson Creek ACEC/SRMA, Public water reserve, Rifle Gap reclamation project, and WSAs. Withdrawing these areas from mineral entry would reduce any adverse effects on special status wildlife species that could result from mineral development in these areas. Of the alternatives, the fewest acres would be petitioned for withdrawal under Alternative A, providing the fewest benefits to special status species.

ROWs or other land use authorizations (e.g., permits, leases, and easements) could be proposed in populations and habitats for special status wildlife species. Construction of ROWs in habitat for special status wildlife species could cause indirect impacts through degradation of habitat, habitat fragmentation, and other surface disturbance. ROWs within viable or occupied special status wildlife species habitat could also degrade habitat by introducing weeds.

Surface disturbances associated with ROWs and other land use authorizations could cause habitat loss or changes in vegetation structure, which could alter special status bird species' breeding at or near disturbance locations. In addition, the construction, operation, and maintenance of ROWs could increase noise and human presence in otherwise remote areas and could increase stress levels of special status bird species. Increased human presence could disturb foraging and nesting behavior of special status bird species prey. The disturbance of individuals could result in reduced productivity or nesting success and increased likelihood of individual mortality.

Construction and operation of roadway systems increase both traffic and visitation to otherwise remote areas. Increases in traffic and human presence could lead to increased mortality of special status wildlife species, such as the Canada lynx, because of vehicle collisions and potential poaching.

ROW construction has the potential to result in short-term impacts on the greater sage-grouse, including temporary displacement, loss of forage, and direct mortality. Potential long-term impacts include loss of habitat from permanent structures and surface-disturbances and disturbance from increased human presence, noise, and increased vehicular traffic on roadways. Direct habitat loss, including the conversion of habitat to agriculture, urban sprawl, and roadway development, has been cited as the reason for population declines in many special status wildlife species. Any direct habitat loss caused by ROW development in occupied or potential habitat could adversely affect special status species.

Alternative A would designate the fewest acres as ROW avoidance areas and ROW exclusion areas of all the alternatives, and therefore would be the least beneficial to special status wildlife species. However, it does have more retention acres than Alternative D, which should generally benefit special status wildlife species since habitat in these areas would be subject to BLM protections (Table 4.2.7-12).

Table 4.2.7-12
Lands and Realty Acres by Alternative

Lands and Realty	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
ROW avoidance areas	101,300	282,800	226,200	134,500
ROW exclusion areas	20,800	39,400	39,900	39,100
Retention areas (land tenure)	494,400	627,600	549,700	439,600
Areas identified for sale	11,100	0	0	0

Acronyms and Abbreviations:
ROW right-of-way

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Of all types of mineral and energy development, fluid mineral development has the greatest likelihood for development to take place in the CRVFO, given the current development and the high potential in the area. Existing leases are of concern since the BLM has much less control over them, compared with future leases. Under all alternatives, the BLM can develop COAs on APDs or voluntary mitigation with the oil and gas companies to reduce impacts on special status species. However, the mitigation is likely to be less protective than if a stipulation were to be placed on the lease. Impacts associated with minerals exploration and development would include habitat loss, habitat modification, and loss of habitat effectiveness. Indirect impacts are displacement of prey species, increased exposure to dust and other contaminants, weed introduction, weed spread, sedimentation, and erosion associated with construction of infrastructure and use of access roads. In the worst-case scenario, all vegetation would be removed from a parcel of land, and the site could be permanently altered. Mineral development would fragment habitats and could eliminate potentially suitable habitat for special status species. Oil and gas stipulations are in place to protect habitats or to ensure the reestablishment of desirable vegetation after the mineral and fluid management actions have been completed. In addition, permits include weed control stipulations that are effective if enforced. Overall, special status species habitat could be altered by minerals management actions, but mitigation measures would be implemented to reduce the impact. Under all alternatives, adverse impacts would be greater than beneficial

impacts, as reclamation efforts often have poor success rates, with loss of species diversity, increase in annuals, and decrease in perennials and woody plants.

Each phase of oil and gas development—from exploration and construction through operation and abandonment—has a specific combination of impact type, intensity, and duration.

- Exploration and Construction—The initial phase of development typically lasts for 25 to 40 days, depending on depth, and is very equipment intensive. Associated activities include blading an access road and pad (with an average combined area of 3.4 acres per well) and nearly continuous operation of a drill rig and other specialized heavy equipment. On average, 580 round-trips by heavy trucks and pickups are associated with each new well.
- Operation and Production—This phase typically involves minimal personnel in the field except at compressor stations and water disposal facilities, with periodic traffic to each well for monitoring and maintenance. Reclamation of temporarily disturbed areas begins on completion of construction. Successful reclamation for weed and erosion control is expected to occur within 3 to 5 years after disturbance; however, productive wildlife habitat restoration could take up to 20 years. The remainder of the disturbed area is occupied by surface facilities and ongoing human activity throughout the life of the well.
- Abandonment—The final phase of an oil or gas well occurs at the end of its productive life, typically ranging from 20 to 40 years. During abandonment, surface facilities are removed, wells are plugged, and access roads are reclaimed unless deemed necessary for resource management or if requested by the landowner. These activities involve a short-term increase in workers and vehicles in the project areas. Abandonment and reclamation activities require approximately 3 days per well and 4 days per mile of access road, for a crew of four people.
- Reclamation—Restoration of temporarily disturbed areas at the well pad and along the access road begins on completion of construction. Attaining reclamation standards in terms of erosion control, weed control, and establishment of vegetation cover typically requires at least 3 to 5 years after planting. Actual recovery of reclaimed areas to conditions that represent productive wildlife habitat may take 20 years or longer, especially in drier sites. Areas of long-term disturbance, which are occupied by surface facilities and ongoing human activity throughout the life of the well, are reclaimed following abandonment.

Oil and gas development is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill drilling and step-out drilling will be the major future activity. Of the federal mineral estate in this high-potential area, approximately 88 has been leased and is currently being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling is likely to occur in areas of medium and low potential, and no drilling activity is predicted in the areas identified as no-known potential. As a result, wildlife impacts relating to natural gas development are not expected to vary by location between alternatives.

Under Alternative A, all WSAs and the Thompson Creek Natural Environment Area (core portion of the ACEC) would be closed to fluid minerals leasing. Over the life of the current RMP, the designation as closed

to fluid minerals leasing for these areas would continue to indirectly maintain special status wildlife species habitat.

The CRVFO 1999 Oil and Gas Leasing and Development Record of Decision and RMP Amendment identified stipulations for leases issued after 1999 to reduce impacts on wildlife. These stipulations included NSO stipulations for SWAs, major river corridors, and raptors, TL stipulations for big game winter habitat, big game birthing areas, grouse, raptors, American white pelicans, and greater sandhill cranes, and LNs for wildlife and wildlife habitat. The ROD also included an NSO stipulation for wildlife seclusion areas and prohibits surface occupancy and surface-disturbing activities within seclusion areas that provide high wildlife value. These areas are Starkey Gulch, Riley Gulch, Crawford Gulch, Paradise Creek, Coal Ridge, Lower Garfield, Jackson Gulch, Bald Mountain, and Battlement Mesa. An NSO stipulation was applied to protect a broad range of values from the impact of human intrusion. Exceptions have been granted and would continue to be granted based on BLM approval of a mitigation plan that suitably addresses the wildlife seclusion values at risk.

Federal oil and gas regulations prevent the BLM from applying new or additional lease stipulations that would be developed through this planning effort to existing leases. However, federal regulations allow BLM to apply other protection measures in conjunction with planning and implementing oil and gas projects. These measures include applying stipulations consistent with the most recent land use plan as terms and conditions for discretionary approvals (e.g., ROW actions), and applying COAs to augment protections related to lease activities. The latter include applying a TL of up to 60 days and requiring that a project component be relocated by up to 200 meters (or more than 200 meters for areas with CSU stipulations) to protect a sensitive resource value. Examples of additional regulatory protections that BLM applies to existing leases are requirements for adequate reclamation, weed control, erosion control, and dust abatement.

East of the Grand Hogback, little impact on special status wildlife species from fluid mineral development would occur under all alternatives based on the lower potential for gas resources. BLM lands west of the Grand Hogback would continue to experience habitat loss, habitat modification, and loss of habitat effectiveness, with some degree of difference based on the level of development proposed. Alternative A anticipates 2,664 federal wells on 333 multi-well pads, with an estimated 3,347 acres of surface disturbance. This acreage includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 2,181 acres on interim reclamation of well pads. The landscape would continue to exhibit a loss of connectivity of habitats from the increased presence of corridors and roads. The spatial distribution, including density, composition, and frequency of species, would be impacted by the intensity and duration of fluid mineral development and production. Maintaining current levels of special status wildlife species populations commensurate with the species and habitats' potential would be at risk under all alternatives. Alternative A would pose more risk that the habitat conditions necessary for a variety of terrestrial wildlife species would not be sustained than under the Proposed RMP and Alternative C but less risk than under Alternative D.

Mineral and energy development under Alternative A would open the greatest amount of land (672,500 acres) and would close the least amount of land (28,700 acres) to fluid minerals leasing in the CRVFO. This alternative would probably cause direct and indirect adverse impacts on potential and occupied special status wildlife habitat. Adverse impacts from fluid mineral development would be greatest under this alternative. Mineral and energy development management would protect special status species and their potential habitat from direct and indirect disturbance by identifying CL areas. Implementation of mitigation measures would

lessen the adverse impacts on special status species. The Proposed RMP and Alternative C protect the most acres by NSO stipulations, CSU stipulations and TLs, with Alternative C being slightly more restrictive. Alternative D has fewer acres open to leasing; however, it has fewer acres protected by stipulations.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, the following areas would be petitioned for withdrawal from locatable mineral exploration and development: Bull Gulch, Deep Creek, and Thompson Creek ACEC/SRMAs. Withdrawing these three areas would protect special status wildlife species in those areas from surface-disturbing actions related to locatable mineral development. Locatable mineral development is not subject to NSO or CSU constraints, so special status wildlife habitat not withdrawn from mineral development would be vulnerable to surface-disturbing actions. The degree of impacts would vary depending on the location of proposed mineral development in relation to special status wildlife habitat. No public lands in CRVFO would be closed to mineral materials (salable) disposal or non-energy solid leasable minerals, except WSAs if Congress designates them as wilderness. However, unlike locatable mineral development, these activities would be subject to the existing stipulations, so impacts on special status wildlife would be minimal.

Impacts from Areas of Critical Environmental Concern Management. Special designations, such as ACECs, would protect special status wildlife species and their habitats by minimizing disturbances from recreation, mineral development, and weeds. Some ACECs would be given additional protection by designating them as ROW avoidance or exclusion areas and by implementing travel restrictions.

Under Alternative A, the BLM would continue designation and special management of the following ACECs: Blue Hill, Bull Gulch, Deep Creek, Lower Colorado River, and Thompson Creek. Although not designated specifically for special status wildlife species, an NSO stipulation on Bull Gulch, Deep Creek, and Thompson Creek to protect the ACEC values may indirectly benefit any special status wildlife species habitat that occurs within these ACECs. However, this NSO stipulation is designed to protect the relevant and important values for which these ACECs were designated, such as scenic qualities and geologic features. Exceptions to the NSO stipulation may be granted for activities that do not impair these values but may have impacts on other resources, such as special status wildlife species.

These ACECs would be petitioned for withdrawal from exploration and development of locatable minerals, which would protect special status wildlife species from surface disturbances related to locatable mining activities. Protections for special status wildlife species provided under Alternative A would be similar to the Proposed RMP, more than under Alternative D, but much less than Alternative C.

Impacts from Wilderness Study Area Management. Four CRVFO WSAs (27,700 acres) are currently managed under the Interim Management Policy: Bull Gulch, Castle Peak, Hack Lake, and Eagle Mountain. It is generally thought that WSAs are beneficial to special status wildlife species since they are designated to retain their character and influence, without permanent improvements or human habitation, and are managed to preserve their natural conditions. These WSAs contain 14,300 acres of mapped lynx habitat and 600 acres of sage-grouse habitat.

Alternative A would not include an NSO stipulation prohibiting surface occupancy and surface-disturbing activities in WSAs. Proposals would be evaluated on a case-by-case basis. Activities proposed under leases, permits, and mining claims would be subject to the IMP non-impairment criteria, except to the extent that a specific proposal is affected by the grandfathered or valid existing rights provision. The Proposed RMP and

Alternatives C and D would include an NSO stipulation prohibiting all surface-disturbing activities in WSAs. If Congress were to release the four WSAs in the CRVFO, these areas (encompassing approximately 27,700 acres) would be managed as ERMAs, and special status species could be disturbed by recreation there.

Impacts from Wild and Scenic Rivers Management. Under Alternative A, all stream segments determined to be eligible would be managed under interim protections to preserve the free-flowing condition, water quality, ORVs, and tentative classification. The interim protections would apply to lands within 0.25 mile of either side of the stream. This protection would benefit special status wildlife species, particularly bird species that prefer riparian habitats (Table 4.2.7-8 and Table 4.2.7-9).

Alternative B (Proposed RMP)

Impacts to special status species-terrestrial wildlife from soils management, general and rangeland vegetation management, weed management, wildland fire management, coal management, WSA management, and managing for wilderness characteristics; would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Special Status Species Management—Terrestrial Wildlife. Impacts would be similar to those under Alternative A, except as described below. All management actions and allowable use decisions proposed in the Proposed RMP and Alternatives C and D for the benefit of special status terrestrial wildlife species would offer short- and long-term benefits to the species and their habitats. The extent of protection varies somewhat by the theme of each alternative. Proposed decisions focus on managing habitat with overall results of (1) preventing the need for listing of proposed, candidate, and sensitive species under the ESA; (2) protecting special status species; and (3) improving their habitats to a point where their special status recognition is no longer warranted.

The Proposed RMP and Alternatives C and D would apply a more extensive NSO stipulation buffer radius for ferruginous hawk nesting and fledgling habitat, greater sage-grouse leks, occupied Columbian sharp-tailed grouse leks, Mexican spotted owl roosts and nest sites, and special status bat species roost sites (The Proposed RMP and Alternative C only). The Proposed RMP and Alternatives C and D would apply revised TLs for bald eagle nest sites and winter roost sites, ferruginous hawk nesting and fledgling habitat, greater sage-grouse winter and nesting habitat, Columbian sharp-tailed grouse winter and nesting habitat, Mexican spotted owl primary activity centers, and special status bat species maternity and hibernation sites.

Land use activities that result in the loss or degradation of sagebrush habitat within occupied greater sage-grouse habitat are of particular concern because sage-grouse depend on sagebrush plant communities year-round. In the CRVFO, occupied greater sage-grouse habitat (Northern Eagle and Southern Routt Counties) and areas of likely gas development (west of the Grand Hogback in Garfield and Mesa Counties) do not overlap; however, other types of land uses may impact greater sage-grouse habitat. The Proposed RMP and Alternative C propose applying a CSU stipulation to relocate potential land use disturbances in sagebrush shrublands within greater sage-grouse habitat. In Alternative C, where the CSU stipulation overlaps with the NSO stipulation for the Greater Sage-Grouse Habitat ACEC, the NSO stipulation would take precedence.

The Proposed RMP would propose applying an NSO stipulation which prohibits surface occupancy and surface-disturbing activities in greater sage-grouse priority habitat to: (1) sustain the integrity of sagebrush biome within priority greater sage-grouse habitats, (2) provide the amount, continuity, and quality of habitat that is necessary to maintain sustainable populations of greater sage-grouse, and (3) maintain the integrity of

habitat surrounding leks. The Proposed RMP would be the most restrictive of the alternatives since this NSO encompasses not only leks that have been active within the last 10 years and the 4-mile buffer, but also incorporates areas of high probability of use (summer or winter, or breeding habitat)

In addition, the Proposed RMP and Alternatives C and D have a TL that prohibits surface occupancy and surface-disturbing activities within a 4-mile radius of an active lek from March 1 to June 30 and within greater sage-grouse crucial winter habitat from December 16 to March 15. The Proposed RMP would be more restrictive than under Alternative A, which applies a 2-mile radius stipulation.

The Proposed RMP and Alternatives C and D propose an NSO stipulation that would be applied for Columbian sharp-tailed grouse leks that prohibits surface occupancy and surface-disturbing activities within a 0.4-mile radius of an active lek. This restriction is more protective than the NSO stipulation proposed under Alternative A, which covers a 0.25-mile radius. The larger radius of this NSO stipulation would better sustain lek persistence over the long term if an active lek were to occur on or near BLM lands. However, there are currently no active or known Columbian sharp-tailed grouse leks on BLM lands within the CRVFO at this time. The closest lek is in Egeria Park, 5 miles northwest of Toponas, Colorado.

To protect special status bat species, a TL included under the Proposed RMP and Alternatives C and D, would limit ground disturbance for maternity sites from April 15 to August 31 and for winter hibernacula sites from November 15 to April 15. An NSO stipulation, found under the Proposed RMP and Alternative C, would prohibit surface occupancy and surface-disturbing activities within a 0.25-mile radius of roost sites for Townsend's big-eared bat, fringed myotis, and other special status bat species, as well as non-status bats that use the sites.

Impacts from Water Resource Management. The Proposed RMP would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of six major rivers, as in Alternatives A, C, and D. It would also prohibit these activities within 1,000 horizontal feet of the ordinary high water mark of any hydrologic feature and within any municipal watershed that provides domestic water with an NSO and extends that to 2,300 horizontal feet for 5 miles upstream with a CSU. Additionally, the Proposed RMP has an NSO stipulation that prohibits surface occupancy and surface-disturbing activities within a buffer distance of 325 horizontal feet from the outer edge of the riparian and wetland zones that qulaify as perrenial streams their riparian areas as well as waterbodies and aquatic-dependent species. Any intermittment and ephemeral streams would be protected by a CSU that applies constraint within 100 feet from the edge of intermittent or ephemeral stream drainages as defined by the USGS National Hydrography Dataset (GIS) or field evaluation to maintain and protect water quality, stream stability, aquatic health, seasonal use and downstream fisheries, and sediment processes downstream.

Impacts from Vegetation Management—Forests and Woodlands. The Proposed RMP and Alternatives C and D would manage lodgepole pine and aspen on an even-aged basis to transition from homogeneous stands of over-mature aspen and lodgepole pine to create a more diverse age-class structure across the landscape. They would manage other species (e.g., pinyon-juniper, Engelmann spruce, Douglas-fir, subalpine fir, and limber pine) on an uneven-aged basis to mimic natural stand conditions and natural regeneration processes. This type of management would benefit special status wildlife species, and in particular lynx, since it would increase available forage for snowshoe hare.

Another objective of these alternatives is to identify areas for current or potential old-growth conditions based on structure and composition across the landscape. Old-growth forest stands are composed of trees that are generally in the late successional stages of development. The desired attributes of old-growth stands are older, large trees for the species and site; signs of decadence (broken or deformed tops or boles and some root decay); multiple layers of canopy; standing and down dead trees; a variation in tree age, size, and spacing; and gaps or patchiness in the canopy and understory. In addition, these objectives aim to maintain or contribute toward the restoration or development of old-growth structure and composition (primarily of spruce, fir, pinyon-juniper, and Douglas-fir stands) in areas where forest treatments utilizing the Healthy Forest Restoration Act are proposed. They would retain stands with old-growth characteristics such as, but not limited to, large trees, down and standing dead trees, and multiple canopy layers. These objectives would benefit lynx in that they would provide or maintain adequate down woody material necessary for lynx denning habitat.

Impacts from Vegetation Management—Riparian. Impacts would generally be the same as described for Alternative A. The Proposed RMP would apply an NSO stipulation that prohibits surface occupancy and surface-disturbing activities within a buffer distance of 325 horizontal feet from the outer edge of the riparian or wetland zones that qualify as perennial streams their riparian areas as well as waterbodies and aquatic-dependent species. This alternative would add approximately 32,900 acres more than Alternatives A and C. Additionally, it includes a CSU stipulation from 325 to 500 horizontal feet from the outer edge of the riparian or wetland zones to: maintain proper functioning condition (including the vegetation, hydrologic and geomorphic functionality of the riparian and wetland zones); protect water quality, fish habitat; aquatic habitat; provide a clean, reliable source of water for downstream users; and indirectly benefit migratory birds, wildlife habitat, amphibians, and other species.

Fisheries and Aquatic Wildlife Management. In addition to the restrictions discussed under Alternative A, the Proposed RMP would apply an NSO stipulation that prohibits surface occupancy and surface-disturbing activities within a buffer distance of 325 horizontal feet from the outer edge of the riparian or wetland zones that qualify as perennial streams their riparian areas as well as waterbodies and aquatic-dependent species. Additionally, it would apply a TL that prohibits in-channel stream work in all occupied trout streams during appropriate spring and fall spawning periods.

The additional protection would benefit special status terrestrial wildlife species such as the yellow-billed cuckoo and other birds that depend on mature riparian areas for nesting by not allowing the removal of important riparian vegetation and by restricting activity during times that coincide with nesting periods.

Impacts from Terrestrial Wildlife Management. The Proposed RMP and Alternatives C and D would not propose an NSO stipulation for wildlife seclusion areas. The Proposed RMP and Alternative C would propose an NSO stipulation for wildlife core areas on unleased BLM lands. The rationale is that BLM has been unable to manage for wildlife seclusion values as a result of the fluid minerals leases issued before the 1999 GSRA Oil and Gas Leasing and Development ROD and RMP Amendment, when the NSO stipulation for wildlife seclusion areas took effect. Only approximately 640 acres of the wildlife seclusion areas are left unleased. The Proposed RMP would include 45,600 acres, which is fewer than Alternative C (57,600 acres). The identification and protection of core wildlife also would protect habitat for special status wildlife species such as greater sage-grouse, Brewer's sparrow, and midget faded rattlesnake. Additionally, the Proposed RMP differs from the other three alternatives in that the Big Game TL and the Big Game Birthing TL are much

shorter, which could increase negative impacts to special status terrestrial wildlife species by allowing disruption impacts to resume in areas that were closed during the winter season.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Applying NSO and CSU stipulations for the protection of special status fish and other aquatic wildlife constrain surface-disturbing activities and would indirectly protect special status wildlife species and their habitat. Surface-disturbing activities often result in the loss of vegetation, which degrades wildlife habitat and alters the behavior of wildlife in those areas. Limiting these impacts would benefit special status wildlife species and their habitat. TLs for special status aquatic species would indirectly protect terrestrial species from disruptive activities during biologically sensitive periods (e.g., nesting, courtship, fledging, spawning, and hatching).

Impacts from Special Status Species Management—Plants. Special status plant species management and stipulations would indirectly protect terrestrial wildlife under the Proposed RMP, which is more restrictive than Alternative A and D, but less than Alternative C. The stipulations would provide indirect protection to special status wildlife species and their habitats in these areas.

Impacts from Cultural Resource Management. Impacts would generally be the same as or similar to those under Alternative A. However, proposed decisions under the Proposed RMP and Alternative C to protect cultural resources would include NSO stipulations to protect historic properties and traditional cultural properties or Native American areas of concern. These restrictions could indirectly protect any special status wildlife species and habitat within these areas from surface-disturbing activities. For example, greater sage-grouse habitat overlaps many of these protected areas; thus, the Proposed RMP and Alternative C would indirectly reduce adverse impacts in greater sage-grouse habitat. However, these stipulations could also harm special status species if a habitat restoration project could not take place because of a cultural site.

Impacts from Visual Resources Management. Impacts would generally be the same as described under Alternative A. In addition, all areas designated as VRM Class I or VRM Class II with slopes greater than 30 percent and high visual sensitivity would be protected with NSO stipulations, and areas designated as VRM Class II would be protected with a CSU stipulation. These stipulations are more constraining than those under Alternative A and would indirectly offer better protections to special status wildlife species and habitat. More area would be designated under the Proposed RMP as VRM Class I (35,600 acres) and VRM Class II (361,000 acres) than under the other alternatives, which would protect special status wildlife species by restricting surface-disturbing activities in these areas.

Under the Proposed RMP, a total of 132,800 acres would be designated as VRM Class III, and 185,500 acres would be managed as VRM Class IV. These areas, which can allow for greater landscape modification and therefore greater surface disturbance, could be subject to such actions as complete vegetation removal, which would drastically alter (at least in the short term) the habitat for special status wildlife species. The Proposed RMP would designate more acres in VRM Class III and IV than under C but fewer acres than under Alternatives A or D.

Impacts from Cave and Karst Resource Management. The NSO stipulation for the cave and karst occurrence areas applied in the Proposed RMP and Alternatives C and D would prohibit surface occupancy and surface-disturbing activities in a 40-acre area around 17 known cave and karst resources to a depth of 5,000 feet below the surface. The NSO area encompasses cave openings and portions of the subsurface features and watersheds immediately above the caves. The NSO stipulation would be applied to 10 known

caves in the Deep Creek cave area, a cave at Hack Lake on the Flat Tops, and small, dry caves in Glenwood Canyon. The Proposed RMP and Alternative D would protect known caves but would not protect caves yet undiscovered. The Proposed RMP and Alternative D would also offer less protection to subsurface portions of the cave that extend beyond the 40-acre area of the NSO stipulation at each cave. The potential indirect impacts to terrestrial wildlife would parallel the change in coverage of the NSO stipulations.

Impacts from Forestry Management. Management actions on forests and woodlands would have similar impacts on special status species as under Alternative A. Under the Proposed RMP, BLM would intensively manage 28,000 acres of forested lands. These actions would probably disturb special status species when and where the actions take place. The location and severity of these actions depend on the timing and number of commercial forestry actions that would occur. Maintaining and constructing roads for forestry would have impacts. The adverse impacts would be lessened through implementation of mitigation measures.

Under the forestry program of the Proposed RMP, a total of 20,734 acres that fall under intensively managed commercial forest and woodland are also within the Canada lynx range, and 4,908 acres are within greater sage-grouse range. If these lands were to ever be harvested, impacts on the special status wildlife species in the area could be adverse, both directly and indirectly.

Conversely, under the Proposed RMP, a combined 123,300 acres of forests and woodlands would be closed to commercial forestry development through WSA, SRMA, WSR, and other special designations. Of that total area, some 21,032 acres would be within Canada lynx range, and 2,222 acres would be within greater sage-grouse range. These closures would benefit special status wildlife.

Impacts from Livestock Grazing Management. In addition to the management discussed under Alternative A, the Proposed RMP would meet the forage demands of livestock operations based on current active preference (AUMs), while improving the quantity and quality of forage available for livestock and wildlife. In regards to greater sage-grouse, the populations are mostly limited to a small northeastern corner of the planning area. Resource uses from livestock grazing are not believed to be impacting sage-grouse as evidenced by both grazing and sage-grouse monitoring as well as the land health assessments. This alternative would be more beneficial to special status wildlife species than under Alternatives A or D, but less so than under Alternative C.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP and Alternatives C and D, BLM lands would be designated as SRMAs or as ERMAs, or left undesignated. Within SRMAs, R&VS management is recognized as the predominant land use focus, where specific recreation opportunities and RSCs are managed and protected on a long-term basis. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Since management within ERMAs is commensurate with the management of other resources and resource uses, all R&VS decisions would be compatible with other resource objectives.

Managing occupied habitat would generally be most compatible with BLM lands that are undesignated for R&VS or ERMA designations because wildlife management and conservation would be emphasized, or emphasized on an interdisciplinary basis commensurate with management of R&VS. However, since recreation actions must be mitigated so as not to contribute to the need to list any special status species under the provisions of the ESA, it is unlikely that any recreation designation or action would be authorized that would negatively impact special status species.

The Proposed RMP and Alternatives C and D would include more limitations (e.g., camping closures, firearm use restriction, and SRPs) on inappropriate recreation use. These limitations, along with the additional wildlife mitigations and stipulations in the Proposed RMP and Alternatives C and D would generally offer reduced risk of disturbance, increased habitat protection, and increased habitat effectiveness through the life of the plan.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as or similar to those under Alternative A, except that the Proposed RMP and Alternatives C and D would have no area travel designations of "open" or "limited to existing routes," which has been identified in land health assessments as causing impacts on wildlife habitats. BLM lands would have area designations of "limited to designated routes," which prohibit over-land cross-country motorized and mechanical travel. This designation would be a benefit to special status terrestrial wildlife species by (1) reducing inappropriate human disturbances, and (2) prohibiting the proliferation of user created routes that is currently occurring on BLM lands.

The Proposed RMP and Alternative C propose more areas with seasonal limitations, which would benefit wildlife by limiting disturbance and avoidance on a greater extent of the CRVFO during critical periods of the year. The winter closure dates may be 15 days less, but the closures apply to motorized and mechanized travel, the modes of travel with the capability to cover long distances.

The Proposed RMP would prohibit over-snow travel on 174,600 acres. The areas and acres that would be limited or closed to over-snow travel would benefit special status terrestrial wildlife species. For example, the functional value of the Castle Peak Canada lynx linkage area and the occupied habitat for greater sage-grouse would be improved by (1) reducing the sight and sound disturbances, and (2) minimizing activities that increase current use levels and human-induced snow compaction (Claar et al. 1999).

Based on the combination of travel limitations for wildlife and the route designations, the Proposed RMP and Alternative C would be more beneficial to maintaining the number, density, and composition of special status terrestrial wildlife species and the quality and connectivity of terrestrial wildlife habitat.

Impacts from Lands and Realty Management. Under the Proposed RMP, lands and realty actions would have impacts similar to those described under Alternative A. Adverse impacts would be direct and indirect. Implementation of Section 368 of the Energy Policy Act of 2005 would reduce impacts by addressing energy corridor-related issues. Benefits to special status wildlife species would result from designating additional ROW avoidance and exclusion areas (Table 4.2.7-5). Other benefits to special status wildlife species would result from minimizing communication sites, identifying areas for retention, and withdrawing lands from locatable mineral development. These actions would protect special status species from removal, displacement, or disturbance, would prevent weed invasion or spread in these areas, and would reduce overall habitat fragmentation. Beneficial impacts would be direct and indirect.

The types of impacts experienced as a result of land tenure adjustments would be similar to those described under Alternative A, except that the Proposed RMP would also include retention areas. Approximately 488,400 acres have been identified for retention for long-term management and include such areas as ACECs, sage-grouse core habitat, perennial stream corridors, and habitat for listed, proposed, or candidate species.

The types of impacts as a result of withdrawals would be similar to those described under Alternative A, except that under the Proposed RMP, an additional 146,700 acres would be proposed for withdrawal.

The types of impacts experienced as a result of wind and solar authorizations would be similar to those described under Alternative A, except that the Proposed RMP would give greater consideration to renewable energy projects. In addition, implementation of the Proposed RMP would allow wind energy exploration and development to be considered in ACECs that are not identified as ROW exclusion areas.

Oil, gas, oil shale, geothermal, wind, solar development, and associated ROWs can affect the sustainability of sage-grouse populations. It is imperative that fragmentation and degradation of greater sage-grouse habitat not occur to the point that sustainable sage-grouse populations can no longer be supported. In November 2004, the BLM National Strategy set goals and objectives and assembled guidance and resource materials. It also provided comprehensive management direction for BLM's contributions to the ongoing multi-state sage-grouse conservation effort. BLM IM 2010-071 reflects continued implementation of the goals set forth in the BLM National Strategy. The IM direction, along with the management actions proposed in the Proposed RMP and Alternative D, would minimize impacts on occupied sage-grouse habitat from energy development and transmission projects that could degrade habitat necessary to sustain sage-grouse populations.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Mineral and energy development under the Proposed RMP would open 565,600 acres and would close 138,900 acres to fluid minerals leasing. As a result, mineral and energy development would probably impact potential and occupied special status wildlife species habitat in the CRVFO, causing direct and adverse impacts. Impacts would be slightly less than under Alternative A because fewer acres would be open to fluid minerals leasing under the Proposed RMP. Adverse impacts would be reduced through implementation of mitigation measures.

The Proposed RMP and Alternatives C and D would not include an NSO for wildlife seclusion areas. The Proposed RMP and Alternative C would include an NSO for wildlife core areas on unleased BLM lands with low to moderate potential for the occurrence of natural gas resources. The rationale is the fact that the BLM has been unable to manage effectively for wildlife seclusion values as a result of the large number of leases issued before the 1999 GSRA Oil and Gas Leasing and Development ROD and RMP Amendment, when the NSO stipulation for wildlife seclusion areas took effect. In addition, the BLM cannot manage for wildlife seclusion on split-estate lands with private surface. Only approximately 640 acres of the wildlife seclusion areas underlying BLM surface lands are left unleased. Decisions from this RMP revision would apply to those 640 acres.

Special status wildlife species and their habitats would benefit indirectly from an increase in stipulations and areas closed to fluid minerals leasing for other resources (e.g., NSO on Core Wildlife Areas). The application of NSO and TL stipulations for wildlife areas would offer specific and direct protections not afforded under Alternative A. West of the Grand Hogback, the Proposed RMP offers slightly less risk that the habitat conditions would not be sustained, based on the lower level of development anticipated and the possible application of mitigation measures consistent with decisions included in this RMP revision.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts would be generally similar to Alternative A. However, the following areas with special status wildlife species habitat would be petitioned for withdrawal from locatable mineral exploration and

development: same areas discussed under Alternative A, the Proposed RMP ACECs, Upper Colorado River SRMA, municipal watersheds (Beaver Creek), and four WSR segments. The following areas with special status wildlife species habitat would be closed to mineral materials (salable) disposal and closed to non-energy leasable minerals under the Proposed RMP: ACECs, SRMAs, WSR segments, and the Beaver Creek municipal watershed. This alternative would protect more special status wildlife habitat than under Alternatives A or D but less than under Alternative C.

Oil, gas, oil shale, and geothermal development can affect the sustainability of sage-grouse populations. It is imperative that fragmentation and degradation of greater sage-grouse habitat not occur to the point that sustainable sage-grouse populations can no longer be supported. In November 2004, the BLM National Strategy set goals and objectives and assembled guidance and resource materials. It also provided comprehensive management direction for BLM's contributions to the ongoing multi-state sage-grouse conservation effort. BLM IM 2010-071 reflects continued implementation of the goals set forth in the BLM National Strategy. The IM direction, along with the management actions proposed in the Proposed RMP and Alternative D, would minimize impacts on occupied sage-grouse habitat from energy development and transmission projects that could degrade habitat necessary to sustain sage-grouse populations.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, BLM would continue designation and special management of the following ACECs: Blue Hill, Bull Gulch, Deep Creek, Glenwood Springs Debris Flow Hazard Zone, and Thompson Creek. Although not designated specifically for special status wildlife species, an NSO to protect the ACEC values may indirectly benefit the special status wildlife species habitat that occurs within these ACECs. However, this NSO is designed to protect the relevant and important values for which these ACECs were designated, such as scenic qualities and geologic features. Exceptions to the NSO may be granted for activities that do not impair these values but may have impacts on other resources, such as special status wildlife species. In addition, the Proposed RMP would also designate Hardscrabble-East Eagle, Lyons Gulch, McCoy Fan Delta, Sheep Creek Uplands, and Mount Logan Foothills as ACECs, which would benefit special status wildlife species in those areas.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, BLM would determine that Deep Creek Segments 2 (wild) and 3 (recreational) are suitable for inclusion into the NWSRS. All other segments but the Colorado River segments would be determined not suitable and would be released from further protection under the Wild and Scenic River Act. BLM would defer a suitability determinations on the Colorado River segments and would apply management action and allowable use decisions proposed under the Proposed RMP along with the adoption of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to protect the free-flowing condition, water quality, ORVs, and tentative classifications. The stakeholder group management plan would protect the ORVs through a cooperative water delivery mechanism. If monitoring indicated a decline in the condition of the ORVs, BLM would start the formal suitability process to designate the Colorado River segments for inclusion into the NWSRS.

BLM has not identified or brought forward and is not analyzing instream flows in this planning process, nor is it required to do so until after designation. At the time of designation, BLM would write a WSR management plan that would then address the needed instream flows.

The stakeholder group management plan would attempt to operate water facilities in a manner that meets water supply objectives and protects the ORVs. With no stakeholder group management plan, water flows

would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use over the life of the plan.

Based on the number of stream segments determined to be eligible and managed under interim protection or found to be suitable, WSR decisions included in the Proposed RMP would be less beneficial than either Alternative A or Alternative C. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the outstandingly remarkable values while acknowledging other uses of the river corridor, rather than just making eligibility determinations. Alternative D would be the least beneficial to special status aquatic species, as none of the eligible segments would be determined suitable for inclusion into the NWSRS.

Alternative C

Impacts to special status terrestrial wildlife from general, rangeland, and riparian vegetation management, weed management, wildland fire management, coal management, and WSA management would be the same as or similar to those under Alternative A. Impacts to special status terrestrial wildlife from soils management, forests and woodlands vegetation management, cultural resource management, and comprehensive trails and travel management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources and uses would be as described below.

Impacts from Special Status Species Management—Terrestrial Wildlife. Alternatives C and D propose applying an NSO stipulation, which prohibits surface occupancy and surface-disturbing activities within a 0.6-mile radius of an active lek (a lek that has been attended by male sage-grouse during the strutting season within the last 10 years). This stipulation is more restrictive than under Alternative A, which has a 0.25-mile radius of protection. The larger radius NSO stipulation would reduce the impacts of surface disturbances such as roads on lek occupancy (Hess and Beck 2009), and in turn would sustain lek persistence over the long term.

The Proposed RMP and Alternative C propose applying a CSU stipulation to relocate potential land use disturbances in sagebrush shrublands within greater sage-grouse habitat. In Alternative C, where the CSU stipulation overlaps with the NSO stipulation for the Greater Sage-grouse Habitat ACEC, the NSO stipulation would take precedence. See Impacts from ACEC Management below for analysis of the Greater Sage-grouse Habitat ACEC.

Impacts from Water Resource Management. Implementation of water quality- and quantity-related actions would guide or advise other program actions and activities in a manner conducive to maintaining or improving surface water quality. This management would be consistent with existing and anticipated uses and applicable state and federal water quality standards. Beneficial impacts on special status species include improved habitat for fish and wildlife and their associated prey. Maintaining or improving habitat associated with aquatic systems would provide long-term benefits for bald eagle, northern goshawk, and western yellow-billed cuckoo habitats and populations.

Alternative C would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of nine major rivers as well as within 50 feet from the ordinary high water mark of any hydrologic feature, and within any municipal watershed providing domestic water. In addition, Alternative C would restrict surface use within 100 feet of the edge of a hydrologic feature, such as ephemeral, intermittent, and perennial channels, wetlands, lakes, fens, and springs.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be similar to those described in Alternative A. In addition, Alternative C would prohibit surface occupancy within 100 meters of all perennial waters. There is also a TL that prohibits in-channel stream work in all occupied trout streams during spring and fall spawning periods, from March 1 to August 1 for rainbow and cutthroat trout and from October 1 to November 30 for brown and brook trout.

Impacts from Terrestrial Wildlife Management. Instead of the NSO stipulation applied under Alternative A and the Proposed RMP, all SWAs would be closed to fluid minerals leasing. In addition core wildlife areas would be closed to fluid minerals leasing. Special status terrestrial wildlife species would indirectly benefit by the elimination of a potential land use disturbances and the reduced risk of habitat fragmentation by fluid minerals development.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts would be similar to those described in the Proposed RMP. However, Alternative C proposes major constraints on surface-disturbing activities in that it establishes four NSO stipulations and no CSU stipulations for the protection of special status fish and other aquatic wildlife. Prohibiting surface-disturbing activities would benefit special status terrestrial wildlife species and their habitat by reducing the loss of vegetation, which degrades wildlife habitat and alters the behavior of wildlife.

Impacts from Special Status Species Management – Plants. Impacts would be generally similar to Alternative A and the Proposed RMP. In addition, under Alternative C, additional protection would be provided to special status plant species with an NSO stipulation, applied to 25,600 acres. This stipulation would provide some indirect protection to special status wildlife species and their habitats in these areas. More ACECs to protect special status plants would be designated under this alternative than any other alternative. Impacts on special status wildlife species terrestrial wildlife would be beneficial, both directly and indirectly.

Impacts from Visual Resources Management. Impacts and management actions would generally be the same as or similar to those under the Proposed RMP. However, more area would be designated as VRM Class I (35,800 acres) and VRM Class II (256,900 acres) under this alternative, which would protect special status wildlife species by restricting surface-disturbing activities in these areas.

Also under Alternative C, a total of 96,200 acres would be designated as VRM Class III and 116,300 acres would be managed as VRM Class IV. These areas, which can allow for greater landscape modification and therefore greater surface disturbance, could be subject to such actions as complete vegetation removal, which would drastically alter (at least in the short term) the habitat for special status wildlife species. Alternative C would designate fewer acres in VRM Class III than under the Proposed RMP and Alternatives A and D.

Impacts from Cave and Karst Resource Management. Alternative C proposes to apply both the NSO stipulation for the Deep Creek Cave area and the cave and karst occurrence NSO stipulation. Alternative C would protect known caves and caves yet undiscovered in the Deep Creek area. Alternative C would offer protections to the subsurface portions of caves in the Deep Creek area that extend beyond the 40-acre margin of the cave and karst occurrence NSO stipulation. Alternative C would offer the greatest extent of protection for caves and special status terrestrial wildlife species that use caves.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, all lands with wilderness characteristics outside existing WSAs (45,800 acres) would be managed to protect their qualities of naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation. These lands would be closed to fluid minerals leasing. In addition, an NSO would prohibit surface occupancy and surface-disturbing activities. These protections would limit impacts on special status wildlife species and their habitat within the protected lands. However, specific exemptions and allowances would be made to accommodate valid existing rights. For example, mineral leases represent a valid existing right and, within areas managed to maintain wilderness characteristics, existing livestock grazing and the activities and facilities that support a grazing program are permitted to continue.

Linkage areas for Canada lynx and greater sage-grouse habitat occur within areas managed for wilderness characteristics. Managing for wilderness characteristics in these land units would reduce or eliminate potential impacts on the lynx and sage-grouse and their habitats within these areas.

New discretionary uses that create valid existing rights are not allowed if they would detract from the wilderness values. For example, new permanent roads would not be authorized unless they meet strict criteria. These lands are also closed to commercial timber harvest, firewood cutting, and special forest product harvest, and fluid minerals leasing development.

Impacts from Forestry Management. Management actions on forests and woodlands would have similar impacts on special status wildlife species as under the Proposed RMP. However, Alternative C would designate 400 more acres as commercial forest for intensive management. There would also be more area (135,500 acres) closed to commercial harvest under Alternative C. These differences would reduce the negative impacts on special status wildlife species by limiting the disturbance to habitat and individuals.

Under Alternative C, a total of 19,449 acres that fall under intensively managed commercial forest and woodland are also within the Canada lynx range, and a small part of it is within greater sage-grouse range. If these lands were to ever be developed, impacts on the special status wildlife species in the area would be adverse, both directly and indirectly.

Conversely, under Alternative C, some 135,000 acres of forests and woodlands would be closed to commercial forestry development based on WSA, SRMA, WSR, or other special designations. Of that total area, some 26,226 acres are within Canada lynx range, and a greater amount is within greater sage-grouse range. These closures would benefit special status wildlife species.

Impacts from Livestock Grazing Management. Impacts would be the same as or similar to Alternative A. However, Alternative C would meet the forage demands of wildlife first, based on CPW objectives, and would meet the forage demands of livestock operations second, based on current active preference. If conflicts for forage were to arise that cannot be mitigated by vegetation or habitat treatments, these areas would either be authorized for a reduced level of livestock use or be designated as unavailable for livestock grazing. This alternative would be the most beneficial to special status wildlife species.

Impacts from Recreation and Visitor Services Management. Under Alternative C, current recreation uses would be recognized but not necessarily accommodated when considering land uses. Impacts would generally be the same as or similar to those under the Proposed RMP except that Alternative C would designate only the Red Hill and the Upper Colorado SRMAs. Three additional ERMAs (Hack Lake, King

Mountain, and The Crown) would be identified to specifically address local recreation issues. The NSO stipulation for core wildlife areas would mitigate recreation developments that would impact special status wildlife species.

Disturbance to special status wildlife would be mitigated through additional winter closures that apply to both mechanized and motorized use, potential closures to human activity and dogs during harsh winters, and travel route designations.

The Proposed RMP and Alternatives C and D include more limitations (e.g., camping closures, firearm use restriction, and SRPs) on inappropriate recreation use. Alternative C includes the most wildlife mitigation in the form of management actions (e.g., winter big game closures) and stipulations (e.g., NSO, TL stipulations) to reduce disturbance and maintain habitat effectiveness. Alternative C would best ensure that Land Health Standard 4 for special status wildlife species would be met through the life of the plan (Appendix J).

Impacts from Trails and Travel Management. Alternative C would prohibit over-snow travel on 206,400 acres. Impacts would be similar to the Proposed RMP except the expanded travel limitations and reduced number of designated routes proposed under Alternative C would further decrease travel-related disturbance to wide-ranging special status terrestrial wildlife species. Under Alternative C, the entire Castle Peak portion of the Greater Sage-grouse Habitat ACEC is closed to over-snow travel, which would decrease human disturbance during the winter months when birds are stressed by factors such as weather, cold temperatures, and reduced food supplies.

Impacts from Lands and Realty Management. Lands and realty actions under Alternative C would have impacts similar to those described under Alternative A. However, Alternative C would offer the most benefit of all alternatives by designating the greatest number of acres for retention and withdrawal and the greatest total number of acres of ROW avoidance and exclusion areas, 226,200 acres for retention and withdrawal and 39,900 acres for ROW avoidance (Table 4.2.7-12). Adverse impacts from alternative energy development are similar to those described for the Proposed RMP. However, the IM direction, along with the management actions proposed in Alternative C (ROW exclusion area identification in the Greater Sage-grouse ACEC and within 0.6 mile of active lek sites), would eliminate impacts to occupied sage-grouse habitat from energy development and transmission projects that could degrade habitat necessary for sustaining sage-grouse populations.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as or similar to Alternative A. However, mineral and energy development would open the fewest acres (521,500) and would close the most acres (179,700) to fluid mineral development under Alternative C. This level of development would probably impact potential and occupied special status wildlife species habitat in the CRVFO. Adverse impacts from fluid mineral development would be least under this alternative. Adverse impacts on special status species would be lessened through the implementation of mitigation measures.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Alternative C would close areas with special status wildlife habitat to locatable mineral exploration and development, mineral materials (salable) disposal, and non-energy leasable mineral sale. Alternative C would protect the most acreage of special status terrestrial wildlife species habitat from surface disturbances associated with mineral development.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, BLM would continue designation and special management of the following existing ACECs: Blue Hill, Bull Gulch, Deep Creek, Glenwood Springs Debris Flow Hazard Zone, and Thompson Creek. Although not designated specifically for special status wildlife species, an NSO stipulation to protect the ACEC values may indirectly benefit the special status wildlife species habitat that occurs within these ACECs. However, this NSO is designed to protect the relevant and important values for which these ACECs were designated, such as scenic qualities and geologic features. Exceptions to the NSO may be granted for activities that do not impair these values but may have impacts on other resources, such as special status wildlife species.

Alternative C proposes to designate additional ACECs (Abrams Creek, Colorado River Seeps, Dotsero Crater, Grand Hogback, Greater Sage-Grouse Habitat, and The Crown Ridge). Management prescriptions for ACECs generally limit habitat disturbances and land uses, indirectly benefiting a wide range of special status terrestrial wildlife.

The Greater Sage-grouse Habitat ACEC is proposed specifically to protect 24,600 acres of greater sage-grouse habitat on BLM land. The ACEC would encompass the southwest flanks of King Mountain, the northern tier of Castle Peak, and the sagebrush shrublands north of Wolcott, Colorado. The Northern Eagle/Southern Routt greater sage-grouse population is one of the smaller populations in Colorado, and the portion of the population within the CRVFO is vulnerable to local extirpation. CPW believes this area to be priority habitat for the Northern Eagle/Southern Routt greater sage-grouse population (Rossi 2011.). Priority habitat is the habitat of highest conservation value relative to maintaining sustainable sage-grouse populations. This ACEC would maintain the current available greater sage-grouse habitat on BLM lands considered critical to conserving the population and necessary to maintain range-wide connectivity and genetic diversity.

Proposed management action and allowable use decisions (e.g., VRM Class II designation, ROW avoidance area identification, and closing the Castle Peak portion to over-the-snow travel) for the Greater Sage-Grouse Habitat ACEC will help maintain or enhance greater sage-grouse numbers and distribution through the protection of habitat from potentially impacting surface uses. The Greater Sage-Grouse Habitat ACEC is encumbered by valid existing rights, such as power lines, ditches, and roads. However, the proposed management action and allowable use decisions ensure that conservation principles such as consolidation of infrastructure to reduce habitat fragmentation and loss are included in authorized activities or infrastructure maintenance.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The interim protections would apply to lands within 0.25 mile of either side of the stream segment. This buffer area would benefit special status terrestrial wildlife species, particularly bird species that prefer riparian habitats. In addition, Alternative C would include a decision that would close the stream segments to oil and gas leasing.

Alternative D

Impacts to special status terrestrial wildlife from soils management, riparian vegetation management, and forests and woodlands vegetation management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Special Status Species Management—Terrestrial Wildlife. Grouse habitat under Alternative D is addressed in the same way as under Alternative C, but without a stipulation concerning Columbian sharp-tailed grouse leks. There are no known Columbian sharp-tailed grouse populations or individuals in the CRVFO planning area.

Special status bats would have the same TL stipulation as under the Proposed RMP and Alternative C. However, Alternative D would not have an NSO for special status bat roost sites but would include a CSU stipulation, which applies restrictions within 0.25 mile of roost sites of special status bat species.

Impacts from Water Resource Management. Impacts would be generally similar to Alternative A, but Alternative D prohibits surface occupancy and surface-disturbing activities within any municipal watershed providing domestic water with two NSOs.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be similar to Alternative A. In addition, Alternative D would designate controlled surface use within 100 meters of all trout-bearing streams and a TL that prohibits in-channel stream work in all occupied trout streams during spring and fall spawning, from March 1 to August 1 for rainbow and cutthroat trout and from October 1 to November 30 for brown and brook trout.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to Alternative A, but, instead of the NSO under Alternative A and the Proposed RMP, Alternative D would have a CSU stipulation to restrict surface disturbance on SWAs. This CSU stipulation is considered a moderate constraint that allows some use and occupancy while protecting wildlife values on unleased lands.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts would be similar to the Proposed RMP, but Alternative D would have an additional NSO that protects core conservation populations of Colorado River cutthroat trout. In addition, a TL applies only to core conservation populations of this species instead of to all occupied habitat, as under the Proposed RMP.

Impacts from Special Status Species Management – Plants. Impacts would be similar to Alternative A and the Proposed RMP. An NSO stipulation on 1,100 acres for special status plant species would provide some indirect protection to special status wildlife species and their habitats in these areas. A CSU stipulation would be applied to surface-disturbing activities within a 100-meter (328-foot) buffer around occupied BLM sensitive species habitat. Impacts on special status wildlife species terrestrial wildlife would be beneficial, both directly and indirectly.

Impacts from Cultural Resource Management. Alternative D would be the least restrictive alternative, with only one management action, an NSO that prohibits surface occupancy and surface-disturbing activities within 0.25 mile of traditional cultural properties or Native American areas of concern. This NSO could be beneficial, both directly and indirectly to special status wildlife species, although if a habitat restoration project were to be precluded by a cultural site, the impacts would be negative.

Impacts from Visual Resources Management.. Impacts and management actions would generally be the same as or similar to those under the Proposed RMP. However, more acres would be designated as VRM Class I (35,200), which would protect special status wildlife species by restricting surface-disturbing activities

in these areas. Conversely, fewer acres would be designated VRM Class II (217,900) than under Alternatives A and C and the Proposed RMP.

Under Alternative D, a total of 113,100 acres would be designated as VRM Class III, and 139,000 acres would be managed as VRM Class IV. These areas, which can allow for greater landscape modification and therefore greater surface disturbance, could be subject to such actions as complete vegetation removal, which would drastically alter (at least in the short term) the habitat for special status wildlife species. Alternative D would designate more acres in VRM Class III and IV than under the Proposed RMP and Alternative C but less than under Alternative A.

Impacts from Forestry Management. Management actions on forests and woodlands would have similar impacts on special status species as under the Proposed RMP. The difference is that Alternative D would designate 3,800 fewer acres as commercial forest for intensive management. There would also be more area (76,600 acres) closed to commercial harvest under Alternative D. These differences would lessen the negative impacts on special status species by limiting the disturbance to habitat and individuals.

Under Alternative D, approximately 20,700 acres that fall under intensively managed commercial forest and woodland are also within the Canada lynx range. If these lands were to be developed, impacts on the special status wildlife species in the area would be adverse, both directly and indirectly.

Impacts from Livestock Grazing Management. Impacts would be generally similar to Alternative A, but under Alternative D, the BLM would provide adequate forage for livestock first and for wildlife second. This alternative would have fewer benefits for special status wildlife than under other alternatives.

Impacts from Recreation and Visitor Services Management. Under the theme of Alternative D, overall management would favor recreation use as well as other land uses. Recreation infrastructure would be constructed to accommodate higher use levels and a destination tourism market for mountain biking in many of the proposed SRMAs (e.g., The Crown, Fisher Creek, Hardscrabble/East Eagle, Red Hill, a portion of Thompson Creek, and Upper Colorado River). Generally more implementation-level conflicts are anticipated to occur with special status terrestrial wildlife in areas that (1) emphasize accommodating or attracting higher numbers of visitors, increasing the risk of disturbance, or (2) require an expansion of recreation trails and facilities that would fragment (effect loss of connectivity) wildlife habitat. The anticipated increases in recreation use and infrastructure, as well as the reduced mitigation (less than the Proposed RMP and Alternative C), would increase the risk of disturbance of wildlife. Alternative D would also pose the most potential of habitat fragmentation and loss of habitat connectivity over the life of the plan.

Impacts from Lands and Realty Management. Lands and realty actions under Alternative D would have impacts similar to those described for Alternative A. Adverse impacts would be direct and indirect. Overall, benefits to special status wildlife species would be less than under the Proposed RMP and Alternative C because communication sites would not be minimized, and avoidance areas and retention areas would be smaller. Adverse impacts from alternative energy development are similar to those described under the Proposed RMP. Adverse impacts could be lessened through mitigation measures.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be generally similar to Alternative A. Mineral and energy development under Alternative D would open 648,400 acres and would close 52,800 acres to fluid mineral development. This level of

development would probably impact potential and occupied special status wildlife species habitat in the CRVFO. Impacts would be slightly greater than under the Proposed RMP, because of the larger amount of land open to leasing. Impacts would be direct and adverse. Adverse impacts would be lessened through implementation of mitigation measures.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative D, the following areas with special status wildlife species habitat would be petitioned for withdrawal from locatable exploration and development: Alternative D ACECs and Upper Colorado River SRMA. Only WSAs would be withdrawn from mineral materials disposal (salable) and only if Congress designates them as wilderness. Areas closed to non-energy leasable minerals would generally be the same as under the Proposed RMP.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be greatest under Alternative D. BLM would continue designation and special management for only three ACECs: Blue Hill, Bull Gulch, and Glenwood Springs Debris Flow Hazard Zone. Alternative D would have the least benefits for special status wildlife species of all alternatives.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. As compared with the other alternatives, special status terrestrial species and their habitats would not benefit from WSR determinations or the associated management action and allowable use decisions.

Cumulative Impacts (Special Status Terrestrial Wildlife)

The cumulative impacts for special status wildlife vary by species. These cumulative impacts would result from surface disturbance and disruptive activities in and near the CRVFO, such as housing development, oil and gas development, and increased recreation. The quantity and quality of habitat available for special status species would be expected to decline over time, especially under Alternatives A and D, which would have the fewest overall restrictions and result in the most development of mineral resources.

The challenge of habitat fragmentation and associated impacts, primarily on biological resources, is anticipated to continue under all alternatives. Regardless of landownership, surface-disturbing activities, fire, weed spread, and activities that remove vegetation and disturb soil are anticipated to contribute to habitat fragmentation within the planning area. Habitat fragmentation from non-BLM actions is primarily anticipated from urban development, energy development, and associated infrastructure (e.g., roads and utility lines). The majority of habitat fragmentation is anticipated to occur near population centers, particularly in Garfield and Mesa Counties in the CRVFO, which are anticipated to have the most population growth over the life of the plan. Habitat fragmentation is also expected to be greater in the western portion of the CRVFO, where most of the mineral development is concentrated.

Increasingly, agencies are working together to reduce habitat fragmentation in the CRVFO and surrounding lands. For example, BLM, the Federal Highway Administration (FHWA), USFWS, USFS, CPW, and CDOT entered into an MOU to address the impacts of the Interstate 70 corridor on wildlife dispersal and habitat fragmentation. The MOU aims to identify and implement corrective actions to increase the permeability of the Interstate70 corridor to terrestrial wildlife species and to streamline the Section 7 consultation process under the ESA for certain projects relating to the corridor.

In general, Alternative C would have the most actions to prevent habitat fragmentation, such as closing the most acres to livestock grazing and fluid minerals leasing, applying NSO stipulations on the most land, designating the fewest SRMAs, and designating the most ROW exclusion areas and special designations. Alternative A would have the fewest actions to prevent habitat fragmentation, as it uses outdated guidance to manage BLM lands. As such, cumulative impacts from habitat fragmentation would be greatest under Alternative A and the least under Alternative C.

If supported by favorable economic conditions, population centers are expected to grow in both geographic area and population density over the life of the plan. The trend in western states of subdividing larger private parcels to support development of residential subdivisions and ranchettes (e.g., 35-acre parcels) is expected to continue and contribute to habitat fragmentation. As larger tracts of land adjacent to public lands are subdivided, the urban interface and its associated issues (e.g., fragmentation, fire suppression, and spread of weeds) are also expected to grow. As the urban interface expands, some tracts of BLM land may become disconnected or isolated from other native habitats and ultimately adversely affect planning area biological diversity. For example, the towns of Carbondale, Glenwood Springs, New Castle, and Rifle all border public lands that are used as "backyard" recreation areas by local residents. Pressure to use and expand these recreation areas is expected to continue as these communities continue to grow. The fences, roads, weed spread, fire suppression, and changes in land use associated with an expanding urban interface all serve to fragment habitat. In addition, multiple landowners in the urban interface are expected to result in varied management of resources and resource use, impacting habitat fragmentation, including weed spread, fire, wildlife, livestock grazing, OHV use, and development.

Land acquisitions by BLM for maintaining vegetation and wildlife habitat, including habitat for special status species, could increase the potential to mitigate degradation of habitat, especially where such acquisitions by BLM would result in large contiguous blocks of public land.

Surface disturbances associated with uses such as recreation, oil and gas, and residential or commercial development would result in cumulative effects over a larger scale and would continue into the future. The combined amount of surface disturbance of these past, present, and future actions would be detrimental to special status wildlife. Other surface-disturbing activities, such as road building and increased OHV use, would increase human access to sensitive areas where the special status wildlife species occur.

Major disturbance factors include recreation throughout most of the area, habitat alteration from mineral related development, and some vegetation treatments, such as forest improvement projects. Direct impacts would be loss of individual special status animals. Indirect impacts would be loss or reduction of cover, forage, and breeding habitat. The overall cumulative impact of activities proposed for all of these resources is projected to be moderate to detrimental at localized areas within the short term, with some long-term improvements for wildlife habitat, such as reclamation. Change in land use or ownership could also result in the loss of habitat for some wildlife species.

The cumulative impacts of all these land uses could affect the sustainability of some populations of special status wildlife species in the future, with the potential for impact greatest under Alternatives A and D, and reduced under the Proposed RMP and Alternative C, respectively. It would benefit special status wildlife species to designate potential ACECs and manage for wilderness characteristics because numerous wildlife habitats would be given special management protection within the boundaries of those designated areas. These benefits would be the greatest under the Proposed RMP and Alternative C.

4.2.8 Cultural Resources

Cultural resources are the material and physical remains of prehistoric and historic human activity, occupation, or endeavor. "Culture [is] a system of behaviors, values, ideologies, and social arrangements. These features, in addition to tools and expressive elements such as graphic arts, help humans interpret their universe as well as deal with features of their environments, natural and social. Culture is learned, transmitted in a social context, and modifiable. Synonyms for culture include 'lifeways,' 'customs,' 'traditions,' 'social practices,' and 'folkways'" (Parker and King 1998). Natural features of importance in human history, such as mountains and rivers, may also be considered cultural resources. Overall, these resources are fragile and nonrenewable, and embody characteristics and information specific to the period in which a cultural group lived. Intrinsically, each cultural resource is important and provides valuable information about human occupation of an area.

There are three goals of cultural resource management, as follows:

- First, determine appropriate uses or management by identifying, preserving, and protecting cultural resources.
- Second, reduce threats and resolve potential conflicts from natural and human-caused deterioration.
- Finally, enhance collaboration, consultation, and working relationships with Native American Tribes.

These goals are accomplished by following objectives to preserve and protect cultural resources and religious areas, promote public outreach and education, and encourage professional research. Native American tribal relationships and consultation are essential throughout the process to ensure protection of traditional properties and uses.

Cultural resources on BLM land are protected by an extensive framework of laws, regulations, executive orders, and formal agreements. These laws have requirements for consultation, site-specific inventory, and evaluation of impacts. The most important of these is Section 106 of the NHPA. Nearly all implementation actions are subject to further cultural resource review before site-specific projects are authorized or implemented. If adverse impacts are identified, mitigation measures (including avoidance) are implemented to minimize or eliminate the impacts. For broad implementation actions, formal agreement documents are initiated between the interested parties (e.g., SHPO, Tribal Historic Preservation Officers, or tribal councils) to mitigate impacts.

All alternatives would ensure preservation of site integrity, setting, and feeling, as well as identify and develop protective measures. They would also emphasize Native American consultation and the recognition of Native American interests. Increased consultation with Native American groups provides land managers with information regarding site use and significance. This information can provide additional mechanisms for site protection that are not traditionally used or are more cooperative with Native American Tribes. During resource management plan development, an ethnographic study of the Ute people was initiated. One of the goals of this study was to bring the Ute people onboard with the RMP process to gather information on their priorities for resource protection and management actions. This study began in 2007 and was completed in 2010 (Ott 2010). It contains information about tribal interests within the planning areas and includes management recommendations for incorporating Native American interests and protections. It is BLM's goal that the collaboration and consultation will continue into the future through additional consultations and field trips to significant sites within the planning area.

Assumptions

- All four alternatives require that BLM-held cultural resources be managed and protected, and comply with all relevant laws and regulations.
- Cultural resources are defined as including archaeological, historic, and Native American traditional cultural property (TCP), religious sites, and sensitive areas, unless otherwise specified in the analysis.
- Historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. The term includes, for purposes of these regulations, artifacts, records, and remains that are related to and located within such properties. The term 'eligible for inclusion in the National Register' includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet National Register listing criteria" (quoted from 36 CFR 800.2e; compare NHPA, Section 301, Appendix 5).
- "An adverse effect is found when an action would alter the characteristics of a historic property that qualify it for inclusion in the National Register of Historic Places (NRHP) in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse impacts would include reasonably foreseeable impacts caused by the action that would occur later in time, be farther removed in distance, or be cumulative" (36 CFR, Part 800.5a).
- Direct impacts result from implementing the management goals, objectives, and actions of other resources that conflict with cultural resource management goals, objectives, and actions.
- Indirect impacts are caused by actions that are farther removed in time or distance that conflict with cultural resource management goals, objectives, and actions.
- Beneficial impacts include management actions or policies that result in preserving the characteristics of cultural resources that are important to traditional or religious uses, and protecting the integrity of the cultural property's location, design, setting, materials, workmanship, feeling, or association that would qualify them for listing on the NRHP.
- Any ground-disturbing activity should be considered a potential threat to cultural resources and Native American traditional properties. Minor impacts accrue over time, resulting in deteriorating site condition and loss of important scientific data and cultural values.
- All NSO stipulations, regardless of the resource being protected, would also likely protect cultural resources. Information such as site purpose, substance strategy, chronology, paleoenvironment or other research data has the potential to be altered or lost without appropriate protection.
- Buffer zones would provide beneficial protection for historic properties from direct and indirect impacts. They would also help preserve site setting and feeling that is an integral part of Native American TCPs and other areas significant to Native Americans.
- All alternatives require consultation with Native American Tribes and recognition of tribal interests during the planning phase of proposed federal undertakings.
- Native American traditional property location, significance, and extent of use are supported by their association with the surrounding environment. Maintaining access and reducing impacts on these properties is the responsibility of the BLM and an important objective of cultural resource management.

- The Blue Hill ACEC would be designated for its cultural resources and Native American traditional property values. All cultural resources within the ACEC would be protected from incompatible activities within the archaeological landscape.
- Periodic monitoring establishes a baseline of direct, indirect, and cumulative impacts to cultural resources. Monitoring helps to evaluate the intensity and duration of unapproved uses that could occur as a result of approved undertakings, as well as casual public use.
- Promoting research opportunities and site interpretation would result in additional scientific information about cultural resources for the professional and Native American communities, as well as provide valuable information to resource managers. Site interpretation for the public has long-term beneficial impacts on the cultural resources as a whole by helping to educate the public about the importance of cultural and tribal resources.
- Nondiscretionary mining notices are not federal undertakings. However, 43 CFR, Part 3809, specifically provides for the protection of cultural properties by prohibiting mining operators on claims of any size from knowingly disturbing or damaging these properties.
- Activities that are unauthorized or unplanned, including unauthorized collection, excavation, and vandalism, have the potential to cause adverse effects that are difficult to monitor and mitigate. Other actions such as unplanned wildland fire, dispersed recreation, and natural processes also have the potential to cause adverse effects to cultural resources. It is difficult to mitigate impacts on Native American traditional properties, sacred sites, historic trails, and other cultural resources that are significant for reasons other than data collection or research. Sites like these may require that the resource and associated setting be avoided to fully mitigate adverse impacts.

Method of Analysis

Analysis was based on the cultural resource knowledge base, the Class I statistical model (Reed et al. 2008), and the level of impacts (or risk of impacts) on cultural resources from the plan. Quantitative analysis was not undertaken for all resources but was concentrated on resources that would have the greatest adverse or beneficial impact on cultural resources. This process consisted of overlaying layers of resource values in GIS with the cultural high prehistoric and historic sensitivity areas database, and then clipping the common areas as potential impact zones. Qualitative impacts were based on the best professional judgment of the preparers and BLM cultural resource specialists.

- Cultural resource inventories have covered 12.8% of the CRVFO resource area. Within the resource area, 19.3% of cultural resource inventories have covered BLM lands administered by the CRVFO. Only a small percentage of the possible total amounts of cultural resources have been identified, and fewer have been evaluated for their eligibility for the NRHP or their potential importance to traditional communities. Therefore, an assumption was made that historic properties and significant traditional properties would be present throughout the planning area, and would be subject to impacts and mitigation prescriptions as appropriate.
- The cultural resource database as of May 2007 contained 6,250 known sites. These data were used in the Class I analysis (Reed et al. 2008) and for the RMP analyses.
- Approximately 11.1% of the planning area has been inventoried to current archaeological standards (Reed et al 2008).

- The average site density was 11.6 known sites per square mile inventoried; this assumption acknowledged that cultural sites do not occur uniformly across the planning area (Reed et al. 2008).
- Impacts on cultural resources from the transportation system were presented in the following three ways:
    - The first was to determine the number of miles of transportation routes that overlap the high prehistoric and historic sensitivity zones, with the exception of obliterated routes.
    - The second method incorporated the assumption that cultural resources within a quarter mile of a road or trail are more susceptible to adverse impacts, including looting and vandalism, than backcountry sites (Nickens et al. 1981). This analysis was based on a quarter-mile wide corridor on each side of the road/trail.
    - The third was to determine the probable number of sites within this half-mile-wide corridor using the assumptions that a square mile equals 640 acres and there are about 11.6 sites per square mile.
- Calculations for ground disturbances were used in a relative sense to compare alternatives.

Impacts on cultural resources are assessed by applying the "criteria of adverse effect." The criteria provide a general framework for identifying and determining the context and intensity of potential impacts on cultural resources. However, a complete assessment of impacts involving Native American or other traditional community, cultural, or religious practices or resources also requires focused consultation with the affected group. In this analysis, the criteria of adverse effect were applied on a broad scale to all known or anticipated cultural resources or cultural resource types.

Implementation level analysis was generally addressed throughout the document within resource sections, where implementation level actions had the potential to impact cultural resources.

Environmental Consequences

Impacts on cultural resources would result from some of the actions included under other resources and resource uses. Programs not addressed below were deemed to have no, or only negligible, impacts on cultural resources under any of the four alternatives.

Alternative A

Impacts from Cultural Resource Management. Under Alternative A, present management would continue to comply with applicable laws and regulations, including a 100-meter avoidance buffer based upon Technical Guidance from the Colorado BLM state office (Haas 2006) to protect historic properties from adverse direct impacts and reduce the potential for indirect impacts. This buffer has been incorporated into the standard operating procedures (SOPs) for Cultural Resource Management, and has been used consistently across-the-board since 2008 for all resources that may impact a historic property.

Impacts from Soils Management. Many cultural resources are susceptible to damage and destruction from ground disturbance and erosion. Damage to cultural sites from ground disturbance could include the modification of the spatial relationships and displacement and broken or destroyed artifacts, features, and midden deposits. The information loss is relevant to the site function, dates of occupation, subsistence, and past environments, and is important to understanding cultural resources. Reclamation measures would preserve or restore the setting of cultural resources as long as the methods used did not impact cultural

resources further. Actions under all of the alternatives would limit soil erosion on steep slopes and ground-disturbing activities. These actions would be beneficial and would help protect cultural resources.

Under Alternative A, soil protection measures would be limited primarily to debris flow, steep slopes, and erosion hazard zones. As a result, direct and indirect impacts on cultural resources would be greater under this alternative than under the Proposed RMP or Alternatives C and D. Adverse effects would occur if compliance with pertinent laws and regulations were not followed. In addition, inadvertent discovery would still likely occur.

Impacts from Water Resources Management. Under this alternative, water quality issues dominate the goals and objectives to protect watersheds and municipal water sources. Protections of watersheds function in the capture, retention, and release of water in quantity, quality, and time to meet aquatic and terrestrial ecosystem needs and to ensure that streams are in geomorphic balance with the water and sediment being supplied by the watershed (e.g., GS -NSO-13 and GS -NSO-3).

Detrimental effects on cultural resources would be similar to those described under soil management. Additionally, erosional processes would have the potential to expose once-buried cultural resources, resulting in an adverse impact. Short-term adverse impacts on cultural resources might occur, depending on the action and methods used to achieve the desired result of protecting water resources. Modifying water resource management practices and stream restoration techniques to address causal factors would probably provide for long-term cultural resource protection.

Because cultural resources have an increased potential to occur near water sources, filing for water rights has the potential to protect cultural resources by ensuring cultural resources are taken into consideration before development. On the other hand, there is an increased potential to adversely affect cultural resources when developing water sources, such as springs for livestock or public access to water bodies.

Some water sources and features are important to the tribes. Actions that protect and maintain water features, including their associated native plant and animal communities, would help preserve tribal values and traditional resources.

Impacts from Vegetation Management. The goals of vegetation management are to maintain healthy, productive native and other desirable plant communities and ensure riparian vegetation compliance with Land Health Standards 2 and 3, maintain forest health, and improve rangeland forage. These goals are likely to be beneficial in the long run for cultural resource management goals. The restoration of desired native species would help retain the historic setting and protect tribal-valued resources by reducing visual interference and noise. It would help preserve site setting and feeling which will benefit cultural resources and Native American traditional properties. Additional beneficial impacts from vegetation management would include thinning around potentially sensitive Native American traditional properties or cultural resources. This thinning would be helpful to reducing fuel load and possibly protecting the sites from unplanned wildfire.

Mechanical, biological, and chemical treatments could adversely affect cultural resources. Mechanical vegetation treatments could result in substantial direct impacts through ground disturbance, include churning soils, disturbing features, and breaking artifacts. Vegetation treatments to eliminate some weed species may adversely affect Native American traditional properties, such as traditional plant communities. Chemical treatments could alter the chemistry of soils and possibly artifact residue. These changes could affect the

potential and reliability of obtaining accurate radiocarbon dates or determining the function and use of an artifact.

Prescribed fire treatments would cause adverse impacts primarily on standing wooden cultural resource features and rock art. These treatments are currently practiced under Alternative A, and could cause direct and indirect adverse effects on historic properties and important Native American traditional properties. The key to preventing these adverse effects would be carefully planned and executed implementation with mitigation measures.

Impacts from Fisheries and Wildlife Management. The objectives and actions to maintain healthy productive plant and animal communities of native and other desirable species are equally important Native American values. Implementation measures to achieve these goals could include chemical and mechanical treatments, prescribed fire, reduced road and trail density, pond construction or maintenance, and water guzzler installation. All of these actions could initially result in adverse impacts on cultural resources and Native American traditional properties through ground disturbance, fire, or vegetation manipulation. On the other hand, long-term benefits from these actions support cultural resource management goals by helping to preserve and maintain native environmental conditions. The key to preventing adverse effects would be carefully planned and executed implementation with adherence to mitigation measures.

Impacts from Special Status Species Management. Stipulations restricting surface-disturbing activities to protect special status species and habitat would be beneficial to cultural resources. Any action that restricts ground-disturbing activities would reduce the potential for direct and indirect impacts on cultural resources. Additionally, these measures would have the potential to reduce visual interference and noise, thus preserving the setting, feeling which help preserve the integrity of sensitive Native American traditional properties. Preservation of certain species that are culturally important to the tribes would also be beneficial; however, there may be some loss of access to these species for gathering purposes. Collecting rare plants or plant parts would need to be as permitted by the BLM. Alternative A would provide fewer beneficial protections for cultural resources and Native American traditional properties than under the Proposed RMP and Alternatives C and D. Inadvertent discoveries would probably still occur.

Impacts from Visual Resource Management. Protection of open spaces, natural aesthetics, and scenic vistas are considered a social, economic, and environmental benefit. VRM Class I and Class II classifications provide more protection of these values and would constitute the greatest beneficial impact on cultural resources. By maintaining the integrity of the visual landscape, the BLM would ensure the landscape, feeling, association, and setting which contribute to the integrity of Native American traditional properties. Table 4.2.8-1 presents the high cultural sensitivity zones overlain with the various VRM classes.

This alternative has the fewest acres designated as Class I and II of all the alternatives; however, the percentage of prehistoric and historic resources protected would be greater under Alternative A and would provide the greatest protection for cultural resources under these designations. However, only inventories within these classes would determine if this projection is true. When all visual classes across alternatives were considered, Alternatives A and D would have fewer beneficial impacts than the Proposed RMP and Alternative C.

Table 4.2.8-1
Visual and Cultural Resource Sensitivity

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Class I Acres*	**22,800**	**35,600**	**35,800**	**35,300**
Acres within prehistoric high sensitivity zones	15,600	15,600	15,600	15,600
(%)	68%	44%	44%	44%
Acres within historic high sensitivity zones	3,600	3,600	3,600	3,600
(%)	16%	10%	10%	10%
Class II Acres*	**311,400**	**361,000**	**334,500**	**304,400**
Acres within prehistoric high sensitivity zones	157,100	189,800	182,500	159,900
(%)	50%	53%	55%	53%
Acres within historic high sensitivity zones	50,000	52,500	52,100	51,500
(%)	16%	15%	16%	17%
Class III Acres*	**161,300**	**132,800**	**144,300**	**161,700**
Acres within prehistoric high sensitivity zones	94,500	74,100	83,600	94,800
(%)	59%	56%	58%	59%
Acres within historic high sensitivity zones	7,800	6,100	6,100	6,600
(%)	5%	5%	4%	4%
Class IV Acres*	**206,200**	**185,500**	**175,300**	**203,400**
Acres within prehistoric high sensitivity zones	100,400	92,000	88,800	100,200
(%)	49%	50%	51%	49%
Acres within historic high sensitivity zones	1000	600	600	600
(%)	0%	0%	0%	0%

* Total Acres include BLM surface and mineral split estate.

Impacts from Wildland Fire Management. Both wildland fire and prescribed fire would have the potential to result in direct disturbance or loss of cultural resources. These impacts can occur through the destruction or modification of structures, features, artifacts, cultural use areas, or culturally modified trees. Organic materials and the information that might have been obtained from cultural resources are especially vulnerable to heat damage, but intense fire has the potential to damage stone as well. Sites exposed by fire or flagged for fire avoidance in prescribed burns would also be susceptible to unauthorized collection and vandalism.

Fire control and suppression may involve ground-disturbing activities that have the potential to directly impact cultural resources by altering the spatial relationships of archaeological sites. The removal of vegetation increases the visibility of cultural resources and exposes previously undiscovered resources. Increasing cultural resource visibility has the potential to increase unauthorized collection or vandalism, and decreased vegetation can lead to soil erosion. On the other hand, increasing visibility can expose significant cultural resources that may yield important information in history. Research on these newly discovered resources would increase our knowledge of the area and provide information helpful to protect cultural resources in the future. However, these resources may also be destroyed by the fire or erosional processes.

The risk of adverse impacts on cultural resources is greatest from unplanned wildland fire, since the locations of cultural resources are less likely to be known and avoided during the fire and fire suppression. Adverse impacts could introduce seeds and pollens that can impact the accuracy of paleobotanical or radiocarbon data obtained from cultural resources. When possible, designated fire classes and planning could reduce these adverse impacts by avoiding culturally sensitive areas when creating firebreaks and by using minimum impact suppression tactics in sensitive areas. The key to preventing adverse effects is carefully planned and executed implementation and adherence to mitigation measures for prescribed fires. Restoration of native vegetation seral stages by fire management would probably be a long-term beneficial impact for Native American traditional properties.

Protection of the public and firefighter safety will always outweigh protection of resources, including cultural.

Impacts from Cave and Karst Resource Management. Cave and karst resources would be managed to retain their current physical, social, and operational settings under all of the alternatives, which could be beneficial to cultural resources. However, the protections under the Proposed RMP, Alternatives C and D, and the NSO stipulation prohibiting surface occupancy and surface-disturbing activities would not be present under Alternative A. The NSO stipulation would have helped provide additional protection for cultural resources. Overuse of caves and karsts from public visitation has the potential to result in direct and indirect impacts to cultural resource in the same area.

Impacts from Forestry Management. The focus of improving forest health and vigor by providing a variety of forest products to meet commercial and private demands on a sustained yield basis could lead to direct and indirect adverse impacts on cultural resources. These impacts can include ground disturbance, destruction of aboriginal wooden features, and site setting disturbance, depending on the methods used and the amount of activity. Maintenance measures that contribute to the restoration or development of old-growth forest structure and composition have the potential to protect and enhance the setting and feeling of sensitive Native American traditional properties.

Intensive management would include such activities as clearcutting, thinning, mechanical treatments, and prescribed fire. Increased access would be particularly damaging through direct disturbance, erosion, and indirect alteration of the setting, particularly for Native American traditional properties (e.g., wickiups, platforms, and traps). Healthy forest limited management includes thinning and other less ground-destructive treatments and techniques, which would have less adverse impacts on cultural resources than intensive management.

Analysis of intensively managed acres of forest and woodlands that overlap areas of historic or prehistoric high sensitivity zones was less than 5 percent per alternative (Table 4.2.8-2). The areas for commercial harvest are mainly large pine, spruce, and fir stands that may include more open woodland edges of pinyon and juniper. Pinyon and juniper woodlands have a high potential for sensitive cultural resources, but the percentage of this type of vegetation within commercial harvest areas is low; therefore, adverse effects to cultural resources would be low.

Table 4.2.8-2
Forest and Woodlands Management and Cultural Resource Sensitivity

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Intensively Managed Acres	**NA**	**28,000**	**28,400**	**32,200**
Acres within prehistoric high sensitivity zones	NA	3,500	3500	4,500
(%)	NA	13%	12%	14%
Acres within historic high sensitivity zones	NA	100	100	100
(%)	NA	0.36%	0.35%	0.31%
Closed Acreage	**NA**	**123,300**	**135,000**	**90,400**
Acres within prehistoric high sensitivity zones	NA	73,800	75,200	56,500
(%)	NA	60%	56%	63%
Acres within historic high sensitivity zones	NA	28,700	34,300	27,400
(%)	NA	23%	25%	30%

No forest management GIS data were available for Alternative A, therefore no analysis of prehistoric and historic high sensitivity areas could be made. Under Alternative A, less land would be available for intensive treatments, which would be beneficial to cultural resources, but fewer acres would be closed, which would be detrimental.

Impacts from Livestock Grazing Management. Direct impacts to cultural resources have the potential to occur more frequently where livestock concentrate. "Direct impacts include trampling, chiseling, and churning of site soils, cultural features, and cultural artifacts including artifact breakage. Impacts occurred from standing, leaning, and rubbing against historic and prehistoric structures and features including rock art panels. Indirect impacts include soil erosion and gully formation and increased access from roads and trails that attract higher recreational use and vandalism" (BLM 2006e). Alteration of vegetation cover and exposed ground surfaces has the potential to increase unlawful collection and vandalism. Continued grazing may cause substantial ground disturbance and cause cumulative, long-term, irreversible adverse effects on cultural resources by reducing their contextual integrity and NRHP value. Range improvement and maintenance construction projects, such as springs, reservoirs, fences, corrals, and livestock trails, have the potential to adversely affect cultural resources, especially if these areas have not been previously inventoried.

Using measures to restrict livestock grazing and fencing sensitive areas to disperse impacts around riparian areas would most likely protect cultural resources. The downward trend in the number of AUMs over the life of the plan is expected to reduce the type and extent of adverse impacts on cultural resources. Analysis of grazing conditions would continue, and when necessary, the grazing levels would be adjusted to reflect this analysis. This, along with monitoring grazing use by the lessees, would ensure the use is consistent within an allowable range. These actions would also tend to have a beneficial impact on cultural resources.

High culturally sensitive zones within livestock grazing allocations across all alternatives are presented in Table 4.2.8-3.

Table 4.2.8-3
Livestock Grazing and High Cultural Resources Sensitivity

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Acres Open to Livestock Grazing	**488,300**	**441,600**	**427,800**	**442,200**
Acres within prehistoric high sensitivity zones	282,400	257,100	251,200	255,800
(%)	58%	58%	59%	58%
Acres within historic high sensitivity zones	50,900	42,000	39,900	44,100
(%)	10%	10%	9%	10%
Acres closed to livestock grazing- BLM only	16,800	63,600	76,700	62,800
Available AUMs (#)	39,200	35,500	35,500	36,500

Acronyms and Abbreviations:
AUM animal-unit month

Conflicts between livestock concentration areas and cultural resources would continue under all the alternatives, requiring additional cultural resource inventories and mitigation. The percentage of lands within prehistoric and historic high sensitivity zones is about the same across all alternatives.

Under Alternative A, more acres would be available for livestock grazing by more AUMs, which could result in more adverse impacts on cultural resources than under the Proposed RMP and Alternatives C and D. Additionally, no provision would be made for excluding livestock from disturbed areas under Alternative A. Implementing this alternative would result in additional ongoing and future adverse impacts on cultural resources. This alternative would probably have the greatest potential for adverse impacts on cultural resources of the four alternatives.

Impacts from Recreation and Visitor Services Management. Recreational use and access has the potential to adversely affect cultural resources through ground disturbance, soil compaction, water drainage, erosion, and changes to setting and feeling of sensitive Native American traditional properties. Additionally, increased access to remote areas could lead to direct and indirect impacts which include unauthorized excavation, collection, and vandalism. The potential for adverse impacts on cultural resources would increase as the population and recreational pressure increase, or as these activities become concentrated. The designation of eight SRMAs in this alternative would increase the intensity of permitted use of these areas, increasing the risk for direct, indirect, and inadvertent damage to cultural resources and Native American traditional properties. There is potential to help protect cultural resources located within SRMA areas through NSO stipulations (GS-NSO-16 and GS-NSO-17), although direct and indirect impacts have the potential to increase as a result of increased visitor use, motorized recreation, and user modifications to trails and camping areas. For example, motorized and mechanical activities concentrated in specific areas have the potential to adversely affect cultural resources through erosion and visual impacts to potentially sensitive cultural areas. User-created trails can often lead to ground disturbance or erosion which can negatively impact cultural resource values (e.g., setting and feeling), which are important sensitive Native American traditional properties.

High cultural sensitivity zones within proposed SRMAs across all alternatives are presented in Table 4.2.8-4.

Table 4.2.8-4
SRMAs and Cultural Resources Sensitivity

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Number of SRMAs	**8**	**5**	**2**	**7**
Acres of SRMAs	**60,400**	**62,800**	**23,800**	**63,600**
Acres within prehistoric high sensitivity zones	46,200	40,300	21,200	50,000
(%)	76%	64%	89%	79%
Acres within historic high sensitivity zones	20,900	16,200	19,100	22,100
(%)	35%	26%	80%	35%

Acronyms and Abbreviations:
SRMA Special Recreation Management Area

Under Alternative A, 76 percent of the SRMAs would be potentially within high prehistoric sensitivity zones, while 35 percent would be within highly historic sensitivity areas. Adverse impacts would probably be greater in SRMAs with an emphasis on motorized use, followed by mountain bike use. Potential adverse impacts on cultural resources within SRMAs under this alternative would be similar to Alternative D, since the number of SRMAs, acres within SRMAs, and the percentage of acres within high culturally sensitive areas are about the same. Under this alternative, Bocco Mountain would be designated as a SRMA, focusing management of this area on recreation. This has the potential to adversely impact sensitive cultural resources in the area through concentrated motorized use.

Dispersed recreation, while not intensive, would have the same potential for adverse impacts, primarily through ground disturbance, vandalism, and unauthorized collecting; however, it would be spread across a wider area. This would make monitoring and mitigating adverse impacts on cultural resources difficult. Dispersed camping would be allowed throughout the planning area, with the exception of specified areas in Fisher Creek, Spring Creek, Glenwood Canyon, and Deep Creek. The removal of camping in these areas would decrease the potential of adverse impacts on cultural resources. Recent studies indicate that most people do not travel more than one-quarter mile from an established camp or road (Nickens et al. 1981). While this would not keep the cultural resources in these areas from adverse impacts, it would probably reduce the potential of impacts on outlying cultural resources.

Construction of additional visitor facilities has the potential to result in adverse impacts due to increased activities in areas that might contain cultural resources. Although cultural resource inventories would be conducted before implementation and cultural resources would be avoided to the extent possible or mitigated, Alternative A would not include additional visitor facilities, which would reduce the amount of ground disturbance and the potential direct and indirect effects on cultural resources and Native American traditional properties.

SRPs could reduce the potential of adverse impacts by reducing overuse by commercial users within specific areas. Additionally, they could provide an avenue for public education and interpretation, which may result in long-term beneficial impacts on cultural resources. Additional cultural review and monitoring of SRPs would reduce the potential for direct and indirect impacts.

ERMAs are undesignated recreational areas managed on an interdisciplinary resource base to allow the public the freedom to pursue a variety of recreation for a variety of outcomes. Specific ERMAs to address local recreation issues, targeted outcomes, or prescribed recreation setting conditions could result in direct and indirect adverse impacts to cultural resources in the same way as SRMAs. The magnitude of effects would be dependent on the specific activity and management prescriptions applied to meet these activities. No ERMAs have been identified under Alternative A. High cultural sensitivity within the proposed ERMAs across all alternatives is presented in Table 4.2.8-5.

Table 4.2.8-5
Designated ERMAs and Cultural Resources Sensitivity

	Alternative A*	Alternative B (Proposed RMP)	Alternative C	Alternative D
Number of ERMAs	**0**	**6**	**9**	**5**
Acres of ERMAs	**0**	**40,900**	**71,400**	**33,000**
Acres within prehistoric high sensitivity zones	0	32,300	42,200	14,800
(%)	0	79%	59%	45%
Acres within historic high sensitivity zones	0	6,200	7,800	5,000
(%)	0	15%	11%	15%

* No GIS information was available for ERMAs under Alternative A; therefore, no spatial analysis was undertaken.

Acronyms and Abbreviations:

ERMA Extensive Recreation Management Area
GIS Geographic Information Systems

Impacts from Comprehensive Trails and Travel Management. OHV use and user-created trails can result in similar adverse direct and indirect impacts as described under R&VS. Impacts on cultural resources from open cross-country OHV use would result in more impacts than those in SRMAs dedicated to motorized uses. When areas are open to cross-country OHV use, use can occur in areas not previously inventoried for cultural resources. Whereas, areas dedicated to motorized use, such as a SRMA, have designated routes that have been inventoried for cultural resources and designed to avoid or mitigated adverse impacts. Under Alternative A, 295,900 acres would remain open to OHV travel. Within the Proposed RMP and Alternatives C and D, open OHV use would not be permitted within the CRVFO, thereby reducing the potential for adverse impacts. Ongoing direct and indirect impacts on cultural resources from use of current routes would be less likely to be detected or monitored. Restricting vehicle use to existing or designated routes (Appendix A and Appendix O) would also reduce the risk of disturbing cultural resources located off travel routes and help protect sensitive Native American traditional properties from impacts that might otherwise affect their integrity. However, enforcing travel routes may be difficult, and unauthorized travel has the potential to continue. The closure of areas to OHV use provides the greatest protection for cultural resources, as long as administrative access is maintained to allow Tribal motorized access to areas for traditional cultural uses. The potential risk for unauthorized collection or vandalism would continue.

Travel routes within high cultural sensitivity areas, as presented in Table 4.2.8-6, are based on the methodology assumptions presented above.

Table 4.2.8-6
Designated Motorized Routes and Probable Impacted Sites

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Miles of routes (all designations except obliterated)	1,632	1,632	1,632	1,632
Total miles of designated motorized routes	950			
Prehistoric High Sensitivity Areas				
Motorized routes within prehistoric high sensitivity areas (miles)	889	482	348	710
Mechanized routes within prehistoric high sensitivity areas (miles)	102	130	112	180
Foot/horse routes within prehistoric high sensitivity areas (miles)	92	216	258	167
Historic High Sensitivity Areas				
Motorized routes within historic high sensitivity areas (miles)	95	43	27	84
Mechanized routes within historic high sensitivity areas (miles)	14	11	17	15
Foot/horse routes within historic high sensitivity areas (miles)	13	20	30	25

Alternative A has the most miles open to full-sized vehicles, ATVs, and motorcycle routes compared with the Proposed RMP and Alternatives C and D. The number of motorized miles within the high prehistoric and historic sensitivity areas under Alternative A is almost double the number of miles of motorized miles under the Proposed RMP. Additionally, Alternative A has the least amount of miles of mechanized and foot/horse routes that fall within prehistoric sensitivity areas, compared with the other three alternatives. Within the historic sensitivity areas, miles of mechanized routes are greater in Alternative A than the Proposed RMP, but less than Alternative C and D. Foot/horse designated routes within historic sensitivity areas are less in Alternative A than the other three alternatives. Overall, this indicates that generally, access by motorized travel is greatest and mechanized or foot/horse travel is less in Alternative A than in the Proposed RMP and Alternatives C and D. Impacts from motorized vehicles are greater than impacts from mechanized or foot/horse, because motorized vehicles can cause ground disturbance, erosion, and increased access to areas; therefore, Alternative A has the greatest potential to impact cultural resources from travel management--more than the Proposed RMP or Alternatives C or D.

Impacts from Lands and Realty Management. Management actions under this resource include retaining, acquiring, and disposing of lands or interests that complement important resource values and that enhance multiple use and further management objectives. The exchange or disposal of lands to nonfederal entities

would permanently remove federal protections for significant cultural resources, and would be an adverse effect under the NHPA if not adequately mitigated. The retention of lands would be beneficial for cultural resources because they would remain under federal ownership and protection.

The issuance of ROWs for transportation systems, utilities, communication sites, and renewable energy will occur to meet public needs. Provisions for siting utility and communication lines along existing corridors where cultural resources are present could be both beneficial and detrimental. Placing linear features side-by-side would be beneficial to cultural resources because it can reduce impacts to additional cultural resources by collocating disturbance areas. However, side-by-side linear features could have an adverse effect on cultural resources within the corridor. As each new linear feature is added, additional disturbance is likely to occur to the same cultural resource, and would require the BLM to mitigate the adverse effects. In some cases, sites would have to be mitigated repeatedly as new lines are added. Various resource NSOs and CSUs could reduce the area available, or would limit how and when the land could be assigned ROWs. This can be a beneficial impact on cultural resources and Native American traditional properties.

Under Alternative A, the CRVFO would identify land suitable for disposal through public sale, which could result in adverse impacts on cultural resources if they are not mitigated. Although Alternative A does not call for designating specific retention areas, a combined 494,400 acres would continue to be considered unsuitable for disposal, which would be beneficial to cultural resource management goals. ROW exclusion or avoidance areas are designated as "unsuitable" for siting utility or communication facilities under Alternative A, which would benefit cultural resources, but are still fewer acres than the Proposed RMP and Alternatives C and D. Designating areas for ROW exclusion under the Proposed RMP and Alternatives C and D would include such areas as ACECs or VRM Class I, which would be beneficial to cultural resources.

As interest in renewable and alternative energy sources increases, the potential for ground disturbance would also increase, which could result in adverse direct and indirect impacts on cultural resources. Additionally, construction of facilities required for renewable energy would probably result in adverse impacts on setting and feeling of significant Native American traditional properties. At present, the area available for renewable energy developments would be limited and generally would occur outside high cultural sensitivity areas, although this could change in the future. Under this alternative, a case-by-case review would determine the needs for cultural resources inventory and mitigation.

Impacts from Coal Management. The Grand Hogback Field is the primary location in the CRVFO with the potential for coal mining; however, no leases have been issued and no development has occurred since mining operations closed in 1991. Areas open to federal mineral estate consideration for coal leasing are greater under Alternatives A and D than under the Proposed RMP and Alternative C. If in the future coal mining were permitted, there would be the potential for ground-disturbing activities and the potential for adverse direct and indirect impacts on cultural resources and Native American traditional properties. All permits would have to comply with NRHP Section 106 procedures before being authorized, to ensure that historic properties were not within the permit area or that they were mitigated. The same would apply for other areas of Native American significance.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Exploration, development, and maintenance would continue through the life of the plan, based on RFD scenarios. Although large portions of the planning area would be open to energy and mineral exploration, only a small portion of the planning area is expected to be subject to new disturbance or further development,

which could adversely impact significant cultural resources and Native American traditional properties if pertinent laws and regulations were not followed. The relocation of industrial facilities when an activity is incompatible with cultural resource protection would be beneficial. Abandonment of facilities would also have beneficial impacts by reducing access to, or activity in, areas where cultural resources and Native American traditional properties are present or anticipated.

Mineral withdrawals, closures, and NSO stipulations would further reduce the risk of adverse impacts from existing development, thereby providing additional direct and indirect protection, and would benefit cultural resources and Native American traditional properties. The potential impacts from oil and gas development within high cultural resources sensitivity is presented in Table 4.2.8-7.

Table 4.2.8-7
Energy and Mineral Management and Cultural Resources Sensitivity
(Estimated Acres of Land Status within the CRVFO Administrative Boundary)

	High Gas Potential	Medium Gas Potential	Low Gas Potential	Unknown Gas Potential
Total Acres Gas Potential	**589,029**	**342,430**	**1,337,865**	**660,979**
Acres within prehistoric high sensitivity	201,900	141,700	309,400	16,900
(%)	34%	41%	23%	3%
Acres within historic high sensitivity	27,700	26,400	78,100	8,300
(%)	5%	8%	6%	1%

The majority of the high and medium gas potential areas occur within high prehistoric zones, which would result in a greater probability of direct and indirect impacts to cultural resources. Potential impacts on historic resources would be low across most gas potential areas, because gas exploration and development is outside town boundaries and urban areas where historic resources are concentrated and more likely to occur.

Oil and gas exploration and development would be subject to the NRHP Section 106 process, protocol regulations, or permitting stipulations, which would probably avoid or address many potential adverse impacts. However, the potential of indirect impacts on cultural resources, Native American traditional properties, and their settings would probably be difficult or impossible to adequately mitigate. Alterations to the landscape would impact a large number of cultural resources and Native American traditional properties. Adverse impacts on cultural resources should be addressed early in the planning phase after the required inventories are completed. Restricting mineral activities that impact NRHP-listed or -eligible cultural resources, Native American traditional properties, or cultural resources requiring additional mitigations/COAs, would be beneficial to cultural resource management goals. However, ongoing indirect impacts in the vicinity of existing developed energy locations would probably continue.

Additionally, oil and gas exploration has yielded numerous cultural resource inventories and documented sites within a more concentrated area than most other Section 106 actions. This information helps to gain a broader understanding of the cultural resources that occur in the CRVFO area.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Locatable minerals and mining activity is anticipated to increase under all alternatives. This would increase the potential for adverse direct and indirect effects on cultural resources. Numerous mining

claims currently exist, but at present, the only significant mining activity is associated with gypsum mining claims north of Gypsum. The uranium, vanadium, and copper operations have been closed and mostly reclaimed. Gold placer activity is primarily limited to sporadic recreational gold panning and dredging. Salable minerals are primarily limited to small- to medium-size sales for commercial and residential uses, and are sold or permitted under the Salable Minerals Sale Act of 1947, as amended. Nondiscretionary mining notices are not federal undertakings, but 43 CFR Part 3809 specifically provides for the protection of cultural properties by prohibiting mining operators on claims of any size from knowingly disturbing or damaging these properties.

Various NSOs, CSUs, TLs, SWAs, fish hatcheries, domestic watershed areas, and VRM Class I and II area restrictions would benefit cultural resources by restricting ground disturbance and maintaining visual integrity. However, when ground-disturbing activities are anticipated, the potential for adverse direct and indirect impacts on cultural resources also increases. All permits would have to comply with NRHP Section 106 procedures before being authorized, to ensure that historic properties are not within the permit area or that they are mitigated as needed.

Alternatives A and D have the fewest number of acres closed to salable/mineral materials and non-energy solid leasable minerals, while the Proposed RMP and Alternative C have areas such as ACECs or municipal watersheds closed. Increasing areas closed to salable/mineral materials and non-energy solid leasable minerals is beneficial to cultural resources, because resources that fall within closed areas will be more protected from adverse impacts from these activities.

Impacts from Areas of Critical Environmental Concern Management. These special management areas are important for the protection of a number of resources such as geologic, botanic, historic, cultural, scenic, fish and wildlife, and rare or exemplary natural systems, or to protect human life and property from natural hazards. Although not all ACECs would be specifically designated for the protection of cultural resources, all ACECs would be beneficial due to management protections. Special management practices include avoiding heavy equipment use, implementing ground disturbance restrictions, prohibiting new motorized routes, performing annual monitoring, and avoiding incompatible activity. Additional beneficial impacts would be afforded though various resource NSOs, VRM Classes I and II, and ROW exclusion and avoidance areas. All of these practices would provide beneficial impacts on cultural resources.

Under this alternative, six areas would be designated as ACECs. The Blue Hill ACEC would be designed under all alternatives to specifically manage and protect cultural resources and Native American traditional property concerns. Designating this area would be beneficial to protecting cultural resources and Native American traditional properties by limiting surface-disturbing activities, closing to leasing for fluid minerals, designating as a ROW exclusion area, limiting travel to designated routes, protecting VRM Class II, and closing to commercial timber harvest. Cultural high sensitivity zones within ACECs are presented in Table 4.2.8-8.

Under the Proposed RMP and Alternatives A and D, 62 percent of the ACECs are within high prehistoric sensitivity zones, although acres of ACECs vary between alternatives. Additionally, Alternative A contains 21 percent of ACEC acres within historic high sensitivity zones. Unexpectedly, Alternative A is slightly more protective for historic high sensitivity zones, although the percent of historic high sensitivity zone areas is generally about the same across all alternatives. However, the greater number of acres protected under ACEC designations through Alternative C would probably provide the most long-term benefits to cultural resources.

Table 4.2.8-8
ACECs and Cultural High Resources Sensitivity

	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Number	**6**	**11**	**16**	**3**
Total Acres of ACECs	**27,000**	**46,400**	**79,800**	**20,200**
Acres within prehistoric high sensitivity zones	16,700	28,700	44,600	12,600
(%)	62%	62%	56%	62%
Acres within historic high sensitivity zones	5,700	7,700	12,600	4,100
(%)	21%	17%	16%	20%

Acronyms and Abbreviations:
ACEC Area of Critical Environmental Concern

Impacts of Wilderness Study Areas Management. The existing four wilderness areas would be retained under all alternatives. Characteristics that define WSAs include naturalness and solitude, both of which are important Native American values, especially for maintaining Native American traditional property integrity. All activities approved in a WSA would be closely managed to ensure that they would not impair the area's wilderness characteristics or its suitability for designation as wilderness, including restricting ground-disturbing activities.

Protecting these areas from incompatible activities would reduce the potential for adverse direct and indirect impacts on cultural resources, as well as provide beneficial impacts by protecting the integrity of feeling, association, and setting of sensitive Native American traditional properties. Restrictive stipulations from other resources, such as NSOs, VRM Class I and II, and ROW exclusion and avoidance areas, would be beneficial and help protect cultural resources.

Impacts from Wild and Scenic Rivers Management. The identification of eligible river segments for inclusion into the NWSRS would protect ORVs, which include cultural resources. Land use activities would have to comply with those permitted by the Wild and Scenic Rivers Act and the NHPA Section 106. Depending on the stream classification, impacts on cultural resources could be either beneficial or detrimental. The intensity of impacts would vary depending on the land use activities allowed. Maintaining wild or scenic classifications could result in fewer direct impacts on cultural resources and has the potential to be more protective of the landscape setting and feeling. The recreational classification has the potential to result in more direct and indirect impacts, due to increased land use activity and dispersed recreation use along the stream segments.

Alternative B (Proposed RMP)

Impacts from Cultural Resource Management. Under the Proposed RMP, compliance with applicable laws and regulations would still be required. However, a 100-meter avoidance buffer (CRVFO-NSO-21) would be applied to historic properties to better protect these resources from direct and indirect adverse impacts. Analysis of looting and vandalism (Nickens et al. 1981) has shown that distance is a key factor in prevention of adverse effects on cultural resources. The 0.25-mile buffer (CRV-NSO-20) would apply to Native American traditional properties and areas of cultural concern for protection. Additionally, proactive field inventories and research would continue to provide information about cultural resources for the benefit of the public, archaeological community, and most importantly for resource managers. The BLM would work

toward a cooperative agreement with the tribes, BLM, USFS, and other interested parties to identify and protect Native American sites for the future of all Americans by incorporating information from the *Ute Ethnohistory in West Central Colorado* (Ott 2010). This includes reintroducing Native American Tribes to their heritage lands and developing an intern program for Native Americans to learn about ethnographic information useful to the tribes and government entities and to earn college credit through conducting ethnographic research of their own.

Impacts from Wildland Fire. Impacts on cultural resources from wildland fire management would be the same as or similar to those under Alternative A.

Impacts from Soils Management. Impacts on cultural resources would be similar to Alternative A, except that the Proposed RMP would include protective measures to ensure surface disturbances would not accelerate erosion on a watershed basis, thereby providing additional protection to cultural resources and Native American traditional properties. Compliance with Colorado Public Land Health Standard 1 would also be beneficial to cultural resources. Adverse direct and indirect impacts under this alternative would be less than under Alternative A and similar to Alternatives C and D.

Impacts from Water Resources Management. Impacts on cultural resources would be similar to Alternative A, however, the additional protective management prescriptions (CRVFO-NSO-3, CRVFO-CSU-2, CRVFO-NSO-4, CRVFO-NSO-5, and CRVFO-CSU-3) in the Proposed RMP would provide additional benefit for cultural resource management goals. Additional NSO and CSU stipulations help protect cultural resources and Native American traditional properties by prohibiting surface occupancy and surface-disturbing activities. Adverse direct and indirect impacts under this alternative would be less than under Alternative A, similar to Alternative C, and slightly more than under Alternative D.

Impacts from Vegetation Management. Impacts on cultural resources would be similar to Alternative A, except that implementation of vegetation treatment and manipulation projects would be greater than under Alternative A. These types of projects would entail land management goals, including forest health, livestock forage improvement, noxious and invasive weed control, and big game habitat improvements. This could result in additional adverse impacts if laws and regulations were not followed. However, protective management prescriptions(CRVFO-CSU-8) have the potential to provide additional protections to cultural resources. Direct and indirect adverse impacts under this alternative would be less than under Alternative A, and similar to Alternatives C and D.

Impacts from Fish and Wildlife Management. Impacts on cultural resources would be similar to Alternative A, with the exception of habitat improvements that could include the construction of in-channel features, ponds, and water guzzlers. Not only will these types of features be used by wildlife year-round, but construction of these features has the potential to impact cultural resources through activities associated with the project, such as equipment access. The relocation of travel routes, sale or exchange of lands to consolidate wildlife habitat, and protection of SWAs from unnecessary surface occupancy and surface-disturbing activities could increase the beneficial impacts on cultural resources. Direct and indirect impacts under this alternative would be less than under Alternative A and D, and more similar to Alternative C.

Impacts from Special Status Species Management. Impacts on cultural resources would be similar to Alternative A, except that the addition of more surface restrictions, buffers, and closures limiting activities that are incompatible with cultural resource protection and management would be beneficial. The

identification and modification or removal of in-channel features that block the movement of fish may result in adverse impacts, since some water diversion structures may be considered historic properties. Modification of these historic facilities might damage their integrity, resulting in a considerable adverse effect, requiring consultation with the SHPO and the application of mitigating measures to reduce or eliminate the adverse effect. This alternative would provide more beneficial protections for cultural resource management goals than Alternative A, but less than under Alternative C and somewhat more than under Alternative D.

Impacts from Visual Resource Management. Impacts on cultural resources would be similar to Alternative A, however, the increase in VRM Classes I and II acres when compared with Alternative A would increase the level of protection of sensitive Native American traditional properties within these class areas. The percentage of Class I and II lands within high cultural sensitivity zones is less than under Alternative A, suggesting that fewer cultural properties might be protected. Only surveys within these VRM Classes will determine if this projection is true. This alternative would provide more long-term protection for cultural resource management goals than under Alternatives A and D, but less than under Alternative C (see Table 4.2.8-1).

Impacts from Managing to Protect Wilderness Characteristics. Five areas would be managed for wilderness characteristics under the Proposed RMP and managed to protect their wilderness values. These areas would be protected by many of the same management action and allowable use decisions that would protect WSAs, ACECs, WSRs, SRMAs, sensitive plant and wildlife areas, and visually sensitive areas. Protecting these areas from incompatible activities would reduce the potential for adverse direct and indirect impacts on cultural resources, as well as protect the integrity of feeling, association, and setting of sensitive Native American traditional properties. This would total 34,500 acres under the Proposed RMP, which does not occur in Alternatives A and D, and is 11,400 acres less than the total acres proposed in Alternative C.

Impacts from Cave and Karst Resource Management. Impacts on cultural resources would be similar to Alternative A; however, additional NSO stipulations prohibiting surface occupancy and surface-disturbing activities under this alternative would complement cultural resource management goals. Beneficial effects would be greater under this alternative than under Alternative A and similar to Alternatives C and D.

Impacts from Forestry Management. Impacts on cultural resources would be similar to Alternative A; however, the increase in the number of acres available for intensive and limited management, as well as the associated number of miles of roads that would have to be built, would probably have adverse direct and indirect impacts on cultural resources. Additional measures to limit ground-based harvesting systems to slopes of 40 percent or less on suitable soils would probably also result in fewer direct impacts. The closure of more acres would have a beneficial impact for cultural resource management goals. Under this alternative, potential adverse impacts on cultural resources would be less than under Alternatives A and C, and similar to Alternative D (see Table 4.2.8-2).

Impacts from Livestock Grazing Management. Impacts on cultural resources would be similar to Alternative A, except that under the Proposed RMP, the provision for excluding livestock from disturbed areas for two years or until site-specific analysis determines that recovery has occurred, would provide temporary and possibly long-term benefits for cultural resource management goals. Making adjustments by closing 48 and combining 11 grazing allotments under this alternative would be beneficial to cultural resources, because it will help reduce potential impacts from livestock. Cultural resource protection benefits come through avoiding the adverse impacts resulting from loss of vegetation cover, erosion, and livestock

trampling. The reduced amount of land available for grazing, along with the reduction in AUMs, would reduce the potential of direct and indirect impacts and the intensity of these adverse impacts. The percentage of lands available within culturally high sensitivity zones is the same across alternatives. Adverse effects under this alternative would be less than under Alternative A, more than under Alternative C, and about the same as Alternative D (see table 4.2.8-3).

Impacts from Recreation and Visitor Services Management. Impacts on cultural resources would be less under the Proposed RMP than Alternative A for recreation and visitor services. Constraints on surface-disturbing activities near developed recreation sites and trails by stipulation CRVFO-CSU-10 has the potential to help protect cultural resources that occur within these areas. Designating recreation areas as ROW avoidance areas can be beneficial to protecting visual and ground-disturbing impacts to cultural resources and Native American traditional properties located near these areas. On the other hand, pushing ROW actions to other locations has the potential to increase impacts to cultural resources in other areas.

Impacts on cultural resources would be similar to Alternative A under SRMAs, except that this alternative has five SRMA designations. More acres would be designated within SRMAs, even though there would be fewer SRMAs. Additionally, fewer acres would fall under high sensitivity zones for both prehistoric and historic resources than under Alternative A, thereby reducing the potential of direct and indirect impacts. Six ERMAs would also be designated to specifically address local recreation issues, which could increase the potential for direct and indirect impacts on cultural resources. Under the Proposed RMP, Bocco Mountain would be designated as an ERMA verses a SRMA based on Native American Tribal consultation. This change in designation would help provide additional protection of sensitive cultural resources and increase management flexibility in the area. Increased cultural resources monitoring and other resource CSU and NSO protections would benefit cultural resource management goals and help protect historic properties and areas of Native American traditional property significance. A more detailed management plan will be completed to fully describe future recreation use restrictions based on cultural study, analysis, and tribal consultation. Additional restrictions will be warranted as additional cultural resource information is acquired from surveys and tribal consultation. The Proposed RMP would probably result in fewer direct and indirect impacts on cultural resources than under Alternative A, more than under Alternative C, and about the same as Alternative D (see Tables 4.2.8-4 & 5).

Impacts from Comprehensive Trails and Travel Management. Impacts on cultural resources would be less under this alternative than Alternatives A and D, and less than Alternative C for miles of motorized travel within both the prehistoric and historic sensitivity areas. This has the potential to reduce adverse impacts to cultural resources through reduced ground disturbance, erosion, and access that can result from motorized travel in cultural sensitivity areas. Miles of mechanized routes within prehistoric sensitivity areas are greater under this alternative than Alternative A and D, but less than Alternative C. Additionally, miles of mechanized routes within historic sensitivity areas are less under the Proposed RMP than Alternatives A, C, and D. Miles of designated routes for foot/horse within prehistoric sensitivity areas are greater under this alternative than Alternative A and D but less than C. Additionally, miles of foot/horse within historic sensitivity areas are greater under this alternative than Alternative A but less than Alternatives C and D. Generally, this indicates that while motorized travel will decrease, mechanized and foot/horse will increase under this alternative in culturally sensitive areas. Although mechanized and foot/horse miles would increase, there would be fewer adverse impacts to cultural resources because these types of travel do not have the same level of impact as motorized. Therefore, adverse direct and indirect impacts under this alternative would probably be less than

under Alternatives A and D, and greater than Alternative C (see Table 4.2.8-6). However, inadvertent discovery effects would probably continue to occur.

Impacts from Lands and Realty Management. Impacts on cultural resources would be similar to Alternative A, except that the reduction in the area of retention could result in more adverse impacts on cultural resources. However, this would probably be offset by the addition of avoidance and exclusion areas, which would have a beneficial impact on cultural resource management goals. The addition of the Blue Hill ACEC as an exclusion area would greatly benefit cultural resources and Native American traditional properties. Adverse direct and indirect impacts under this alternative would probably be less than under Alternative A, more than under Alternative C, and about the same as Alternative D.

Effects from renewable energy management would be similar to Alternative A, except that fewer acres would be available for leasing, which has the potential to result in fewer direct and indirect impacts on cultural resources and Native American traditional properties. Potential adverse impacts on cultural resources under the Proposed RMP would probably be similar to Alternatives A, C, and D.

Impacts from Coal Management. Impacts on cultural resources would have the greatest potential under the Proposed RMP as compared with Alternatives A, C, or D, because the entire planning area is open to coal leasing. Currently, no lands within the planning area have the potential for coal leasing, but if potential is identified, then any area within the planning area would be open. Current conditions would have no impact on cultural resources, but if potential is identified in the future, the Proposed RMP would have the greatest impact to cultural resources because it has no limits to coal leasing.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts on cultural resources would be similar to Alternative A, along with more restrictive stipulations than under Alternative A. This would benefit cultural resource management goals and would reduce the potential for adverse impacts. Potential adverse direct and indirect impacts would therefore be less under this alternative than under Alternative A, about the same as Alternative D, but more than under Alternative C (see Table 4.2.8-7).

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts on cultural resources would be similar to Alternative A, except that under this alternative, more lands would be recommended for withdrawal or exempt from salable and non-energy solid leasable minerals. All of these actions would benefit cultural resource management goals by reducing the potential for direct and indirect impacts. Adverse direct and indirect impacts under this alternative would therefore be less than under Alternatives A and D, but more than C.

Impacts from Areas of Critical Environmental Concern Management. Impacts on cultural resources would be similar to Alternative A, except that three additional ACECs would be designated. Increased acres of ACEC designation would provide additional acres of protection for cultural resources by limiting or restricting land uses in these areas. More acres fall within high prehistoric and historic cultural resource sensitivity zones within ACECs under the Proposed RMP than Alternative A. The additional ACEC acres would provide more long-term benefits for cultural resource protection, so there would probably be fewer adverse direct and indirect impacts under this alternative than under Alternatives A and D, but more than under Alternative C (see Table 4.2.8-8).

Impacts from Wilderness Study Area Management. Impacts on cultural resources would be similar to Alternative A, except that under this alternative, additional protections would enhance the benefits for the protection of cultural resources and Native American traditional properties. These additional protections would include no motorized or mechanical travel in the Eagle Mountain WSA, no surface occupancy or ground-disturbing activities, and designation of VRM Class I for these areas. Impacts under the Proposed RMP would be more beneficial than under Alternative A, and similar to Alternatives C and D.

Impacts from Wild and Scenic Rivers Management. The Proposed RMP designates four Deep Creek segments (including two Deep Creek segments on USFS lands) as suitable for designation. It also proposes to rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River Segments 6 and 7. Monitoring the ORVs within each segment would retain their integrity and would also help protect historic values associated with the segments. The closure to fluid mineral leasing and the ROW avoidance or exclusion restrictions would provide long-term protection of cultural resources by restricting incompatible uses. However, WSR designations could also increase the potential for adverse impacts due to increased recreational use. Direct and indirect impacts would probably continue with the potential for them to increase through time. The proposed stipulations and public education could reduce the potential for adverse impacts.

WSR actions under the Proposed RMP are less beneficial for cultural resources than Alternative A, because Alternative A proposes to manage all stream segments as eligible for WSR designation. Based on the number of stream segments determined to be eligible and managed under interim protection or found to be suitable, the Proposed RMP would be less beneficial than Alternative A or C, but would be more beneficial than Alternative D.

Alternative C

Impacts to cultural resources from wildland fire, wilderness, WSRs, and WSA management would be the same as or similar to Alternative A. Impacts to cultural resources from visual resources, soils, cultural resources, and cave and karst resource management would be the same as or similar to the Proposed RMP. Impacts to cultural resource management would be the same as for the Proposed RMP and Alternative D. Impacts from management of all other resources and uses would be as described below.

Impacts from Water Resources Management. Impacts on cultural resources under this alternative would be similar to the Proposed RMP, except stipulation CRV-CSU-2 would be applied to hydrologic features. This CSU calls for site-specific relocation within 100 feet of the edge of a hydrologic feature, which has the potential to benefit cultural resource management goals by protecting sites along water features. This alternative would have the fewest adverse direct and indirect impacts on cultural resources and Native American traditional properties.

Impacts from Vegetation Management. Impacts on cultural resources under this alternative would be the same as under the Proposed RMP, with the exception that this alternative has more restrictions to protect riparian and wetland zones (CRV-NSO-6). These protective measures would also benefit cultural resources management goals by protecting sites along water features. This alternative would have the fewest adverse direct and indirect impacts on cultural resources and Native American traditional properties.

Impacts from Fish and Wildlife Management. Impacts on cultural resources under this alternative would be similar to the Proposed RMP; however, a few fish and wildlife management protective measures would be upgraded under this alternative. While all these measures would benefit cultural resource management goals, the oil and gas NSO in SWAs would provide substantially more benefits. This alternative would have the fewest adverse direct and indirect impacts on cultural resources and Native American traditional properties.

Impacts from Special Status Species Management. Impacts on cultural resources under this alternative would be similar to the Proposed RMP, however, protective measures included under this alternative would be somewhat more restrictive than under the Proposed RMP. This provides additional beneficial impacts on cultural resource management goals. This alternative would have the fewest adverse direct and indirect impacts on cultural resources and Native American traditional properties.

Impacts from Managing to Protect Wilderness Characteristics. Six areas would be managed for wilderness characteristics under Alternative C. These areas would be protected by many of the same management actions and allowable use decisions that would protect WSAs, ACECs, WSRs, SRMAs, sensitive plant and wildlife areas, and visually sensitive areas. Protecting these areas from incompatible activities would reduce the potential for adverse direct and indirect impacts on cultural resources, as well as protect the integrity of feeling, association, and setting of sensitive Native American traditional properties. This would total 45,900 acres in Alternative C, which does not occur in Alternatives A and D. This protection is 11,400 acres more than the total acres managed for wilderness characteristics in the Proposed RMP. Generally, this alternative would provide the most protection for cultural resources.

Impacts from Forestry Management. Impacts to cultural resources under this alternative would be similar to the Proposed RMP, except that there would be more acres available for intensive management but fewer acres available for limited management, along with the associated number of miles of roads to access these areas. Alternative C is more restrictive to areas closed to timber harvest that fall under special management areas such as ACECs or SRMAs, and would close 11,700 more acres than the Proposed RMP. While there would probably still be direct and indirect impacts on cultural resources and Native American traditional properties that would have to be mitigated, the closures would have a beneficial impact on cultural resource management goals. Slightly lower percentages of areas of prehistoric or historic high sensitivity would fall within intensively managed forest and woodland management zones under Alternative C verses the Proposed RMP. Adverse impacts on cultural resources would be less under this alternative than under the Proposed RMP and Alternative D, but more than under Alternative A (see Table 4.2.8-2).

Impacts from Livestock Grazing Management. Impacts to cultural resources under this alternative would be similar to the Proposed RMP, except that 58 allotments would be closed due to suitability issues. The reduced amount of land available for grazing, along with the reduction in AUMs, could reduce the potential of direct and indirect impacts, as well as the intensity of these impacts. The percentage of lands available within culturally high sensitivity zones is the same across alternatives. This alternative would have the fewest adverse impacts (see Table 4.2.8-3).

Impacts from Recreation and Visitor Services Management. Impacts on cultural resources under this alternative would be similar to the Proposed RMP for R&VS. Under Alternative C, only two SRMAs would be designated, resulting in 39,000 fewer acres within this designation. While fewer acres would be designated as SRMAs, a greater percentage of this land would be within high cultural sensitivity zones, which could increase the potential for direct and indirect impacts. Just the opposite is true for ERMAs; more acres would

be designated under ERMAs, but less of that area falls within sensitive cultural areas. Under Alternative C, nine ERMAs would be designated but unlike the Proposed RMP, Bocco Mountain would not be designated as an ERMA. This can potentially increase adverse impacts to cultural resources within the area. Overall this alternative would benefit cultural resources by decreasing acres of SRMAs and increasing acres of ERMAs, but has the potential to be more impactful to the Bocco Mountain area cultural resources (see Tables 4.2.8-4 & 5).

Comprehensive Trails and Travel Management. Impacts on cultural resources would be similar to the Proposed RMP, except that fewer miles of routes would be designated for motorized travel under this alternative. This has the potential to reduce adverse impacts to cultural resources through reduced ground disturbance, erosion, and access that can result from motorized travel in cultural sensitivity areas. Closing the planning area to open OHV travel is significantly beneficial to cultural resources, because it limits the possibility of adverse impacts to unknown or undocumented cultural resources and decreases the potential for vandalism and unauthorized collection. The miles of routes designated for motorized travel within sensitive cultural resource areas are less under Alternative C than any other alternatives, which would be beneficial to protecting cultural resources. Miles of mechanized routes within prehistoric sensitivity areas are less than the Proposed RMP and Alternative D but greater than A. Additionally, miles of mechanized routes within historic sensitivity areas are greatest under this alternative compared with all other alternatives. Finally, miles of foot/horse routes within both prehistoric and historic sensitivity areas under this alternative are greater than all other alternatives. This indicates that generally, impacts to cultural resources from motorized travel under this alternative would be less than all other alternatives. Although mechanized and foot/horse would generally increase, there would be fewer adverse impacts to cultural resources because these types of travel do not have the same level of impact as motorized. Long-term adverse direct and indirect impacts on cultural resources and management goals would probably be less under this alternative than the other alternatives (see Table 4.2.8-6).

Impacts from Lands and Realty Management. Impacts on cultural resources would be similar to the Proposed RMP, except that slightly more acres would be placed in retention and ROW avoidance and exclusion areas under this alternative. Beneficial impacts would be more protection of cultural resources and Native American traditional properties than the other alternatives. Direct and indirect impacts under this alternative would be substantially less than under Alternative A, and slightly less than under the Proposed RMP and Alternative D.

Impacts to cultural resources from renewable energy actions would be similar to the Proposed RMP, except Alternatives C and D would allow the consideration of ROW applications for solar energy development. This consideration may increase the potential to impact cultural resources from solar development, and that would be less likely to occur in the Proposed RMP or Alternative A.

Impacts from Coal Management. Impacts under this alternative would be similar to Alternatives A and D, because it limits open mineral estate of coal leasing to certain designated acres within the Field Office This alternative would have the fewest adverse impacts on cultural resources and Native American traditional properties because the fewest number of acres would be open to coal leasing.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts on cultural resources would be similar to the Proposed RMP, except that under this alternative, more acres would be closed to fluid minerals leasing than the other alternatives. This closure would result in fewer

well locations and ancillary facilities, along with more restrictive stipulations, which would benefit cultural resource management goals by providing more protection and fewer adverse impacts. This alternative would have fewer adverse direct and indirect impacts than the other alternatives (see Table 4.2.8-7).

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts on cultural resources would be similar to the Proposed RMP, except that more acres could be withdrawn, and more restrictive measures would apply under this alternative than the other alternatives. This alternative would have the fewest adverse impacts on cultural resources and Native American traditional properties.

Impacts from Areas of Critical Environmental Concern Management. Impacts on cultural resources would be similar to the Proposed RMP; however, the addition of 10 ACECs would provide more protection for cultural resources. While the area within these ACECs is greater than under the other alternatives, the percentage of land within cultural resource high sensitivity areas is less, suggesting that fewer resources might be protected under this alternative. However, not all the ACECs have been adequately inventoried, and the actual number of significant resources within these ACECs could be greater than projected. Over the life of the plan, more long-term beneficial protections would be afforded to cultural resources. Therefore, there would be fewer direct and indirect impacts under this alternative than under any of the other alternatives. This alternative would provide the greatest protection to cultural resources, and would enhance cultural resource management goals (see Table 4.2.8-8).

Alternative D

Impacts on cultural resources from wildland fire management would be the same as Alternative A. Impacts from cultural resource management would be the same as for the Proposed RMP and Alternative C. Impacts on cultural resources from management of all other resources and uses would be the same as or similar to the Proposed RMP, except as described below.

Impacts from Visual Resource Management. The reduction in VRM Class I and II acres, when compared with Alternative C, could also reduce the level of protection of cultural resources and Native American traditional properties. The percentage of Class I and II lands within high cultural sensitivity zones is less than under Alternative A and similar to the Proposed RMP and Alternative C. This suggests that more cultural properties might be protected under this alternative than under the Proposed RMP and Alternative C, but fewer than under Alternative A. However, only surveys within these classes will determine if this projection is true. In the long term, the area protected under Alternative D would be expected to be more beneficial for cultural resource management goals than under Alternative A, but less than under the Proposed RMP and Alternative C (see Table 4.2.8-1).

Impacts from Forestry Management. Impacts to cultural resources resulting from actions and land allocations under this alternative are similar to the Proposed RMP, but with greater potential for adverse impacts on cultural resources and Native American traditional properties. This is because more acres would be open to intensively managed forest and woodlands, and more acres would fall within potentially high cultural resource sensitivity areas (see Table 4.2.8-2).

Impacts from Recreation and Visitor Services Management. Impacts on cultural resources would be similar to the Proposed RMP, except that the percentage of SRMA land within sensitivity zones would be greater and the percent of ERMA land within sensitivity zones would be less. There would also be fewer

restrictive actions under this alternative when compared with the Proposed RMP, which could result in increased direct and indirect impacts. Overall, adverse effects under this alternative would probably be more than under Alternative C, about the same as under the Proposed RMP, but less than under Alternative A (see Tables 4.2.8-4 & 5).

Comprehensive Trails and Travel Management. Impacts on cultural resources would be greater under this alternative than the Proposed RMP. Impacts from motorized vehicles are greater than impacts from mechanized or foot/horse because motorized vehicles can cause ground disturbance, erosion, and increased access to areas. This alternative would have similar impacts to those analyzed under Alternative A.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts on cultural resources would be similar to Alternative A, except that the increase in acres available for leasing, the number of well locations and roads, and fewer restrictive stipulations have the potential to increase the amount of adverse impacts on cultural resources. There would probably be more adverse direct and indirect impacts under this alternative than under the other alternatives on cultural resources and Native American traditional properties (see Table 4.2.8-7).

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts on cultural resources under this alternative would be similar to those under Alternative A. However, more acres would be open to mineral exploration, and fewer restrictive stipulations would apply, increasing the potential of direct and indirect impacts on cultural resources. Alternative D would have the most adverse impacts on cultural resources and Native American traditional properties.

Impacts from Areas of Critical Environmental Concern Management. The percentage of ACEC acres within culturally high sensitivity zones are about the same as under Alternative A, but lower than under the Proposed RMP and Alternative C. This suggests that more cultural resources might be impacted than under the Proposed RMP and Alternative C. However, not all the ACECs have been adequately inventoried, and the actual number of significant resources within these ACECs could be greater than projected. Over the life of the plan, more long-term adverse impacts and fewer protections for cultural resources are likely under this alternative. Therefore, potential adverse direct and indirect impacts would be greatest under this alternative on cultural resources and Native American traditional properties (see Table 4.2.8-8).

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. Direct and indirect impacts on cultural resources would probably continue, with the potential for them to increase through time due to the anticipated increase in river recreational uses. WSR decisions in Alternative D would be the least beneficial for cultural resources and Native American traditional properties.

Cumulative Impacts

Decisions from this RMP would have impacts that, when combined with other past, present, and reasonably foreseeable actions, could produce cumulative impacts on cultural resources and religious, traditional, or sensitive Native American traditional properties. The potential for cumulative impacts includes those impacts from neighboring lands with connected cultural resources and actions, including adjoining but separate field office BLM lands, the WRNF, BOR lands, and state and private lands within and adjacent to the planning area. Every impact on cultural resources is cumulative. Adverse impacts to archaeological resources are

permanent and beneficial impacts cannot reverse these impacts. Adverse impacts to architectural resources (e.g., a historic cabin, etc.) can sometimes be mitigated through stabilization and rehabilitation which, in turn, can be beneficial to cultural resources.

All federal undertakings, whether sanctioned by the BLM, USFS, or BOR, are required to adhere to cultural resource laws and regulations requiring inventory, identification, and evaluation of cultural sites. Some undertakings might further require mitigation, avoidance, and in some cases data recovery or significant cultural resources identified. These requirements are expected to continue into the future. While federal undertakings can and do extend some protection for cultural resources onto private and state lands, exclusively private projects are subject only to state statutes covering cases of inadvertent discovery of burials.

Increasing development pressures, including increased oil and gas development, recreation uses, construction of pipelines, transmission lines, roads, urban expansion, as well as livestock grazing, would probably continue on a regional scale. Resource management within the planning area and surrounding areas would probably result in a trend toward increased adverse impacts to cultural resources through time and across political boundaries. If this trend continues as expected, the preservation of cultural resources, research, public education, and consultation with Native American Tribes will become even more critical.

Surface-disturbing activities are the greatest contributor to cumulative impacts on cultural resources. Before NHPA Section 106, many activities occurred with no regard for the protection of cultural resources. In the recent past, vegetation treatments using bulldozers and chains ripped trees, mostly pinyon and juniper, from the ground, possibly destroying many cultural resources located in this vegetation type. These treatments not only destroyed the physical remains of sites (such as wickiups and platforms), but also exposed the ground surface to increasing erosion. Potentially, the increased erosion might have washed the site away or exposed buried cultural materials. In addition, many roads and trails were constructed before Section 106. User-created trails and roads still occur. They often exacerbate erosion and adversely affect the integrity of setting and feeling of Native American sensitive areas.

Oil and gas development and other mineral development has occurred in the past and is expected to continue into the future on lands within and surrounding the planning area. As mineral development increases, so will human presence, possibly increasing adverse cumulative impacts through looting, vandalism, and inadvertent impacts. Impacts have a higher potential to occur based on the proximity to roads, pads, and support facilities, and also based on the magnitude, duration, and intensity of these activities. However, cumulative impacts of mineral development would probably be less than the potential impacts from the increasing recreational activity in and around the planning area, which is expected to continue and increase over time regardless of which alternative is selected.

Regionally and nationally, recreation is increasing, and as more people find themselves living in urban environments, the demand to recreate on public lands is becoming more intense. The broad publicity of recreation within the area, expanding target audience, and changes in marketing strategies will likely increase numbers of recreational users. This increase has the potential to stress the regional infrastructure, making it difficult to support the demand for additional public recreation and services, such as search and rescue or law enforcement. Changes in technology and equipment, such as GPS units or OHVs, can potentially lead to increased demand for access and intensity of user activities. The expected increase in use of public and private lands for recreational activities has the potential to increase the risk of deterioration, damage, vandalism, and unauthorized collection, which in turn will increase cumulative impacts to cultural resources.

Encroachment onto public lands is also increasing as adjacent agricultural lands are being converted into subdivisions which can increase the risk of impacts on cultural resources. Impacts on adjacent private lands may be significantly greater than on federal lands since they are not subject to the same requirements or protections as federal lands. The construction of buildings, roads, and associated structures increases ground disturbance, which can cause adverse direct impacts as well as indirect impacts on the natural landscape. Changes that affect the visual aspect, along with increased noise levels from human presence (voices and vehicles) have the potential to affect sensitive Native American traditional properties. Any one of these impacts may individually reduce and cause loss of scenic values, which can diminish the landscape setting and feeling of an area. Cumulatively these impacts would negate integral factors important to Native American traditional properties. In general, the more people and development in an area, the greater the potential is for disturbance and increased cumulative impacts on cultural resources.

Analysis of the alternatives has shown that implementation of Alternative C would generally have the lowest degree of potential negative impacts on cultural resources, and would provide the greatest overall benefits for cultural resource management goals. Overall, fewer acres of land would be open for ground-disturbing activities under this alternative than under any other alternatives. While there is no direct correlation between acres of surface and subsurface disturbance and numbers of cultural resources impacted, this trend is substantiated by the analysis. The Proposed RMP would be somewhat less protective of cultural resources with an intermediate potential for adverse impacts. Alternatives A and D have roughly comparable levels of potential adverse impacts on cultural resources, which would be greater than under the Proposed RMP and Alternative C.

Under all alternatives, beneficial impacts, such as those from road closures, reduced livestock grazing, and the maintenance of large undisturbed land blocks, may help to offset these impacts. All undertakings would be subject to the Section 106 process of the NHPA and other applicable laws and regulations. Adherence to appropriate predevelopment, development, and post-development protective measures is critical to mitigate direct, indirect, and cumulative impacts to cultural resources.

4.2.9 Paleontological Resources

Methods and Assumptions

This section is a discussion of impacts on paleontological resources from management actions of other resources and resource uses. Adverse impacts on paleontological resources occur from natural weathering and erosion and from surface-disturbing activities, excavations, and theft or vandalism. In general, adverse impacts on paleontological resources include the physical destruction or damage of fossil-bearing geological formations and resulting loss of significant 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 CRVFO is not known, the analysis considered the different management actions and their potential to directly or indirectly affect paleontological resources. Beneficial impacts included increased knowledge about the presence and types of paleontological resources in the planning area. Management actions considered protective of existing paleontological resources were also regarded as beneficial.

For this analysis, adverse 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 planning area. Most discoveries would occur in PFYC Class 4 and 5 geologic units.
- Inventories conducted before surface disturbance in high-probability areas and some unknown potential areas would result in the identification and evaluation of previously undiscovered resources, which the BLM would manage accordingly.
- Unmitigated surface-disturbing activities could dislodge or damage paleontological resources and features that were not visible before surface disturbance.
- Increased access associated with new development and increased recreation use would lead to increased access to paleontological sites.
- Vandalism and unauthorized collecting could destroy a feature or remove it from its context and availability for scientific study.
- Public education would increase public appreciation and awareness of the need for protection, but publication of specific locations would lead to increased visitation.

Environmental Consequences

Impacts on paleontological resources would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no impacts, or only negligible impacts, on paleontological resources under any of the four alternatives.

Alternative A

Impacts from Paleontological Resources Management. Management decisions for the protection of paleontological resources would provide opportunities for scientific, educational, and recreational uses of those resources. Standard lease terms require a paleontological survey prior to surface disturbance for areas historically known to produce an abundance of fossils. These surveys may result in protection of any paleontological resources discovered.

Impacts from Recreation and Visitor Services Management. Unauthorized off-trail recreational OHV travel has the potential to damage undiscovered fossil resources. Theft and vandalism from associated recreational uses also has the potential to destroy these resources. Actions that would have a beneficial impact on protecting paleontological resources include increased monitoring and patrolling, onsite presence of friends groups and volunteers, maintaining trails and signs, controlling erosion, conducting interpretive and guided educational programs, promoting public awareness, and continuing to prohibit unauthorized uses.

Although recreational rockhounding and fossil collecting is allowed on public lands, except for developed recreation sites, special management areas, and where otherwise prohibited and posted, recreational collectors may inadvertently collect scientifically important fossil specimens. Current guidelines specify that common invertebrate and plant fossils can be collected, but not to exceed what one person can fit into a 1-gallon container in 1 day. Vertebrate fossils (which include dinosaurs, mammals, sharks, and fish, or any animal with a skeletal structure, or any scientifically important invertebrate or plant fossils) cannot be collected on public lands without a special collecting permit administered by the BLM. Increased education and awareness about what is, or is not, a vertebrate fossil will have a beneficial impact on these resources. Under Alternative A, no management measures would provide increased knowledge and protection of such resources.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Activities related to oil and gas development have the potential to impact paleontological resources if surface-disturbing activities related to such development uncover vertebrate, scientifically important invertebrate, or plant fossils. Predisturbance field assessments of geologic units mapped as Class 4 or 5 under the PFYC system are required of oil and gas operators under standard lease terms and conditions. Field assessments for fossil resources are performed by a qualified paleontologist in areas that are devoid of thick soils, well developed vegetation, or in areas that have previously yielded fossil resources. Oil and gas development or drilling would not be precluded, but mitigations, including preconstruction pedestrian surveys and construction monitoring, may be appropriate. Geologic units mapped Classes 1 and 2 generally not required to have preconstruction assessments. Areas mapped as PFYC Class 3 have unknown fossil potential, and in cases of larger projects, may be required to be sample surveyed. Under Alternative A, LN-CO-29 would require a paleontological inventory of surface-disturbing activities in Class 4 and 5 paleontological areas.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Paleontological resources could be impacted by the extent and depths of ground disturbance associated with salable and locatable mineral development. However, LN-CO-29 calls for a paleontological survey before land use authorizations or surface disturbance. This inventory allows for avoidance and mitigations to be implemented, which would adversely affect mineral resources, but such actions would be direct and short-term. Subsequent reclamation efforts may backfill obscure known paleontological resources, but impacts in that instance would be indirect, preserving the fossil resource until subsequent erosion or additional activities uncover those resources.

Alternative B (Proposed RMP)

Impacts on paleontological resources from fluid minerals management and locatable minerals, salable minerals, and non-energy leasable minerals management would be similar to those under Alternative A, although generally less because less area would be available to these extractive industries and greater restrictions would apply on surface-disturbing activities. Impacts from other resource management actions would be as described below.

Impacts from Paleontological Resources Management. Management decisions for the protection of paleontological resources would provide opportunities for scientific, educational, and recreational uses of those resources. Under this alternative, 1,500 acres from the McCoy Fan Delta ACEC would be protected from surface disturbing activities, and from vertebrate and significant invertebrate fossil collection. Management actions through standard lease terms would continue and further expand the protection of paleontological resources through the PFYC system, which further defines criteria and expectations based on geologic units, to which paleontological resources are closely tied. The PFYC system will be used to classify paleontological resource potential on public lands in order to assess possible resource impacts and mitigation needs for federal actions involving surface disturbance, land tenure adjustments, and land use planning. This classification system for paleontological resources is continually updated with new information and would provide a uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts.

Impacts from Recreation and Visitor Services Management. Impacts on paleontological resources from the management of recreation would have beneficial anticipated impacts under this alternative. Increased protection would be provided by management measures to expand paleontological support activities, such as data gathering, GIS integrations, Class 4 and 5 surveys, and sensitivity mapping. Opportunities for education, awareness, and interpretation would be provided for sites deemed suitable for such qualities. Increased educational opportunities may provide greater public awareness of the occurrence of fossils on public lands and the educational values they provide. These actions would have an overall beneficial impact on these resources.

Alternative C

Impacts from paleontological resources management, recreation management, and locatable, salable, and non-energy leasable minerals management would be similar to those under the Proposed RMP. The greater amount of land closed to fluid minerals leasing under this alternative, and the somewhat generally greater restrictions on surface-disturbing activities would reduce the potential for adverse impacts from fluid and solid minerals development.

Alternative D

Impacts on paleontological resources would be similar to those under Alternative A and somewhat greater than those under the Proposed RMP and, especially, Alternative C.

Cumulative Impacts

The cumulative impact analysis for paleontological resources included the planning area and neighboring lands with connected paleontological resources. The cumulative effects of surface-disturbing activities within PFYC Class 4 and 5 areas, especially mineral development within the region, have the potential to damage or destroy this nonrenewable resource. However, existing laws, regulations, and policies provide for mitigation of effects through avoidance or data recovery efforts. Although it is expected that some fossils would be

destroyed in the course of legitimate uses of public lands, as well as natural weathering and erosion, mitigation measures would probably bring paleontologists to areas that had not been previously studied. Fossils that would have otherwise been destroyed would be collected for curation in university and museum repositories. Beyond mineral development, cumulative impacts on paleontological resources could occur through incremental degradation from a variety of sources, including dispersed recreation use and cross-country OHV use. These impacts would reduce the educational and interpretative potential of the resource value, and would result in impacts on paleontological resources.

4.2.10 Visual Resources

Methods and Assumptions

This section presents potential impacts of the alternatives on visual resources, specifically the potential for management decisions to create visual changes in, or contrasts from, the existing landscape. Visual resources generally are impacted by surface-disturbing activities that introduce new visual elements into the landscape, changing the features that characterize the existing landscape (e.g., the form, line, color, and texture of the landform, water, vegetation, and structures). Generally, the greater the surface disturbance, the greater the change to the characteristic landscape.

Public lands have a variety of visual values. These different values warrant different levels of management. Because it is neither desirable, nor practical, to provide the same level of management for all visual resources, it is necessary to systematically identify and evaluate these values. These values are identified through a Visual Resource Inventory (VRI). These VRI objectives provide a baseline for determining how much a proposed management action would affect visual resources and scenic quality, as well as determining the level of disturbance an area can support while still meeting visual resource objectives. Inventory classes are informational in nature and provide the basis for considering visual values in the RMP process. They do not establish management direction and should not be used as a basis for constraining or limiting surface disturbing activities.

VRM classes are assigned through RMPs. The assignment of visual management classes is ultimately based on the management decisions made in the RMP. BLM's VRM class objectives provide the visual management standards for the design and development of future projects and for rehabilitation of existing projects. The following BLM VRM class objectives and descriptions are summarized from BLM Manual Handbook H-8431-1 (1986a).

VRM Class I

The objective of Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes, but it does not preclude very limited management activities. The level of change to the characteristic landscape should be very low and should not attract attention.

VRM Class II

The objective of this class is to retain the existing character of the landscape. The level of change to the landscape should be low. Management activities may be visible but should not attract the attention of the casual observer. Any changes to the landscape must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

VRM Class III

The Class III objective is to partially retain the existing character of the landscape. The level of change to the landscape should be moderate. Management activities may attract the attention of the casual observer but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

VRM Class IV

The objective of Class IV is to provide for management activities that require major modifications to the existing character of the landscape. The level of change to the landscape can be high. The management

activities may dominate the view and may be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic visual elements of form, line, color, and texture.

All surface-disturbing activities, regardless of the alternative or management action, would be subject to the management objectives of the area within which the activity takes place. The visual resource contrast rating system is used to analyze the potential site-specific impacts of surface disturbance and the facility design and placement. Surface-disturbing activities and facilities would be designed to mitigate their visual impacts and conform to the area's designated VRM objective. Mitigation could include painting, facility design, and placement.

The criteria for analysis were the number of acres of the various VRM classes to be designated under each alternative and the associated amount of impacts and surface disturbance anticipated for each class. At the broad-scale level, analysis of the impacts on visual resources is discussed in terms of the number of acres in each VRM class, because the RMP management actions would be required to not exceed the designated VRM class objectives within the CRVFO. Impacts on visual resources are determined through the consistency of proposed management actions with the identified VRM class prescriptions and objectives. More surface disturbance or structures would add to the cumulative impact of resource development on the visual quality of the landscape. Degradation of visual qualities would primarily occur from surface-disturbing activities, such as those associated with construction of ROWs (e.g., pipelines, transmission lines, communication lines) and oil and gas facilities (e.g., well pads, reserve pits, roads). The development of permanent structures would result in long-term degradation of scenic quality and in some cases could become the dominant feature on the landscape. The degree of impact would depend on the amount of development projected to occur and the effectiveness of mitigation measures (e.g., siting, painting, and screening).

The analysis was based on the following assumptions:

- VRM class objectives apply to all resource uses. Class objectives would be adhered to through application of BMPs, which could include special project design, avoidance, or mitigation.
- All management and resource uses would be subject to NEPA analysis, which may include completing a VRM visual resource contrast rating analysis.
- Proposed activities that could not be effectively mitigated would not be authorized.
- In accordance with BLM Policy (2001d), WSAs would be managed as VRM Class I, which would preserve the existing character of the landscape under all alternatives.
- All resources with management actions that permit surface disturbances could have adverse impacts on visual resources to some degree if not properly mitigated. Surface disturbances could introduce new visual elements onto the landscape or intensify existing visual elements, thus altering the line, form, color, and texture that characterize the existing landscape.
- The greater the size and severity of surface disturbance, the greater the impact there would be on scenic quality.
- Changes in visibility from smoke, dust, haze, or other pollutants could reduce or degrade scenic quality by obscuring distant views in the short term and long term. However, the CAA, not visual resources, sets limits on the allowable degradation of visibility within the adjacent Class I Airsheds.

- Scenic resources and related "open space" have been identified as an important value on public lands by adjacent affected communities. The importance of scenic values, natural appearing landscapes, and unaltered open space on BLM lands is expected to increase in value to residents and visitors over the life of the RMP. The Visual Resource Management Update (Otak, Inc. 2007) prepared for the CRVFO was used to update VRM classes, based on an assessment done with information from affected communities and agencies and from a viewshed analysis done on key transportation corridors with high visual sensitivity within the CRVFO.
- While visual values have been mapped on private surface lands and the BLM would consider the visual values on adjacent private lands when analyzing proposals, VRM classes and subsequent management objectives apply only to federal surface lands. On split-estate lands, visual objectives can be adopted for private surface land with a landowner's consent.
- 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 were renewed.
- Actions (such as CSU and NSO) designed to prevent surface disturbance or disturbance to wildlife and special status species could indirectly limit the level of change to characteristic landscapes. In Class I and II areas, these actions could support VRM objectives but would have a negligible impact, since the level of change to the characteristic landscape would already be low to very low. In addition, NSO stipulations would be applied to all VRM Class I areas, and VRM Class II-designated areas would have CSU leasing stipulations applied. In Class III and IV areas, these actions could be beneficial to the scenic quality by limiting the amount of surface disturbance, since the level of change to the characteristic landscape could be moderate to high. Therefore, the impacts on visual resources from NSO and CSU stipulations would be addressed by listing those actions, but the acre totals and impact from specific stipulations from other resources are not analyzed further.

Table 4.2.10-1 shows the acres of the VRI and designated VRM management classes under each alternative. The analysis assumed that areas designated as VRM Class III and VRM Class IV objectives would permit more surface-disturbing impacts and potentially have greater adverse impacts on visual resources and scenic quality than those areas designated as VRM Class I and Class II objectives. The Proposed RMP cumulative numbers for the VRM classes resulted from the final combination of proposed special designations (e.g., ACECs and SRMAs) and land units managed for wilderness characteristics. Each of the individual designations and identifications proposed as VRM class II were in the Draft range of alternatives.

Table 4.2.10-1
Acres of Visual Resource Inventory and Visual Resource Management Classes by Alternative

VRM Class	VRI	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Class I	0	22,700	35,600	35,800	35,200
Class II	228,100	227,800	268,900	256,900	217,900
Class III	129,100	112,900	84,200	96,200	113,100
Class IV	148,000	141,800	116,500	116,300	139,000
Total	**505,200**	**505,200**	**505,200**	**505,200**	**505,200**

Environmental Consequences

Impacts on visual resources would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on visual resources under any of the four alternatives.

Alternative A

Impacts from Visual Resource Management. There would be negligible impacts on the visual quality of the landscape in Class I areas, where virtually no change to the visual character of the landscape is allowed. There would be minor impact on the visual quality of the landscape in Class II areas. The objective in Class II areas allows projects to be seen but not to create sufficient impact (i.e., contrast with the surrounding landscape) to attract the attention of the casual observer. However, ongoing resource use and development in areas managed as Class III and IV would have the potential to impact visual resources. This is particularly true in areas that are largely natural in appearance.

Stipulation GS-NSO-18 for the Interstate70 viewshed would prohibit surface occupancy and surface-disturbing activities on slopes over 30 percent with high visual sensitivity. Lands with high visual sensitivity are those within 5 miles of Interstate 70, of moderate to high visual exposure, where details of vegetation and landform are readily discernible, and where changes in visual contrast can be easily noticed by the casual observer on the interstate. This management action would preserve and protect visual resources to the extent allowable under the VRM class objectives, with long-term beneficial impacts on scenic quality in these areas.

Table 4.2.10-1 shows the acres designated as each VRM class for all alternatives. The analysis assumed that areas designated as VRM Class III and VRM Class IV objectives would permit more surface-disturbing impacts and potentially have greater adverse impacts on visual resources and scenic quality than those areas designated as VRM Class I and Class II objectives. Compared with the VRI, Alternative A would increase protections to visual resources due to the increase in acres of VRM Class I and Class II (see Table 4.2.10-2). Compared with the Proposed RMP and Alternatives C and D, Alternative A would include the least amount of VRM Class I and II.

Impacts from Air Quality Management. All planning area resources that degrade air quality could have adverse impacts on visual resources to some degree. Changes in air quality from smoke, dust, haze, or other pollutants could reduce or degrade scenic quality by obscuring distant views in the short term and long term. The CAA sets limits on the allowable degradation of air quality.

Impacts from Soils Management. Over the long term, soil management designed to improve ecological conditions could indirectly enhance visual resources on a localized basis. However, in the short term, methods used to achieve improved ecological conditions could directly create visual changes to landscape form, line, color, and texture.

Stipulations GS-NSO-15 for steep slopes greater than 50 percent for oil and gas facilities and GS-NSO-14 for debris flow hazard zones would prohibit surface occupancy and surface-disturbing activities. GS-CSU-4 for erosive soils and slopes greater than 30 percent may require special design, construction, operation, and reclamation measures to limit the amount of surface disturbance. The intentions of the stipulations were to apply similar measures to other public land activities in order to reduce erosion and maintain soil site stability.

Table 4.2.10-2
Visual Resource Inventory Class Designations (Acres)

ALTERNATIVES - VRM MANAGEMENT CLASS DESIGNATIONS		VRI Class I (Acres)		VRI Class II (Acres)		VRI Class III (Acres)		VRI Class IV (Acres)	
Alternative A (Acres)									
VRM I	22,700	0	0%	15,400	7%	2,100	2%	5,200	4%
VRM II	227,800	0	0%	193,600	85%	27,400	21%	6,800	5%
VRM III	112,900	0	0%	16,600	7%	92,800	72%	3,500	2%
VRM IV	141,800	0	0%	2,500	1%	6,800	5%	132,500	90%
Sum	**505,200**	**0**	**0%**	228,100	100%	129,100	100%	148,000	100%
Alternative B (Proposed RMP) (Acres)									
VRM I	35,600	0	0%	25,300	11%	4,800	4%	5,500	4%
VRM II	268,900	0	0%	189,800	83%	49,900	39%	29,200	20%
VRM III	84,200	0	0%	11,800	5%	68,600	53%	3,800	3%
VRM IV	116,500	0	0%	1,200	1%	5,800	4%	109,500	74%
Sum	**505,200**	**0**	**0%**	228,100	100%	129,100	100%	148,000	100%
Alternative C (Acres)									
VRM I	35,800	0	0%	26,300	12%	4,000	3%	5,500	4%
VRM II	256,900	0	0%	186,000	82%	41,400	32%	29,500	20%
VRM III	96,200	0	0%	14,500	6%	77,700	60%	4,000	3%
VRM IV	116,300	0	0%	1,300	1%	6,000	5%	109,000	74%
Sum	**505,200**	**0**	**0%**	228,100	100%	129,100	100%	148,000	100%
Alternative D (Acres)									
VRM I	35,200	0	0%	26,300	12%	3,400	3%	5,500	4%
VRM II	217,900	0	0%	183,800	81%	27,200	21%	6,900	5%
VRM III	113,100	0	0%	16,600	7%	91,800	71%	4,700	3%
VRM IV	139,000	0	0%	1,400	1%	6,700	5%	130,900	88%
Sum	**505,200**	**0**	**0%**	228,100	100%	129,100	100%	148,000	100%

Impacts from Water Resource Management. Over the long term, water resource management designed to improve ecological conditions could indirectly enhance visual resources, on a localized basis. However, in the short term, methods used to achieve improved ecological conditions could directly create visual changes to landscape form, line, color, and texture. Mitigation to meet VRM class objectives would be required for any water management-related project that would cause any surface disturbance. Stipulations GS-NSO-3 for major river corridors and GS-NSO-13 for municipal watershed areas would prohibit surface occupancy and surface-disturbing activities.

Impacts from Vegetation Management. Restoration and vegetation treatments designed to improve ecological conditions could indirectly enhance visual resources on a localized basis. However, in the short

term, methods used to achieve improved ecological conditions could directly create visual changes to landscape form, line, color, and texture. Such impacts would range from minor to moderate, depending on the scope and magnitude of treatment and the methods used. Any vegetation removal associated with larger scale research or restoration efforts could produce impacts similar to those described for mechanical vegetation treatments. Chemical and biological methods would tend to gradually create visual contrasts that mimic natural ecological change, whereas fire and mechanical methods would create such contrasts more suddenly and noticeably. All alternatives would allow for a full range of treatment methods (including mechanical, wildland or prescribed fire, and chemical methods). Some of the identified treatment methods (e.g., mechanical, chemical) would result in localized short-term impacts on visual resources by creating visual contrasts.

Stipulations GS-NSO-2 for riparian and wetland zones, which would prohibit surface occupancy and surface-disturbing activities within riparian vegetation, and GS-CSU-2 for riparian/wetland vegetation (within 500 feet of the outer edge), and GS-CSU-3 for species listed as sensitive would require special design, construction, and implementation measures.

Impacts from Fisheries and Aquatic Wildlife Management. Provisions to maintain and improve the priority habitat requirements on BLM lands for a variety of aquatic species are in all alternatives. These measures would generally complement the maintenance of landscape character and the conservation of visual resources. Constructing or modifying wildlife water developments could create visual contrasts with surrounding landscapes. Stipulation GS-NSO-5 for the Rifle Falls and Glenwood Springs fish hatcheries would prohibit surface occupancy and surface-disturbing activities.

Impacts from Terrestrial Wildlife Management. Provisions to maintain and improve BLM's share of the priority habitat requirements for a variety of terrestrial wildlife species are in all alternatives. These measures would generally complement the maintenance of landscape character and the conservation of visual resources. Constructing or modifying wildlife habitat could create visual contrasts with surrounding landscapes. Stipulations for wildlife seclusion areas, SWAs, and raptor, waterfowl, and shorebird nesting habitats would prohibit surface occupancy and surface-disturbing activities.

Impacts from Special Status Species Management. All alternatives prohibit actions that destroy, adversely modify, or fragment federally listed species habitat and include habitat improvements for special status species, which could indirectly limit the level of change to characteristic landscapes. The protective management prescribed for special status species (including those relating to riparian habitats, ACECs, and non-ACEC habitats) would also indirectly limit the level of change to the landscape. Restoration measures that involve surface or vegetation-disturbing components could create contrast or reduce scenic quality ratings. Such impacts would be direct and short-term and could range from minor to moderate, depending on the type of treatment or restoration and the amount of change that it would cause to existing landscape form, line, color, or texture. NSO stipulations for a variety of special status plant and wildlife species would prohibit surface occupancy and surface-disturbing activities.

Impacts from Cultural Resource Management. The protective management of cultural resources would generally complement the maintenance of landscape character and the conservation of visual resources. When excavation or restoration measures involve surface- or vegetation-disturbing activities, noticeable contrast or reduced scenic quality ratings could result.

Impacts from Wildland Fire Management. Impacts on visual resources from prevention and mitigation programs aimed at reducing unwanted fire would be similar to those described for vegetation treatments. However, actions related to prevention could reduce human-caused ignitions and related visual impacts caused by fire. Post-fire rehabilitation methods, such as seed drilling, mulching, netting, or hydroseeding, could directly result in localized visual contrasts. Impacts would be minor to moderate in the short term but would become negligible in the long term. Wildland fires and prescribed fires would result in smoke, causing short-term, minor to moderate impacts on visual resources. Such fires would also affect visual resources because of increased vehicle traffic, fire lines, and the contrast between burned and unburned areas. The latter could vary in size from a few acres to thousands of acres.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative A, all lands with wilderness characteristics outside WSAs—Castle Peak Addition, Flat Tops Addition, Grand Hogback, Pisgah Mountain, and Thompson Creek—could be managed as VRM Class III or IV. This would lead to management actions that do not retain the characteristic landscape. This would offer less protection to visual resources.

Impacts from Cave and Karst Resource Management. Stipulation GS-NSO-16 for the Deep Creek cave area would prohibit surface occupancy and surface-disturbing activities in the Deep Creek cave area (including NSO for 5,000 feet below the surface). The area encompasses the cave openings, subsurface features, and the watersheds immediately above the caves. Compared with the Proposed RMP and Alternatives C and D, Alternative A would provide the same benefits to visual resources but over a smaller area.

Impacts from Forestry Management. Restoration and forestry treatments designed to improve ecological conditions could indirectly enhance visual resources on a localized basis. However in the short term, methods used could directly create visual changes to landscape form, line, color, and texture. These methods are clearcuts, shelterwood, and other partial cuts, pre-commercial and commercial thinning, seeding and planting, timber stand improvement, sanitation treatments, and mechanical treatments or prescribed fire for stand replacement or conversion to achieve improved ecological conditions. Such impacts would range from minor to moderate, depending on the scope and magnitude of treatment and the methods used. Any vegetation removal associated with larger scale research or restoration efforts could produce impacts similar to those described for mechanical treatments. Under Alternative A, a total of 17,900 acres of commercial forestland would be intensively managed.

Impacts from Livestock Grazing Management. Livestock grazing would continue to be authorized on 489,600 acres. The installation of additional fences or livestock improvements (cattle guards, water developments, and roads necessary to access improvement sites) could change characteristic landscapes. Such impacts would be localized and long-term and could range from negligible to moderate. Where livestock grazing would not be available, the potential for these impacts would be eliminated, effectively maintaining visual resource integrity over the long term. Any removal of livestock facilities in these areas would enhance visual resources in the long term by bringing the area back into its natural or near-natural condition. Areas in which livestock tend to congregate would create contrasts that would be noticeable to the casual observer. These impacts would typically be long-term, direct, and localized. Alternative A would allow for the most acres available to grazing and would therefore have the most impacts on visual resources.

Impacts from Recreation and Visitor Services Management. Overall recreation guidance, ERMA management decisions, and the continued issuance of special recreation permits would not affect visual resources. No specific facilities were identified, but any facilities constructed would be based on needs for resource protection and user demand. New facilities or new types of commercial activities could result in changes to the landscape. However, specific projects were not identified at this time and therefore cannot be analyzed. Recreation would have site-specific impacts near frequent high-use areas, such as campgrounds, parking lots, trailheads, and other recreation-related use areas. Long-duration trail use (e.g., walking, horseback and OHV riding, mountain biking) could result in loss of vegetation cover, especially during wet periods. These impacts would change the characteristic landscape and would be site-specific and localized. Dispersed recreation would create fewer impacts on visual resources than would these more intensive, concentrated recreation uses. Closing or rehabilitating undeveloped sites would restore the visual resources of those sites.

Under Alternative A, existing stipulations GS-NSO-16 for SRMAs and GS-NSO-17 for Recreation Management Areas (both including Rifle Mountain Park) would prohibit surface occupancy and surface-disturbing activities. A total of 60,400 acres is currently managed as SRMAs, and 60,700 acres are recognized as RMAs.

Impacts from Comprehensive Trails and Travel Management. Under all alternatives, the designation of OHV open areas could cause adverse impacts on landscapes and visual values. The level of use, season of use, type of soil, and vegetation community all could influence the amount of change to the landscape. Cross-country OHV use could result in visual contrasts in color because of disturbed soils and vegetation and contrasting linear disturbance on the landscape. Although the landscape in many areas would not be impacted by cross-country use because of topographic and vegetation limitations, continuing to manage large areas as open would allow the greatest potential for changes to the landscape and impacts on scenic resources because of soil disturbance, tire tracks, and hill climbs. In those areas in which OHV use is limited to designated routes, management would limit impacts on the landscape to the existing transportation system and would eliminate the creation of new routes that would result in further changes to the landscape and visual quality. The designation of limited routes would protect visual resources by reducing the potential for the creation of additional routes and changes to the landscape, such as soil disturbance, erosion, and loss of vegetation. Areas with a closed designation would have long-term benefits to visual resources because those areas would no longer receive impacts from OHV use. Alternative A would designate 295,900 acres as open to OHV use, 165,300 acres as limited to existing and designated routes, and 44,000 acres as closed to OHVs.

Impacts from Lands and Realty Management. ROWs associated roads or other access would create linear features across the landscape. Impacts from issuance of these authorizations would vary based on the nature and purpose of the authorization and the amount of change it would cause to existing landscape form, line, color, or texture. Sale or exchange of public lands would remove all VRM designations and accompanying objectives for protection of their scenic values. When public lands are disposed of, the BLM no longer controls the scenery, and development could affect the visual qualities of adjoining public lands. Because it is unknown which lands (if any) might be sold, it is unknown whether those lands would be of high value because of visual interest. When the BLM acquires lands, it also acquires responsibility for the scenery. Acquired lands would undergo a visual resource inventory or could have a management class designated as part of the acquisition process.

Impacts from Coal Management. Exploration and development of coal creates surface disturbances that could adversely affect visual resources. Impacts on visual resources would be unavoidable because of major surface-disturbing activities to mine for coal. However, little development of locatable minerals is expected during the next 15 to 20 years.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). In the area with development, the construction of roads, well pads, and other facilities would add impacts on the landscape. Many of the developments would be visible and would attract attention, which would result in changes to the existing visual resources. Oil and gas development would be augmented by large numbers of lights because drilling rigs operate at all hours of the day and night. Night lighting in the immediate area of gas field development and potentially in large areas surrounding the gas field would significantly reduce the nighttime viewing experiences of individuals. The CRVFO RFD (BLM 2008g) estimated that 99 percent of new gas development would occur in high-potential areas and one percent in moderate- to low-potential areas. Fluid mineral development would have long-term adverse impacts on visual resources. Alternative A would manage 672,500 acres as open to fluid minerals leasing and development.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Exploration and development of locatable minerals create surface disturbances that could adversely affect visual resources. Impacts on visual resources would be unavoidable because of major surface-disturbing activities to mine for the mineral sources. Alternative A would open 470,700 acres to solid minerals leasing.

Impacts from Areas of Critical Environmental Concern Management. Although ACEC designation alone does not necessarily provide protection, the management actions included in ACECs are often more restrictive, thus indirectly providing protection for visual resources.

Impacts from Wilderness Study Area Management. The visual quality of WSAs would be protected. Under all alternatives, they would be managed under both the Wilderness IMP and the VRM Class I objective, which would protect them until Congress provides alternate direction for their management. In all alternatives, 27,800 acres would be VRM Class I. This would have long-term benefits to visual management.

Impacts from Wild and Scenic River Management. Protecting the outstandingly remarkable values of the eligible or suitable stream segments would help protect visual resources by preventing ground-disturbing activities that would impact the scenic character in the river corridors. Under the Proposed RMP and Alternatives A and C, eligible or suitable stream segments would be managed to preserve their ORVs, free-flowing condition, water quality, and tentative classification. This management would preserve the existing character of the landscape in these areas.

Impacts from Transportation Facilities Management. Under all alternatives, BLM roads would be maintained according to intensity levels. As costs have risen, fewer miles of BLM roads have been maintained each year. The actual miles of roads maintained each year would be based on annual budgets. Maintenance could result in visual contrasts in color because of disturbed soils and vegetation and contrasting linear disturbance on the landscape. Since the roads already exist, these impacts would be low to moderate on the characteristic landscape and would be site-specific and localized.

Impacts from Health and Safety Management. Under all alternatives, the CRVFO would continue to monitor and address public health and safety as problems arise. Emergency actions required for health and safety management could have an adverse impact on visual resources.

Alternative B (Proposed RMP)

Impacts to visual resources from management of other resources would be the same as or similar to those under Alternative A except as described below.

Impacts from Visual Resource Management. There would be negligible impacts on the visual quality of the landscape in Class I areas. The objective for Class I allows virtually no change to the visual character of the landscape. There would be minor impact on the visual quality of the landscape in Class II areas, where the objective allows projects to be seen but not to create impact (i.e., contrast with the surrounding landscape) sufficient to attract the attention of the casual observer. However, ongoing resource use and development in Class III and IV areas could impact visual resources. This is particularly true in areas that are largely natural in appearance.

The following management actions would preserve and protect visual resources to the extent allowable under the VRM class objectives, with long-term beneficial impacts on scenic quality in these areas:

- Within VRM Class II areas, management may concentrate all new disturbances within existing ROWs or within 200 meters (656 feet) of existing disturbances.
- Application of stipulation CRVFO-NSO-22 would prohibit surface occupancy and surface-disturbing activities in VRM Class II areas with slopes over 30 percent and high visual sensitivity to preserve the visual setting and integrity. Lands with high visual sensitivity are those lands within 5 miles of the sensitive viewshed corridors of moderate to high visual exposure, where details of vegetation and landform are readily discernible and changes in visual contrast can be easily noticed by the casual observer.

Table 4.2.10-1 shows the acres designated as each VRM class for all alternatives. The analysis assumed that areas designated as VRM Class III and VRM Class IV objectives would permit more surface-disturbing impacts and potentially have greater adverse impacts on visual resources and scenic quality than those areas designated as VRM Class I and Class II objectives. Compared with the VRI, the Proposed RMP would increase protections to visual resources due to the increase in acres of VRM Class I and II (see Table 4.2.10-2). The Proposed RMP would provide more benefit than Alternative C, and Alternative D would provide the least benefit for visual resources among the action alternatives. All of the action alternatives would provide more benefit to visual resources than Alternative A.

Impacts from Water Resource Management. Impacts under the Proposed RMP would be similar to those under Alternative A, with the addition of CRVFO-CSU-3 for intermittent and ephemeral streams, and CRVFO-NSO-5 for perennial streams, water bodies, riparian areas and aquatic dependent species, which may apply restrictions preventing surface-disturbing activities. Compared with Alternative A, the Proposed RMP would provide more benefits to visual resources.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under the Proposed RMP would be similar to those under Alternative A except for the addition of CRVFO-NSO-5 for fisheries, which would

prohibit surface occupancy and surface-disturbing activities. Compared with Alternative A, the Proposed RMP would offer more benefits to visual resources.

Impacts from Terrestrial Wildlife Management. Impacts under the Proposed RMP would be similar to those under Alternative A, with the addition of NSO stipulations for big game migration areas, priority wildlife areas, and osprey nesting areas, which would further prohibit surface occupancy and surface-disturbing activities.

Impacts from Special Status Species Management. Impacts under the Proposed RMP would be similar to those under Alternative A, with the addition of NSOs for additional special status species (e.g., occupied sensitive plant habitat, big-river fishes, sage-grouse leks, Mexican spotted owl, special status bat habitats, and sensitive amphibian breeding area), which would further prohibit surface occupancy and surface-disturbing activities.

Impacts from Cultural Resource Management. The protective management of cultural resources would generally complement the maintenance of landscape character and the conservation of visual resources. When excavation or restoration measures involve surface- or vegetation-disturbing activities, noticeable contrast or reduced scenic quality ratings could result. Stipulations CRVFO-NSO-20 for heritage areas and CRVFO-NSO-21 for historic properties would prohibit surface occupancy and surface-disturbing activities. Compared with Alternative A, the Proposed RMP would have similar benefits.

Impacts from Managing to Protect Wilderness Characteristics. The Castle Peak Addition, Flat Tops Addition, Pisgah Mountain, and Thompson Creek Units would be managed as VRM Class II under the Proposed RMP. This would preclude management actions that do not retain the characteristic landscape. Closing lands managed for wilderness characteristics to fluid minerals leasing under Alternative C would preclude visual impacts on these land units from fluid minerals leasing. NSO stipulation CRVFO-NSO-23 would prohibit surface occupancy and surface-disturbing activities that could impact visual resources. Compared with Alternative C, the Proposed RMP would provide slightly less benefit to retaining the characteristic landscape in the Grand Hogback Unit, but more than Alternatives A and D.

Impacts from Cave and Karst Resource Management. Stipulation CRVFO-NSO-24 for cave and karst occurrence areas would prohibit surface occupancy and surface-disturbing activities in the area of known cave and karst resources (including no subsurface occupancy for 5,000 feet below the surface). The area encompasses the cave openings, subsurface features, and watersheds immediately above the caves. Compared with Alternative A, the addition of CRVFO-NSO-24 under the Proposed RMP and Alternatives C and D would offer more protection to visual resources.

Impacts from Forestry Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP would intensively manage 28,000 acres of commercial forest and woodland to target an average annual PSQ of 0.9 MMBF, would apply limited management to the 391,700 acres of remaining forests and woodlands, and would prohibit commercial timber harvest on 81,800 acres of forests and woodlands in the CRVFO. Compared with Alternatives C, the Proposed RMP would have less area that prohibits commercial timber; compared with Alternative D, it would have more area that prohibits commercial timber.

The Proposed RMP and Alternative D would allow for accelerated harvest levels after adverse events (e.g., pine and spruce beetle infestations, other insect outbreaks, disease, blowdown, wildfire). Allowing accelerated harvest would accelerate the regenerative process of the forest and lead to a greater variety of natural contrasts in form, line, color, and texture in the characteristic landscape after adverse events. However, the harvest of timber can lead to short-term adverse impacts on the form, line, color, and texture of the characteristic landscape while the area is regenerating. In addition, accelerated harvest levels after adverse events would help to prevent a large wildfire, reducing the risk of experiencing a high degree of modification and contrasts to the existing landscape.

Impacts from Livestock Grazing Management. Impacts under the Proposed RMP would be similar to those under Alternative A, except that livestock grazing would continue to be authorized on 441,400 acres. Compared with Alternative A, the Proposed RMP would allow for 48,000 fewer acres for grazing compared with Alternative A, which would provide long-term benefits to visual resources.

Impacts from Recreation and Visitor Services Management. Impacts under the Proposed RMP would be similar to those for Alternative A, except that Stipulation CRVFO-CSU-11 for ERMAs and CRV-CSU-19 for developed recreation facilities and trails would allow the BLM to require special design, construction, and implementation measures.

A total of 62,800 acres would be managed as SRMAs. CRVFO-NSO-25 for SRMAs would prohibit surface occupancy and surface-disturbing activities in these areas. Compared with Alternatives A and C, recreation and visitor services management under the Proposed RMP would provide more benefits to visual resources.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as those under Alternative A, except that the Proposed RMP would designate no acres as open to OHV use, 464,000 acres as limited to designated routes, and 41,200 acres as closed to OHVs. Compared with Alternative A, the Proposed RMP has no open designation, and would have long-term beneficial impacts on visual resources.

Impacts from Lands and Realty Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP has 191,200 acres of ROW avoidance areas and 39,400 acres of ROW exclusion areas. Compared with Alternative A, the Proposed RMP would provide more benefits to visual resources.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as under Alternative A, except that the Proposed RMP would manage 565,600 acres as open to fluid minerals leasing and development. Compared with Alternative A, the Proposed RMP would create fewer impacts on visual resources.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP would open 342,700 acres to solid minerals leasing. Compared with Alternative A, the Proposed RMP would create fewer impacts on visual resources and the least among all the action alternatives.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP would designate 18,300 acres in Thompson Creek, Bull Gulch, and Deep Creek ACECs as VRM Class I, and 15,600 acres in Blue Hill, Glenwood Springs

Debris Flow, Grand Hogback, and McCoy Fan Delta ACECs as VRM Class II. Compared with Alternative A, the Proposed RMP would provide more benefits to visual resources.

Impacts from Wild and Scenic River Management. Under the Proposed RMP, BLM would determine that Deep Creek Segments 2 (wild) and 3 (recreational) are suitable for inclusion into the NWSRS. All other stream segments but the Colorado River segments would be determined not suitable and would be released from further protection under the Wild and Scenic River Act. The Proposed RMP relies upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Appendix Q), in concert with BLM land management authorities, to protect the free-flowing nature, ORVs, classification, and water quality of Colorado River Segments 6 and 7. The Upper Colorado River Stakeholder Group Management Plan would protect the ORVs through a cooperative water delivery mechanism. If monitoring indicated a decline in the condition of the ORVs, BLM would start the formal suitability process to designate the Colorado River segments for inclusion into the NWSRS.

Impacts would be similar to those under Alternative A. The Proposed RMP would offer less indirect benefit from WSR management to visual resources than Alternatives A and C, but more than Alternative D. However, policy guidance directs BLM to proceed with suitability determinations and evaluate various river management options to identify the method that will best support the outstandingly remarkable values while acknowledging other uses of the river corridor, rather than just making eligibility determinations.

Alternative C

Impacts under Alternative C to visual resources from water resource management, vegetation management, soils management, terrestrial wildlife management, special status species, cultural resource management, visual resource management, and cave and karst resource management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under Alternative C would be similar to those under Alternative A except for the addition of CRV-NSO-16 for perennial waters, which would prohibit surface occupancy and surface-disturbing activities. Compared with Alternative A, Alternative C would offer more benefits to visual resources.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, the Castle Peak Addition, Flat Tops Addition, Grand Hogback, Pisgah Mountain, and Thompson Creek Units would be managed for wilderness characteristics with supporting VRM Class II designations. This would preclude management actions that do not retain the characteristic landscape. NSO stipulation CRV-NSO-43 would prohibit surface occupancy and surface-disturbing activities. Compared with the other alternatives, Alternative C would be the most beneficial to retaining the characteristic landscape on the most acreage because it also includes the Grand Hogback Unit.

Impacts from Forestry Management. Impacts would be similar to those under Alternative A, except that Alternative C would intensively manage 28,400 acres of commercial forest and woodland to target an average annual PSQ of 1.8 MMBF, would apply limited management to the remaining 341,500 acres of forests and woodlands, and would prohibit commercial timber harvest on 135,000 acres of forests and woodlands in the CRVFO. Compared with the other alternatives, Alternative C would have the most area that prohibits commercial timber, and therefore would have the least impact on visual resources.

Alternative C does not allow for accelerated harvest levels after adverse events (e.g., pine and spruce beetle infestations, other insect outbreaks, disease, blowdown, wildfire). Not allowing accelerated harvest would slow the regenerative process of the forest and lead to changes in form, line, color, and texture of the characteristic landscape after adverse events. While these events may be natural, they can still have an adverse impact on visual resources. In addition, not allowing for accelerated harvest levels after adverse events could contribute to or cause a large wildfire. If this were to occur in the area, while it would be a natural process, the landscape could experience a high degree of modification and contrasts to the existing landscape.

Impacts from Livestock Grazing Management. Impacts under Alternative C would be similar to those under Alternative A, except that livestock grazing would continue to be authorized on 432,000 acres. Compared with Alternative A, Alternative C would allow for the least amount of grazing at 57,600 acres less than Alternative A. This would provide the most long-term benefits to visual resources of any of the alternatives.

Impacts from Recreation and Visitor Services Management. Impacts under Alternative C would be similar to those under the Proposed RMP. Stipulation CRV-NSO-45 for Rifle Mountain Park would prohibit surface occupancy and surface-disturbing activities, and stipulation CRV-CSU-19 for developed recreation facilities and trails would allow the BLM to require special design, construction, and implementation measures. A total of 23,800 acres would be managed as SRMAs. Stipulation CRV-NSO-46 for SRMAs would prohibit surface occupancy and surface-disturbing activities in these areas. In addition, SRMAs would be managed as VRM Class II, so they would provide long-term beneficial impacts on visual resources. Compared with the Proposed RMP and Alternative D, recreation and visitor services management under Alternative C would provide fewer benefits to visual resources.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those under Alternative A, except that Alternative C would designate no land as open to OHV use, 461,300 acres as limited to designated routes, and 43,900 acres as closed to OHVs.

Compared with Alternative A, Alternative C has no open designation, has the most amount of closed designation, and would have the most long-term beneficial impacts on visual resources.

Impacts from Lands and Realty Management. Impacts would be similar to those under Alternative A, except that Alternative C has 196,800 acres of ROW avoidance areas and 39,900 acres of ROW exclusion areas. Compared with Alternative A, Alternative C would provide the most benefits to visual resources of all the action alternatives.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts under Alternative C would be similar to those under Alternative A, except that Alternative C would manage 521,500 acres as open to fluid minerals leasing and development. Compared with Alternative A, Alternative C would create fewer impacts on visual resources and the least among all the action alternatives.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Impacts would be similar to those under Alternative A, except that Alternative C would open 323,100 acres to solid minerals leasing. Alternative C would create fewer impacts on visual resources than the other alternatives.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be similar to those under Alternative A, except that Alternative C would designate 16,200 acres in Thompson Creek, Bull Gulch, and Deep Creek ACECs as VRM Class I and the remaining 49,560 acres of ACECs as VRM Class II. Compared with Alternative A, Alternative C would benefit visual resources and would have the most benefit among all the action alternatives.

Impacts from Wild and Scenic River Management. Under Alternative C, all eligible stream segments outside of the Roan Plateau planning area would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The interim protections would apply to lands within 0.25 mile of either side of the stream segment. The notable difference is in the Colorado River segments. The suitability determination would not include a cooperative agreement with the stakeholder group. With no *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, water flows in the Colorado River would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use within the Upper Colorado River SRMA over the life of the RMP. Impacts to visual resources would be similar to those described under Alternative A, where constraints on land uses would indirectly benefit the protection of visual resources in the stream corridors.

Alternative D

Impacts to visual resources from soils management, vegetation, cultural resource management, visual resource management, and cave and karst resource management would be the same as or similar to those under the Proposed RMP. Impacts to management of all other resources and uses would be the same as or similar to those for Alternative A, except as described below.

Impacts from Water Resource Management. Impacts under Alternative D would be similar to those under Alternative A.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A, with the additional stipulation of CRV-CSU-6 for trout-bearing streams, which may have site-specific relocation restrictions. Compared with Alternative A, Alternative D would offer more benefits to visual resources.

Impacts from Terrestrial Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A, except for the application of an NSO stipulation for osprey nesting areas. Compared with Alternative A, Alternative D would have similar impacts.

Impacts from Special Status Species Management. Impacts under Alternative D would be similar to those under Alternative A, except for additional NSO stipulations, including those for occupied sensitive plant habitat, sage-grouse leks, Mexican spotted owl habitat, special status bats, and big-river fishes, all of which would prohibit surface occupancy and surface-disturbing activities. Additionally, CRV-CSU-8 for significant plant communities would provide additional management flexibility to BLM by requiring special design or relocation of projects by more than 200 meters.

Impacts from Forestry Management. Impacts would be similar to those under Alternative A, except that Alternative D would intensively manage 32,200 acres of commercial forest and woodland to target an average

annual PSQ of 1.8 MMBF, would apply limited management to the remaining 387,700 acres of forests and woodlands, and would prohibit commercial timber harvest on 85,000 acres of forests and woodlands in the CRVFO. Compared with Alternative C, Alternative D would have less area where commercial timber harvesting is prohibited, but an area similar to the Proposed RMP; therefore, Alternative D would have an impact on visual resources similar to that of the Proposed RMP.

The Proposed RMP and Alternative D do allow for accelerated harvest levels after adverse events (e.g., pine and spruce beetle infestations, other insect outbreaks, disease, blowdown, wildfire). Allowing accelerated harvest would accelerate the regenerative process of the forest and would lead to a greater variety of natural contrasts in form, line, color, and texture in the characteristic landscape after adverse events. However, the harvest of timber can lead to short-term adverse impacts on the form, line, color, and texture of the characteristic landscape while the area is regenerating. In addition, accelerated harvest levels after adverse events would help to prevent a large wildfire, reducing the risk of experiencing a high degree of modification and contrasts to the existing landscape.

Impacts from Livestock Grazing Management. Impacts under Alternative D would be similar to those under Alternative A, except that livestock grazing would continue to be authorized on 443,400 acres. Alternative D would allow for 46,200 fewer acres for grazing compared with Alternative A.

Impacts from Recreation and Visitor Services Management. Impacts under Alternative D would be similar to those under the Proposed RMP and Alternative C. Stipulation CRV-NSO-45 for Rifle Mountain Park would prohibit surface occupancy and surface-disturbing activities. Stipulation CRV-CSU-19 for developed recreation facilities and trails would allow the BLM to require special design, construction, and implementation measures.

A total of 63,600 acres would be managed as SRMAs. Stipulation CRV-NSO-46 for SRMAs would prohibit surface occupancy and surface-disturbing activities in these areas. In addition, SRMAs would be managed as VRM Class II. Therefore, SRMAs would provide long-term benefits to visual resources. Compared with the Proposed RMP and Alternatives A and C, recreation and visitor services management under Alternative D would provide the most benefits to visual resources.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those under Alternative A, except that Alternative D would designate no land as open to OHV use, 464,800 acres as limited to designated routes, and 40,400 acres as closed to OHVs. Compared with Alternative A, Alternative D would have no open designation, the least amount of closed designation among the action alternatives, and long-term beneficial impacts on visual resources.

Impacts from Lands and Realty Management. Impacts would be similar to those under Alternative A, except that Alternative D has 105,100 acres of ROW avoidance areas and 39,100 acres of ROW exclusion areas. Compared with Alternative A, Alternative D would provide more benefits to visual resources.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be similar to those under Alternative A, except that Alternative D would manage 648,400 acres as open to fluid minerals leasing and development. Compared with Alternative A, Alternative D would have the most impact on visual resources of all the action alternatives, allowing for the largest amount of surface disturbance.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Impacts would be similar to those under Alternative A, except that Alternative D would open 477,400 acres to solid minerals leasing. Compared with Alternative A, Alternative D would have the most impact on visual resources of all the action alternatives, allowing for the most amount of solid mineral leasing.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be similar to those under Alternative A, except that Alternative D would designate 10,400 acres in Bull Gulch ACEC as VRM Class I and 3,700 acres in Blue Hill as VRM Class II. Compared with Alternative A, Alternative D would benefit visual resources and would have the least benefit among all the action alternatives.

Impacts from Wild and Scenic River Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments outside of the Roan Plateau planning area would be released from management protections afforded eligible or suitable stream segments. Alternative D would offer less indirect benefit to visual resources due to the increased potential for surface-disturbing activities in the stream corridors.

Cumulative Impacts

The cumulative impact analysis boundary for visual resources includes the decision area and neighboring lands within the viewshed that overlap the CRVFO. Development actions within and outside the analysis boundary could produce long-term cumulative impacts on visual resources. Potential impacts on visual resource management would result primarily from surface disturbance activities that cause visual intrusions and degrade the visual quality of the CRVFO analysis area. Activities related to oil and gas development, fire suppression, vegetation treatments, and ROW corridors would have the potential to degrade visual resources. Cumulative impacts would likely be greater in the western portions of the CRVFO where mineral development is more intense. Reasonably foreseeable future actions in the CRVFO include these same types of actions, which would continue to create visual contrasts within the landscape.

Projects in VRM Class I and II areas could be required to conform to these VRM Class objectives through design, camouflage, and/or topographic screening, which would prevent their cumulative impacts on visual resources from becoming dominant features on the landscape in sensitive VRM Class designations. Cumulatively, Alternative C would provide the greatest protections to visual resources because it contains the most VRM Class I and II. Alternative A has the least amount of VRM Class I and II. The Proposed RMP has slightly less Class I and II than Alternative C. Alternative D has slightly more Class I and II than Alternative A. VRM Class III and IV area objectives in the decision area would not emphasize protection of an unmodified landscape and visual resources, and would allow for moderate to major modifications to the landscape. Overall, Alternative A has the most amount of Class III and IV, and Alternative C has the least Class III and IV. In addition, the Proposed RMP has slightly more Class III and IV than Alternative C, and Alternative D has slightly less Class III and IV than Alternative A. Activities that occur in these areas could result in greater change to the characteristic landscape and may not protect scenic values. Under all alternatives, BLM lands are managed to protect visual resources. In summary, the protection provided is greatest under Alternative C, least under Alternative A, with Alternative D providing slightly more protection than Alternative A and the Proposed RMP providing slightly less protection that Alternative C. Past and present management, and reasonably foreseeable future actions, combined with the proposed action alternatives, would have cumulative impacts on visual resources that preserve scenic quality within the master planning area.

4.2.11 Wildland Fire Management

Methods and Assumptions

This section describes potential impacts on wildland fire management from implementing management actions for other resource programs. Existing conditions concerning wildland fire management are described in Section 3.2.11. 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, ignition, frequency, and fire response including suppression and fuels treatments.

Indicators on wildland fire and fuels management include the following:

- Alterations of the vegetation cover (standing and non-standing) the results in a substantial shift in fire regime condition class of the planning area (away from the natural range of variability);
- A substantial increase in the risk of wildland fire ignitions and/or frequency of ignitions;
- Management actions that substantially inhibit the response to wildfires or can reduce the effectiveness of fuels treatments designed to prevent wildland fires; and
- Large wildfire costs and the frequency of occurrence of those large fires.

This analysis was based on the following assumptions:

- Fire management is designed to complement resource management objectives. As the management prescriptions across the landscape change, so will the role of fire.
- Fire is an important functional natural disturbance in many of the ecological systems.
- Demands for fuels treatments would likely increase over the life of this plan.
- All conservation measures pertaining to emergency wildfire management operations would be followed unless firefighter or public safety or the protection of property, improvements, or natural resources renders them infeasible during a particular operation.
- All conservation measures pertaining to fuels treatments would be followed when implementing management of prescribed fires, and other vegetation treatments.
- A direct relationship exists between the level of human use within the planning area and the frequency of human-caused fires.
- A direct relationship exists between fuel loading, potential fire intensity, fire severity, fire size, and fire suppression costs.
- Most fires in the planning area have natural causes (e.g., lightning strikes).
- Management priorities for suppression, prescribed fire, non-fire fuels treatments, and community protection/assistance would be described in a Fire Management Plan (FMP). The FMP provides specific implementation strategies. Once completed, the revised CRVFO RMP will provide management guidance to which subsequent, routinely updated FMPs are tiered.
- Unplanned wildfires from natural causes managed for resource benefit will improve fire regime condition class and will lower fire suppression costs over the long term.

- The more frequently small and medium sized fires burn on a landscape, the less prone that landscape is to extremely large destructive fires.
- The decision to manage for multiple objectives including resource benefit are made on a case-by-case basis considering land use plan direction, weather, fuel condition, fire resource availability, and other factors. Some wildfires may receive full suppression based on these factors.
- Fire is a desirable component of these ecosystems. Constraints such as political, ecological, and social, need to be considered when developing fire management response.

Large fire suppression costs will remain higher across all alternatives due to large areas of mixed ownership of BLM and private land, large amount of WUI, and moderate to high fire occurrence within the planning area.

Environmental Consequences

Impacts on wildland fire management would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on wildland fire management under any of the four alternatives.

Alternative A

Impacts from Wildland Fire Management. All alternatives propose to give first priority to public and firefighter safety and to protection of property. All alternatives would integrate fire and fuels management to meet land health standards and natural and cultural resource objectives across landscapes, agencies, and government boundaries. All alternatives also recognize the rule of wildland fire as an essential ecological process and allow fire to play a natural role in the ecosystem where or when resource objectives can be met. The objective for all alternatives is to meet specific wildland fire management unit objectives established in the RMP and to allow for planned and unplanned ignitions to meet wildland fire and other resource management objectives.

Alternative A lacks an RMP objective to restore fire regime condition classes; wildfire management options would be based in meeting other resource objectives. Under Alternative A, both planned and unplanned fire could be used to meet resource objectives. This alternative has 278,300 acres identified where unplanned natural wildfire could be used for resource benefit. On the other 227,100 acres, unplanned fire would not be at option to manage for resource benefit and would require a suppression strategy. This alternative would allow fire managers to utilize unplanned fire for resource benefit as a tool to meet land management objectives. Overall this alternative would give the second lowest projected wildland fire suppression costs over the short and long term of all the alternatives.

Alternative A proposes the least constraints and mitigation measures on fuels treatments.

At the implementation-level, all alternatives propose to minimize costs and loss of property and natural resources, complement resource management objectives, and sustain the productivity of biological ecosystems through fire management.

Impacts from Air Quality Management. Air quality management could have an impact on wildland fire management. Air quality management could reduce acres burned by prescribed fire or unplanned natural fire due to smoke management and emissions standards. All planned fires require a Colorado smoke permit from Colorado Air Pollution Control Division. Once permits are attained, projects follow permit conditions to

meet air quality objectives. Multiple smoke management techniques are used to minimize prescribed fire impact to air quality, including burning under optimal weather conditions, limiting prescribed burning to certain wind directions, and limiting duration of prescribed burns.

Impacts from Soils Management. Soils management under Alternative A would focus on areas of debris flow hazard zone and erosion hazard areas. Soils management could have a negative impact on fire management. Areas where fragile soils or steep slopes are a concern may require a suppression response to unplanned fire ignitions. This may reduce management flexibilities to use unplanned fires for multiple objectives that include resource benefit in the event the fire was in an area of soils concern. Minimal impact suppression tactics may be used during an unplanned wildland fire to minimize soil impacts during suppression operations.

Impacts on the fuels management program could include alterations of design and methods available for prescribed fire and mechanical fuels treatments (i.e., hydroaxe, roller-chopper, tires or tracked vehicles). The magnitude in which the soil concerns could alter fuels treatment projects would depend on the site-specific pretreatment conditions and anticipated post-treatment recovery of the vegetation.

Impacts from Water Resources Management. Impacts from implementation of water resource management actions could affect wildland fire management. In order to meet the objective of maintaining or improving water quality in Alternative A, there is the potential to affect design of fuels projects and the implementation of unplanned natural fire used for multiple objectives including resource benefit. Most conflicts with fuels projects and water resource management would be mitigated and addressed in the site specific NEPA process and design of the project. Additionally during wildfires, consideration related to water resources management is given to types of suppression tactics and equipment to be used near water resources.

Impacts from Vegetation Management. In Alternative A, very little specific guidance is given about the role of fire within individual vegetation communities. There would also be little to no restriction in the use of planned fire as a tool to meet fuel reduction and other land management objectives.

Woodlands that have potential for commercial forest products would be intensively managed under Alternative A. Removal of commercial forest products could reduce fuels loadings and intensive forest management could increase forest health, with both actions improving fire regime condition class. Areas managed for commercial timber often are full suppression areas, thus limiting the ability to use unplanned fire for multiple objectives including resource benefit.

Treatment of noxious and invasive weeds should benefit the wildland fire management program by reducing the fire regime condition class.

Impacts from Fish and Wildlife Management. Fish and wildlife management would have both adverse and beneficial effects on the fire and fuels management program. Management actions that help reduce fire regime condition class can benefit the fire management program. Restrictions designed to protect wildlife can alter fuel project schedules and design, adding to program costs. In Alternative A, there is the least amount of restrictions from wildlife protections. This alternative does not have any management actions designed to improve habitat through vegetation treatments that may also restore fire regime condition class.

Impacts from Special Status Species Management. Buffer distances for special status species management (including nesting sites) could have negative impacts on suppression flexibility and fuels project design. Buffer distances vary by species and have different exceptions that would affect the fire and fuels program in a variety of ways. Site specific project level NEPA would determine the feasibility and design criteria for prescribed fire and mechanical fuels projects. Mitigation to address special status species could lead to increased costs and redesigned projects. Compared with the other three alternatives, Alternative A has the least amount of restrictions that could impact the fire and fuels program. Unplanned wildland fire would have less impact due to its being an emergency action.

Impacts from Cultural Resources Management. Impacts to the fire and fuels program from cultural resource management in Alternative A include reducing areas available for fuels treatment, leaving pockets of undisturbed vegetation adjacent to cultural resources, leaving these areas more prone to wildfire. Although there would be a 0.25-mile buffer around heritage areas, this is not a formal stipulation. Additionally while there is a buffer to protect historic properties, it is technical guidance versus a designated NSO. The result of these buffers could alter fuels project design, thus reducing the effectiveness of the hazardous fuels treatment.

Impacts from Visual Resource Management. VRM slightly impact wildland fire management across all alternatives by requiring fuels treatment projects to maintain the visual quality and integrity of designated VRM classes. Fuels treatment design could be affected in areas designated VRM Class I or Class II. However, site-specific NEPA will mitigate VRM issues and the fuels projects would still move forward. Prescribed fire and fuels projects can improve VRM values by increasing the richness of line, form, color, and texture of a landscape. VRM 2 areas can benefit the wildland fire program by collocating ROWs and communication sites, therefore reducing the frequency of facilities on the landscape that would need to be protected during future wildfires. This is also true for VRM Class I areas that will not allow facilities to be built that would need protection during a wildfire, further reducing fire management costs associated with the response to future wildfires in these areas.

Impacts from Forestry Management. Forestry management activities benefit the fire program by reducing fuel loadings, improving the fire regime condition class, and promoting healthy timber stands that are more resistant to future wildfires. The number of acres available for commercial timber harvest varies by alternative; therefore, the potential benefit to the fire program varies by alternative. Alternative A would allow the most acres of all the alternatives that are open to forest management actions. This alternative also would have the highest annual PSQ of all the alternatives. Forest product sales on these lands can be used in conjunction with fuels treatments to offset treatment cost. There may be a very slight increase in potential for human-caused ignition from forest management activities. Areas designated to have commercial timber value may reduce the flexibility in the response to wildfire. The suppression of wildfires in these areas will be the normal response limiting the potential to manage fires for multiple objectives including resource benefit.

Impacts from Livestock Grazing Management. Livestock grazing can have beneficial and adverse impacts on wildland fire management. Livestock grazing can assist with suppression efforts by reducing the fine fuel loading of grasses and forbs, which are the main carriers of fire. The benefit of this reduction is most notable where grass is the primary carrier of the fire. In the vast majority of the planning area, brush or other woody species are the primary carries of fire so grazing has less impact on reducing fuel loading to prevent wildfires on this landscape. Alternative A has the highest AUMs and therefore would have the most potential for reduction in fine fuel loading from grazing. Overgrazing can spread cheatgrass that can alter fire regimes, causing an upward shift in fire regime condition class. This alternative would not close any allotment where

the potential for cheatgrass issue is the highest. Under this alternative, all seeded areas must defer livestock grazing for up to two growing seasons to allow for grasses and forbs to get established. This may slightly increase fuels treatment costs on seeded projects in temporary fence fuels project areas. Conducting vegetation manipulations to improve forage could have a beneficial effect on the wildland fire management program by reducing fuel loadings that carry wildfires.

Impacts from Recreation and Visitors Services Management. Impacts from SRMAs can be both beneficial and adverse on wildland fire management. SRMAs offer a greater potential to intensely manage recreation, which can benefit the wildland fire program by minimizing the potential for human-caused fires through regulations on activities (campfires, shooting, etc.) that cause wildfires. Wildfire in these areas will almost always be suppressed limiting the potential to manage fire for multiple objectives including resource benefit. However most of these SRMAs receive a suppression response already due to adjacent WUI. The need to preserve recreational settings and the recreational facilities will create higher demand for fire suppression resources and increase fire suppression cost. Fuels treatments are allowed in SRMAs as long as they do not impact the natural character and other recreational values over the long term. This has potential to slightly alter fuels treatment design in SRMAs.

Impacts from ERMAs include altering fuels treatment design to not impact the natural character and other recreational value. This can add to project cost and reduce program flexibilities. Unlike SRMAs, there is less ability to regulate ERMAs to reduce human-caused fires. Additionally EMRAs do not always require a full suppression response to wildfire and offer more flexibility to manage naturally caused wildfire for multiple objectives including resources benefit than SRMA.

Allowable uses for visitors and safety aid the wildland fire program in reducing the risk of human-caused wildfire. Restrictions on shooting use will reduce the number of wildfires caused by target shooting. Camping/overnight use closures will reduce the number of fires caused by abandoned campfires. Alternative A would have very little acreage closed to shooting and camping, thereby having the highest potential of all the alternatives for human-caused fires from these wildfire-causing activities.

Impacts from Comprehensive Trails and Travel Management. Alternative A, in having open designation for travel on over half the planning area, would increase the potential of human-caused fire from vehicle travel. Especially problematic is the cross-country off-road travel this designation allows, where hot exhausts can come in contact with burnable vegetation. This alternative would have the highest potential of all the alternatives for human-caused fire from Trails and Travel Management that can increase fire management program costs and demand for fire suppression resources.

Impacts from Lands and Realty Management. Issuance of ROWs can cause both beneficial and adverse impacts on wildland fire management. While there is a need to meet the needs of development and public use authorizations, such as power lines, utilities, transportation systems, and communication sites, it adversely affects wildland fire management by creating additional infrastructure to protect during a wildfire and increases potential sources of human-caused ignitions. The more ROWs and communication sites there are, the higher the fire suppression costs to protect these sites when a fire does start. Some ROWs can benefit the wildland fire program by providing access to wildfires. Additionally a small portion of ROWs can serve as fuel breaks before the vegetation becomes re-established. As new ROWs and communications sites are developed, additional fuels treatments are necessary to address potential impacts from wildfires. ROW corridors limit fire

management flexibilities and the potential to use natural unplanned fire for multiple objectives including resources benefit.

Impacts from Fluid Minerals. The development of oil and gas would increase access and would potentially require more fire suppression resources when a wildfire occurs within oil and gas development. Materials and machinery that are associated with oil and gas development have a potential to increase human-started fires through thrown sparks, heated material, and spontaneous combustion.

Development of oil and gas resources could create new facilities that would need protection from wildland fire, thus limiting the ability to maintain or restore ecosystems and treat hazardous fuels in certain areas by using prescribed fire and unplanned natural fire managed for multiple objectives including resource benefit. Large fire costs also increase in responding to fires in these areas to protect infrastructure. Flexibility of fire managers to use unplanned fires could be limited in development areas and full suppression efforts may be required.

Oil and gas development creates additional hazards to firefighters that they have to mitigate when responding to wildfires. Exposure to hydrogen sulfide gas has been a problem for fire managers in the past and affects responding to wildland fire because the gas cannot be seen. Additional training and equipment are needed to deal with this hazard in the oil and gas fields. Potential to become exposed to additional types of hazardous chemicals used in oil and gas exploration and production is an additional hazard encountered by firefighters responding to wildfire. Evacuation of oil and gas fields in the event of an unplanned wildland fire is challenging. Use of mechanical equipment (bulldozers) to respond to wildfires is sometimes delayed in order to locate underground pipelines or may be infeasible where underground pipelines are numerous. Additional cost to the fire program would be necessary for training and equipment to properly address safety issues while working in emergency situations.

Alternative A has the most acres available for fluid mineral leasing out of the four alternatives, and therefore would have the largest impact to the fire management program, increasing fire program costs and presenting the greatest amount of safety issues during the response to wildfire. Closed areas under this alternative have very little fire management workload.

Impacts from Areas of Critical Environmental Concern Management. The designated ACECs have management actions that are both beneficial and adverse in their effects on the wildland fire program. Alternative A does not have the restriction that affects the fire management program within ACECs; the other alternatives do. Direct management action in ACECs related to vegetation management, allowable uses, and response to fire are not part of Alternative A. This may benefit the fire program because these can be an implementation-level decision. The Glenwood Springs Debris Flow Hazard Zone ACEC is the only ACEC in this alternative located within significant WUI where issues could arise with implementation of fuels projects designed to protect the WUI.

Impacts from Wilderness Study Area Management. WSA designations are the same throughout all alternatives. These designations can have minor negative effects on the wildland fire management program in requiring the use of minimum impact suppression tactics and having restriction on use of mechanized equipment. However maximum flexibility is provided to fire managers to manage naturally ignited wildfire for multiple objectives include resource benefit. WSAs provide for unplanned fire managed for resource benefit to reduce fuel loading and restore natural fire regimes. In the Hack Lake WSA and Eagle Mountain WSA, this

management of wildfire would be compatible with current USFS fire management direction on adjacent White River National Forest lands. In preservation of wilderness characteristics, restrictions on building improvement and facilities would lower future wildfire response costs by putting little to no value at risk for fire fighter resources to have to protect.

Impacts from Wild and Scenic Rivers Management. WSRs can impact fire management program in both an adverse and beneficial way. These designations can have minor negative effects on the wildland fire management program in reducing fire management techniques to preserve the ORVs in the stream segments. WSRs would potentially provide an increase in recreation users, potentially increasing the number of human-caused fire ignitions. Higher use of regulations on camping and other human-caused fire activities could reduce human-caused ignition along these river segments. Alternative A maintains the WSR eligibility, thus the need to preserve the ORVs, but does not have as many requirements for protection as the other alternatives.

Alternative B - Proposed RMP

Impacts from Wildland Fire Management. Alternative B (the Proposed RMP) allows the use of naturally caused unplanned wildfires to be managed for multiple objectives including resource benefit in specific geographic areas on 192,200 acres. On the other 312,300 acres of the CRVFO fire will be managed under a suppression strategy due to the proximity of the WUI, risk to other natural resource values like watersheds, undesired fire effects like cheatgrass conversion, or protection of cultural or other resource values. In geographic areas where unplanned wildfire may managed for multiple objectives including resource benefit, natural ignitions may receive little to no direct suppression in order to allow fire to fill its natural role in ecosystem. The Proposed RMP would improve fire regime condition class and lower wildfire suppression costs over the long term.

Implementation of fuels treatments under the Proposed RMP to restore fire regime condition class would reduce the negative impacts from future wildfires. Fuels treatments are designed to improve firefighter and public safety, protect private property, reduce the severity of future wildfires, improve fire regime condition class, and reduce fire suppression costs. The wide range of fuel treatment methods listed in the Proposed RMP would give future fire managers the tools they need to protect public safety meet natural resources objectives when conducting fuels projects. The variety of treatment methods would provide flexibility to improve fuel treatment effectiveness and lower fuels program costs. Manipulating the vegetation in these treatments will make the CRVFO lands less prone to large high intensity wildfires will lower fire suppression costs over the life of this plan. Fuels treatments improve initial attack success by giving firefighters the opportunity to keep fires small in treated areas. The public also benefits from fuel treatments reducing the potential for unplanned wildfires that start on BLM land to burn onto adjacent private lands, destroying homes, facilities, and infrastructure. Additionally, fuels treatments reduce the rate of spread of future wildfires, allowing more time for the public to evacuate during a wildfire event.

Use of planned prescribed fire will restore fire regime condition classes and return this natural process to the ecosystem. Overall the proposed RMP gives lowest projected wildland fire suppression costs over the short and long term of all the alternatives.

Impacts from Air Quality Management. In the Proposed RMP, there is potential for increase air quality monitoring required during prescribed fire and other fuels treatments. Air quality monitoring needs would need to be coordinated with Colorado Department of Public Health and Environment and local governments.

Air quality management could reduce acres burned by prescribed fire due to smoke management and emissions standards. All planned fires require a Colorado smoke permit from Colorado Air Pollution Control Division. Stricter air regulations could limit windows for prescribed burns to be accomplished and could result in project units being smaller and/or more difficult hold or result in the conversion of prescribed fire projects into mechanical fuels treatments. Mechanical treatments are often more expensive than prescribed burns further impacting the wildland fire management program.

Impacts from Soils Management. Soils management could have a negative impact on fire management. Areas where fragile soils or steep slopes are a concern may require a suppression response to unplanned fire ignitions. This may reduce management flexibilities to use unplanned fires for multiple objectives that include resource benefit situations in the event the fire was in an area of soils concern. Minimal impact suppression tactics may be used during an unplanned wildland fire to minimize soil impacts during suppression operations. Certain types of wildfire suppression equipment such as bulldozers may be limited to address concerns over soil impacts.

Impacts on the fuels management program could include alterations of design and methods available for prescribed fire and mechanical fuels treatments (i.e., hydroaxe, roller-chopper, tires or tracked vehicles). To address soil concerns, these alterations to fuels project design could limit the size, reduce the effectiveness, or increase costs of vegetation treatments. The magnitude in which soil concerns could alter fuels treatment projects would depend on the site -specific pre-treatment conditions and anticipated post-treatment recovery of the vegetation. For the Proposed RMP, post-treatment canopy cover and ground cover at a landscape level will need to meet Land Health Standard 1. Followup treatments on fuels projects may be necessary if projects show not meeting or marginally meeting Land Health Standard 1.

Impacts from Water Resources Management. Impacts from implementation of water resource management actions would affect wildland fire management with stipulations in the Proposed RMP. These stipulations could affect design of fuels projects and implementation of unplanned natural fire used for multiple objectives including resource benefit. The objective for vegetation treatments in the fuels program is often compatible with the goals of the water resource stipulations, by preventing severe wildfires that could degrade water resources and the functionality of the riparian vegetation.

The wildland fire management program will follow strategies to protect water quality and watershed functions. During unplanned wildfires tactics and equipment to be used (bulldozers) near water resources will be made on a case-by-case basis. Most conflicts with fuels projects and water resource management would be mitigated and addressed in the site-specific NEPA process and design of the project. Fuels management actions would need monitoring to make sure they were meeting Land Health Standard 5. If not, followup mitigations could be necessary, adding to program costs. Post-fire rehabilitation could expedite soils stabilization reducing wildfire impact to water resources, as well as reseeding vegetation to support slope stabilization.

Impacts from Vegetation Management. Vegetation management actions complement fire and fuels management through vegetation objectives that manage vegetation to improve or maintain ecological function. There would be beneficial effects on wildland fire management within the Proposed RMP by allowing the offering of forest products by reducing fuels loadings that can lead to large severe wildfires. Resting disturbed areas for two growing seasons would reduce the potential establishment of cheat grass thus benefiting the wildland fire program. Actions that reduce cheatgrass lower potential for conversion to

cheatgrass that can drastically cause an upward shift in fire regime condition class, increasing future fire suppression costs. Post-treatment resting of fuels treatments may increase project costs by creating the need for temporary fencing.

Suppression of all fires in the salt-desert shrub communities may increase suppression costs; however most fires in the salt-desert shrub are currently suppressed due to being located in the WUI. Treating cheatgrass and restoring native vegetation will benefit the wildland fire management program by reducing fire regime condition class, thus limiting the potential extent of future wildfires.

Avoiding the use of natural and prescribed fire in low-elevation cheatgrass-infested sagebrush communities could increase fire program costs. There is more significant impact to fire management resources and costs in this vegetation type because sagebrush is the second largest acreage of all the vegetation types within the field office. It is unknown what percentage of sagebrush areas are infested with cheatgrass, but in these areas planned and unplanned fire would be avoided. Suppression response to wildfires in these areas would be required, limiting flexibility to manage fires for multiple objectives that could include resource benefit. Concerns over cheatgrass-infested sage may convert prescribed fire projects into mechanical fuel treatment projects. However, the reduction of fire in the cheatgrass-infested areas may potentially reduce the conversion of these areas to a cheatgrass monoculture that increases the fire regime condition class. Focus on the management of sagebrush would be looking at sagebrush obligate species, which could have variable benefit and potential restriction to meeting fire management goals like reducing fire regime condition class. Other vegetation treatments in sagebrush for improving habitat and reducing conifer encroachment would benefit the fire program by reducing fuel loading that leads to large severe wildfires.

Use of planned and unplanned fire, mechanical treatments and chemical treatments in mixed mountain shrub will benefit the wildland fire program by reducing fuel loading that will lead to large severe wildfire. Diversifying age class structure will reduce fire regime condition class. However, the objective of perpetuating mid and late seral stands of mountain shrublands may increase fire suppression costs by creating landscape more prone to the larger fires due to fuel bed characteristics of late seral mountain shrub vegetation.

Use of planned and unplanned fire, mechanical treatments in pinyon and juniper woodlands and other forest and woodland types will benefit the wildland fire program by reducing fuel loading that will lead to large severe wildfire. Protecting old growth pinyon and juniper except in the WUI may lead to increased fire suppression costs since these late seral stands are more prone to large fires.

Additionally in the Proposed RMP, creation of diversity in age classes of woodlands would improve fire regime condition class. Also early seral forest is often less prone to large wildfires than late seral stands. This alternative would have the most active forest management to reduce disease vectors and risk across forest and woodland types to address factors that can lead to an upward shift in fire regime conditions class.

Treatment of noxious and invasive weeds should benefit the wildland fire management program by reducing the fire regime condition class. Additionally the implementation action to restore areas that have become monocultures of cheatgrass would help reduce wildfire risk and lower suppression costs due to the fact that cheatgrass burns at higher intensities and more frequently than native vegetation.

Impacts from Fish and Wildlife Management. Fish and wildlife management would have both adverse and beneficial effects on the fire and fuels management program. Managing habitat for wildlife species would

include vegetation treatments (chemical, mechanical, biological, prescribed fire, or managing unplanned natural fire) as a tool in the Proposed RMP and would present a beneficial effect on the wildland fire management program by reducing fuel loadings.

Stipulations associated with migratory birds, big game winter habitat, big game production areas, raptors, waterfowl could impact hazardous fuels treatments by limiting program flexibility in time of year when treatments can occur. This would increase fuel program costs by limiting dates when fuels contracts can be implemented. Vegetation alteration avoidance from for these wildlife timing restrictions could also conflict with prescribed burn windows resulting in missing prescribed burn windows to accomplish projects.

Fuels treatments within the area covered by CRVFO-NSO-7: *Priority Wildlife Habitat* would need design criteria to be compatible with protection of wildlife vegetation cover and forage. Many of the areas cover under this stipulation are within the WUI, which will continue to need fuels treatment to reduce the risk of wildfires.

Impacts from Special Status Species Management. Buffer distances for special status species management (including nesting sites) could have negative impacts on suppression flexibility and fuels project design. Buffer distances vary by species and have different exceptions that would affect the fire and fuels program in a variety of ways. Due to the emergency response to a wildfire, less impact would occur associated with wildfire when compared with impacts to a fuels project.

Stipulations for special status species--fish and other aquatic wildlife could affect design of fuels projects and implementation of unplanned natural fire used for multiple objectives including resource benefit. The objective for vegetation treatments in the fuels program is often compatible with the goals to protect aquatic habitat stipulations, preventing severe wildfires that could degrade water resources and the functionality of the associated habitat. Site-specific project level NEPA would determine the feasibility and design criteria for prescribed fire and mechanical fuels projects to be compatible with fisheries values to be projected. Mitigation to address this could lead to increased costs and redesigned projects.

Stipulations for special status species plants effect on fire and fuels program would vary depending on the species. Stipulations to protect Debeque Phacelia would have negligible effect on fire and fuels program due to most of the habitat it is found being very sparse (almost devoid of vegetation), thus limiting its potential to have enough fuels to support wildfires. Stipulation CRVFO-NSO-10 *Sensitive Plants within ACECs* in the Proposed RMP will restrict the area available to fuels treatments, designed to prevent wildfires, to buffer known population of Harrington penstemon. Additionally stipulations for special status plant species could have minor negative effects on wildland fire management by adding survey costs to project design and by moving flexibility from fire managers in the response to wildfires. Implementation actions in special status species habitat to control cheatgrass would benefit the fire program by lowering suppression costs due to the fact that cheatgrass burns at higher intensities and more frequently than native vegetation.

Stipulations for special status species-terrestrial wildlife create timing limitations and buffers that will affect the fuels program by altering design of project (NSOs) and limiting the windows (TLs) for implementation. The following species have TLs for nesting: American White Pelican, Ferruginous Hawk, Columbian Sharpe Tailed Grouse, Greater Sandhill Crane, and Mexican Spotted Owl. These TLs would have a negligible effect on the fuels program due to lack of habitat occupied now and anticipated for the life of this plan. CRVFO-NSO-12 *Bald Eagle Roost and Nest Site,* CRVFO-TL-8 *Bald Eagle Nest Sites and Winter Roost Sites,* CRVFO-NSO-

14 *Peregrine Falcon-Cliff Nesting Complex,* and CRVFO-TL-10 have potential to slightly affect fuels management in very limited areas. These stipulations may reduce the window for implementing prescribed fire and other fuels projects. Additionally they may alter the extent and or design of fuels treatments.

CRVFO-NSO-15 *Priority Habitat for the Northern Eagle/Southern Routt County Greater Sage Grouse Habitat* in the Proposed RMP and CRVFO-TL-11 *Greater Sage Grouse Winter Range and Nesting Habitat* would have the greatest effect on the wildland fire program of all special status species management actions. Planned and unplanned fire would only be allowed if it is determined to be beneficial to maintaining or enhancing greater sage-grouse priority habitat. Mechanical fuels treatments would only be allowed if they met sage-grouse habitat objectives. Overall lack of vegetation management in this area would lead to a shift to later seral stages increase fire regime condition classes. Suppression of naturally caused wildfires would occur both in greater sage-grouse habitat and potentially in vegetation type adjacent to habitat, thus increasing fire program costs. Lack of fuels treatment and lack of ability to use natural fire as a management tool to reduce fuels loads will increase the potential at the landscape level for large wildfire, thus increasing large fire costs.

Impacts from Cultural Resources Management. Allowable uses for cultural resources would impact the design and potential effectiveness of fuels treatment projects. In the Proposed RMP Stipulation CRVFO-NSO-20 *Heritage Areas* and CRVFO-NSO-21 *Historic Properties* both require buffer distance around cultural resources. These buffers usually are left untreated within any given project, lessening treatment effectiveness to slow or stop future wildfires. Most project areas require a cultural inventory during site-specific analysis, which adds to project cost. Mitigations for cultural resources could have moderate to major impacts for prescribed fire and mechanical treatments.

Cultural resources may alter the response to wildfire in reducing the range of suppression techniques. In areas with important cultural values, use of mechanical bulldozers may not be authorized (Blue Hill ACEC). Potential also exists that a suppression response, instead of managing a wildfire for multiple objectives including resource benefit, to a wildfire may occur if the fire is a threat to certain cultural sites. Overall there is a slight increase to suppression costs in protecting and preserving cultural resources.

Impacts from Visual Resource Management. The Proposed RMP would have similar impacts as described under Alternative A with some changes in scope and magnitude. Impacts to fuels treatments from VRM Class I areas are minimal due to little demand for fuels treatments in these areas because of their considerable distance from the WUI. The greater impact to the fuels program would be in areas designated VRM Class II, which are often adjacent to communities where the WUI is located, and that is the current focus of the fuels program. Under the Proposed RMP, Hardscrabble/ East Eagle SRMA, Red Hill SRMA, and The Crown SRMA, King Mountain SRMA, Colorado River SRMA and Glenwood Debris Flow ACEC are also designated VRM Class II, and these areas currently have a need for fuels treatment to protect adjacent WUI from wildfires. While VRM II does not exclude fuels treatment designed to reduce harm caused by future wildfires, it will just alter design so treatments do not attract the attention of the casual observer. This is especially the case on slopes over 30% in relation to CRVFO-NSO-22: *VRM Class II Areas with Slopes over 30 Percent and High Visual Sensitivity*. In the response to wildfire, VRM will be a minor consideration. VRM Class II areas under this alternative can benefit the wildland fire program more under the Proposed RMP than under Alternative A by collocating ROWs within 200 meters, again reducing the frequency of facilities that would need to be protected during future wildfires.

Impacts from Forestry Management. Impacts are similar to those described in Alternative A; however they would be less in magnitude because the Proposed RMP has the fewest acres available for intensive forest management. This alternative has the second most acres closed to commercial timber harvest, some of which are in the WUI where fuels projects may occur into the future. This alternative does emphasis accelerated harvest for stands impacted by insects, including mountain pine beetle and other diseases, thus improving fire regime condition class. Accelerating harvest of dead and dying timber will reduce the fire hazard in these stands, limiting potential for catastrophic fires.

Impacts from Livestock Grazing Management. Impacts are similar to those described in Alternative A. This alternative would have the second fewest acres to achieve fuels reduction of fine fuels. AUMs in this alternative are tied for the lowest with Alternative C. However this alternative would have more implementation actions that would prevent the increase of cheatgrass associated with livestock grazing, thus reducing fire regime condition class. There may be more flexibility for post-seeding grazing management based on site-specific analysis and monitoring data as it relates to fuels projects.

Impacts from Recreation and Visitor Services Management. Impacts are similar in description to Alternative A, with differences in acreage of SRMAs and where SRMAs are located. This alternative has the second most SRMAs adjacent to WUI that may be able to reduce human starts through intensive management but may also alter WUI fuel treatments to reduce impact recreation values.

Within the allowable uses for both SRMA and ERMA under the Proposed RMP, there is the ability to do vegetation treatments for hazardous fuels objectives provided that the natural character and other recreation values on BLM land are not impacted over the long term (five years). This has potential to slightly alter fuels treatment design in SRMAs.

Allowable uses for visitor use and safety aid the wildland fire program in reducing the risk of human-caused wildfire. Restriction on shooting will reduce the number of wildfires caused by target shooting and closures for camping/overnight uses will reduce the number of fires caused by abandoned campfires. The Proposed RMP would have the second highest potential to reduce human-caused fires from these wildfire causing activities.

Impacts from Comprehensive Trails and Travel Management. Comprehensive trails and travel management under the Proposed RMP would close all acres in the resource planning area to overland, cross-country travel. Not allowing overland travel would reduce the potential for vehicles to cause fires, which would reduce demand for fire suppression resources. Established roads and trails that would be closed would still have administrative access for fire equipment and personnel to access wildfires. Overland travel can also increase the spread of invasive weeds, particularly cheatgrass, which can alter fire regimes and increase fire behavior potential.

Impacts from Lands and Realty Management. While impacts are similar to that described in Alternative A, the magnitude of those impacts would be largest because of this alternative's having the most acres of ROW avoidance and the second most acres of ROW exclusion of all the alternatives. This alternative would also prioritize collocating communication sites that would lower the frequency of sites that would need protection during future wildfires.

Impacts from Fluid Minerals Management. Impacts are similar to those described in Alternative A. However the Proposed RMP has the second fewest acres available for fluid mineral leasing out of the four alternatives. This alternative would have the third largest impact from fluid minerals to the fire management program, fire program costs and safety issues during the response to wildfire. While the second most acres of lands are closed in this alternative, they have lower historic fire occurrence than those areas left open to leasing. The western end of the field office has the high fire load (number of start and acres burned); this is also the area with the most oil and gas development and potential for oil and gas development.

Impacts from Areas of Critical Environmental Concern Management. The designation of ACECs has management actions through all alternatives that are both beneficial and adverse in their effects to the wildland fire program. The Proposed RMP has the second most total and acres of ACECs behind Alternative C. This results in a slightly lower magnitude for the following impacts: allowable uses across all ACECs would eliminate some of potential human-caused fire threats by limiting motorized travel to designated routes, closing entire ACECs to motorized travel, excluding or avoidance of ROWs, and closing the areas to leasing of fluid minerals, mineral material and non-energy solid minerals.

In the ACECs Bull Gulch, Deep Creek, Lyons Gulch, Sheep Creek, and Thompson Creek, the flexibility in the response to wildfire exists to use unplanned natural fire managed for multiple objectives including resource benefit. This will benefit the wildland fire program over the life of this plan by reducing fire suppression costs and improving fire regime condition class of the landscape. The scope of management for resource benefit of natural ignitions will be determined by a variety of factors including the willingness of the adjacent community's public to allow fire to play a critical role as a natural process in maintaining these ecosystems. Demand for vegetation treatments in these areas may also be reduced if wildfires can naturally reduce fuel loading while maintaining or enhancing the identified relevant and important value of that ACEC.

Vegetation treatments would be allowed in all ACECs if the treatments maintain or enhance the identified relevant and important value of that particular ACEC. These treatments would improve fire regime condition class and reduce large fire potential. Additionally, in the Proposed RMP, fuels treatments solely to protect WUI would be allowed in the following ACECs: Grand Hogback, East Eagle/Hardscrabble, and the Glenwood Springs Debris Flow Hazard Zone. This is the only alternative where a distinction to allow for WUI treatments is made for those ACECs.

An adverse impact to the wildland fire program is allowing use of only non-mechanized ground disturbing fire suppression techniques (no bulldozers) in both the Blue Hill ACEC and the Mount Logan ACEC. This would limit flexibility in fire suppression techniques and could lead to increased fire costs. This may also increase the potential for wildfires if these ACECs escape initial attack and become large fires. However both of these ACECs have abundant slopes that are too steep for mechanized equipment, thus limiting the actual adverse impact. Additionally in this alternative, an adverse impact to the wildland fire program is in closing ACECs to timber harvest, firewood cutting, and special forest product harvest thus limiting the potential to have these activities to reduce fuel loading.

Impacts from Wilderness Study Area Management. The Proposed RMP would have the same or similar impacts as in Alternative A. The only exception is this alternative gives additional management direction if Congress were to release these WSAs. The future management of these WSA would have similar effect to the fire management program as described previously.

Impacts from Wild and Scenic Rivers Management. This alternative would release most of the eligible segments. The segments determined to be suitable on Deep Creek have very little WUI adjacent currently so very minimal impact would occur to the fuels program. Subsequent WSR designation would potentially cause an increase in recreation users, potentially increasing the number of human-caused fire ignitions. Additional visitor use regulations could reduce the risk of human-cause ignitions along these river segments.

Alternative C

Impacts from Wildland Fire Management. Impacts would be the same or similar as in Alternative A and the Proposed RMP. Several goals and objectives described in Alternative A and the Proposed RMP are also in this alternative. The main difference is there is not an objective focusing fuels treatments to restore fire regime condition class. The geographic areas in which unplanned fire could be used would be the same as the Proposed RMP. Overall Alternative C has the second highest projected wildland fire suppression costs over the long and short term of all the alternatives.

Impacts from Air Quality Management. Impacts would be very similar to the Proposed RMP except in Alternative C the Wildland Fire Management program would not have to manage air resources within the planning area in accordance with the Comprehensive Air Resource Protection Protocol (Appendix L). This may increase management flexibilities in the use of prescribed fire and mechanical fuels treatment projects. Air quality monitoring needs would need to be coordinated with Colorado Department of Public Health and Environment and local governments. Air quality management could reduce acres burned by prescribed fire due to smoke management and emissions standards. All planned fires require a Colorado smoke permit from Colorado Air Pollution Control Division.

Impacts from Soils Management. Alternative C impacts would be the same as or similar to those in the Proposed RMP.

Impacts from Water Resources Management. The same or similar impacts would occur as in the Proposed RMP.

Impacts from Vegetation Management. Resting disturbed areas for two growing seasons would reduce the potential establishment of cheatgrass thus benefiting the wildland fire program. Actions that reduce cheatgrass lower potential for conversion to cheatgrass that can drastically cause an upward shift in fire regime condition class, increasing future fire suppression costs. Post treatment resting fuels treatments may increase project costs by creating the need for temporary fencing.

Alternative C does not require suppression of all fires in the salt desert shrub communities, increasing fire management flexibilities; however most fires in these communities are currently suppressed due to being located in the WUI. Therefore Alternative C's increase in fire management flexibility of not requiring full suppression does not significantly change overall fire management costs and demand for fire management resources as compare to the Proposed RMP. Treating cheatgrass will benefit the wildland fire management program by reducing fire regime condition class, thus limiting the potential extent of future wildfires.

The focus of management of sagebrush in Alternative C would offer the greatest flexibilities to fire management when compared with the Proposed RMP. Under this alternative all sagebrush areas would be available for planned and unplanned fire. However, post-fire cheatgrass would remain a concern in some of these sites. Fuels treatments and use of unplanned fire management for resource benefit could be used to

meet fire program objectives of reducing fire regime condition class in all sagebrush areas. Additionally with this alternative, the objective of creating age class diversity in sagebrush across the landscape would meet fire program goals more than managing sage for sage obligate species in the Proposed RMP.

Use of planned and unplanned fire, mechanical treatments and chemical treatments in mixed mountain shrub will benefit the wildland fire program by reducing fuel loading that will lead to large severe wildfire. Diversifying age class structure will reduce fire regime condition class. Alternative C is less focused on preserving older age class of mountain shrub; therefore this alternative would have fewer restrictions on where fuels projects could occur to lessen impacts from wildfire and reduce fire program costs overall.

With no objective or management action to use planned and unplanned fire, mechanical treatments in pinyon and juniper woodlands under Alternative C, it is less likely that the fire management objective of reducing wildfire hazard and restoring fire regime condition class could be achieved. Having no exception in the WUI to the objective of maintaining old growth pinyon and juniper could lead to higher fire program costs.

The effects of treatment of noxious and invasive weeds are the same or similar to what was described in the Proposed RMP.

Impacts from Fish and Wildlife Management. Alternative C would have the same or similar impacts as the Proposed RMP, with the exception that more acres and areas of core wildlife would impact design and cost of fuels projects.

Impacts from Special Status Species Management. While the impacts would be similar to what was described in the Proposed RMP, they may be found over a larger area in Alternative C. NSOs and TLs may be different under this alternative but in general effects are the same. Some species have additional protection while some remain the same. The impact will be the greatest to the fuels program under this alternative's increasing cost and alteration of project design. The impact to unplanned fire will be minimal due to this being an emergency function. More unplanned lightning-caused wildfires may be suppressed in these areas versus managed for multiple objectives that would include resource benefit. This alternative does not prioritize cheatgrass control in degraded areas, thus not improving fire regime condition class.

Impacts from Cultural Resources Management. Alternative C would have similar impacts as the Proposed RMP. One difference is the buffer for historic properties is the largest at 200 meters under this alternative. Thus this alternative would have the greatest impact on the fuels program within wildland fire management because of cultural resource management.

Impacts from Visual Resource Management. Alternative C would have the same or similar impacts as the Proposed RMP.

Impacts from Forestry Management. Impacts are similar to those described in Alternative A. The magnitude would be less due to more acres closed to commercial timber sales and fewer acres available to intensive forest management. No accelerated harvest of dead or dying trees would potentially leave the landscape more prone to fire in this alternative. This alternative does not address accelerated harvest of the mortality and fire hazard caused by the mountain pine beetle in the lodgepole pine in the eastern end of the field office.

Impacts from Livestock Grazing Management. Impacts are similar to those described in Alternative A. This alternative would have the fewest acres available to achieve fuels reduction of fine fuels but AUM would be the same as the Proposed RMP.

Impacts from Recreation and Visitors Services Management. Impacts for Alternative C are similar in description to Alternative A, with difference in acreage of SRMAs and where SRMAs are located. More areas are considered ERMA versus SRMA in this alternative, which may reduce the ability to have management actions that could reduce human-caused fire. But fuels treatment in the WUI would not need to be as compatible with recreation setting, thus reducing fuel treatment costs and increasing treatment effectiveness in slowing or stopping future wildfires. This is the most restrictive alternative for not allowing shooting in some areas and closing the most acres to camping that is not in developed or designated sites. Therefore this alternative would limit potential of human-caused fire the most of all alternatives for these wildfire causing activities.

Impacts from Comprehensive Trails and Travel Management. Alternative C would have the same or similar impacts as the Proposed RMP.

Impacts from Lands and Realty Management. While impacts are similar to those described in Alternative A, the magnitude of those impacts would be second largest because of this alternative's having the second most acres of ROW avoidance and the most acres of ROW exclusion of all the alternatives. This alternative would also prioritize collocating communication sites, and would lower the frequency of sites that would need protection during future wildfires.

Impacts from Fluid Minerals Management. Impacts are similar to those described in Alternative A. However Alternative C has the fewest acres available for fluid mineral leasing out of the four alternatives. The most acres of lands are closed to leasing in this alternative, and the closed areas have lower historic fire occurrence than those areas left open to leasing. This alternative has the smallest impact to the fire management program from fluid mineral leasing

Impacts from Areas of Critical Environmental Concern Management. This alternative has similar impacts as those described in the Proposed RMP except over a larger area due to more ACECs and ACEC acres in Alternative C. The only vegetation treatments allowed in ACECs under this alternative must benefit the identified relevant and important value that ACEC was designated for. This may limit WUI treatments and other fuels treatment within these ACECs and leading to an upward shift in fire regime condition class and increased fire suppression costs. There is no restriction on ground-disturbing fire suppression equipment in this alternative. This alternative is the same as the Proposed RMP in closing ACECs to timber harvest, firewood cutting, and special forest product harvest so reduced fuel loading from these activities would be achieved.

Impacts from Wilderness Study Area Management. Alternative C would have the same or similar impacts as Alternative A and the Proposed RMP.

Impacts from Wild and Scenic Rivers Management. Alternative C would have the same or similar impacts as described in Alternative A and the Proposed RMP, except the impacts would occur along all stream segments determined to be suitable.

Alternative D

Impacts from Wildland Fire Management. Alternative D would have the same or similar impacts as Alternative A and the Proposed RMP. Several goals and objectives described in Alternative A and the Proposed RMP are also in this alternative. The main difference is there is not an objective focusing fuels treatments to restore fire regime condition class. The geographic areas in which unplanned fire could be used would be the same as the Proposed RMP. The emphasis on commercial use would cause this alternative to have the highest fire suppression costs over the short and long term compared with the other alternatives. Over the long term this alternative would create a landscape with more infrastructures located on BLM lands that would need protection during future wildfires.

Impacts from Air Quality Management. Alternative D would have the same or similar impacts as Alternative C.

Impacts from Soils Management. Alternative D would have the same or similar impacts as the Proposed RMP.

Impacts from Water Resources Management. Alternative D would have the same or similar impacts as the Proposed RMP.

Impacts from Vegetation Management. Alternative D would have the same or similar impacts as Alternative C.

Impacts from Fish and Wildlife Management. Alternative D would have the same or similar impacts as the Proposed RMP, with the exceptions that there is no emphasis on priority wildlife areas to protect vegetation and forage. When compared with Alternative C and the Proposed RMP, less protection would alter or preclude future fuels treatment projects.

Impacts from Special Status Species Management. Impacts would be similar to the Proposed RMP but would occur over fewer acres. Besides Alternative A, this alternative has the fewest acres of restriction that could impact costs and design of prescribed fire project and mechanical fuels projects. No areas are identified for protection of special status plants in this alternative. This alternative does not prioritize cheatgrass control in degraded areas, thus not improving fire regime condition class

Impacts from Cultural Resources Management. Alternative D would have the same or similar impacts as the Proposed RMP.

Impacts from Visual Resource Management. Alternative D would have the same or similar impacts as the Proposed RMP.

Impacts from Forestry Management. Impacts are similar to those described in Alternative A and the Proposed RMP while having a high PSQ and intensively managing more acres from commercial timber harvest. This alternative would also close fewer acres to commercial timber harvest than the Proposed RMP and Alternative C.

Impacts from Livestock Grazing Management. Impacts are similar to those described in the Proposed RMP. The very slight increase in AUMs offered under this alternative compared with the Proposed RMP would have a negligible difference to the wildland fire program.

Impacts from Recreation and Visitors Services Management. Impacts are similar in description to Alternative A, with differences in acreage of SRMAs and where SRMAs are located similar to the Proposed RMP. This alternative has the greatest acreage of SRMAs in the WUI of all the alternatives, and the impact that brings as stated in Alternative A and the Proposed RMP. The biggest difference is there is less emphasis to allow for fuel treatments in SRMAs than in the Proposed RMP. This alternative has the second least amount of area closed to shooting and closed camping outside developed and designated sites. This has potential to generate the second most human-caused wildfire from these activities after Alternative A.

Impacts from Comprehensive Trails and Travel Management. Alternative D would have the same or similar impacts as the Proposed RMP.

Impacts from Lands and Realty Management. While impacts are similar to those described in Alternative A, the magnitude of those impacts would be second least because of this alternative's having the least amount acres of ROW avoidance and the fewest acres of ROW exclusion of all the alternatives. This alternative would not prioritize collocating communication sites, potentially increasing the number of sites needing protection during future wildfires. Beside Alternative A, Alternative D would increase fire program costs the most from actions associated with Lands and Realty Management.

Impacts from Fluid Minerals Management. Impacts are similar to those described in Alternative A. However, Alternative D has the second most acres available for fluid mineral leasing out of the four alternatives. This alternative has the second fewest acres closed to leasing. Again those acres closed have lower fire occurrence than those areas left open to leasing. The western end of the field office has the high fire load (number of starts and acres burned); this is also the area with the most oil and gas development and potential for oil and gas development. This alternative has the second largest impact from fluid minerals to the fire management program, impacting fire program costs and safety issues during the response to wildfire.

Impacts from Areas of Critical Environmental Concern Management. Alternative D would have similar impacts as described in the Proposed RMP, but over a smaller area with only three ACECs in this alternative. The Glenwood Spring Debris Flow Hazard Zone ACEC is the only ACEC with a significant amount of adjacent WUI. This ACEC may reduce the ability to complete future fuels projects designed to protect the WUI from wildfire. There is no restriction on ground- disturbing fire suppression equipment in this alternative. This alternative is the same as the Proposed RMP in closing ACECs to timber harvest, firewood cutting, and special forest product harvest so no reduced fuel loading from these activities would be achieved.

Impacts from Wilderness Study Area Management. Alternative D would have the same or similar impacts as Alternative A and the Proposed RMP.

Impacts from Wild and Scenic Rivers Management. Alternative D would have no impact due to all segments to be found unsuitable for inclusion into the NWSRS.

Cumulative Impacts

The cumulative impact analysis area (CIAA) includes the CRVFO and adjacent areas of continuous burnable vegetation. The CRVFO area is composed of a mix of BLM-administered lands, state-administered lands, and private lands. Wildfire does not stop at administrative borders; nor do the cumulative impacts for the wildland fire management program. The BLM-administered lands are often scattered parcels and have private lands next to or within BLM parcels. Other agency land that borders CRVFO-administered lands includes other BLM field offices and USFS-administered lands of both the White River National Forest and Routt National Forest.

Effects of wildland fire management due to any of the CRVFO RMP alternatives in part will be shaped by future wildfire on the landscape and the continued need for fire suppression resources. Fire managers will have to protect the ever growing WUI adjacent to the intermingled land ownership of the CRFVO over the life of the RMP. Increased WUI can also increase costs associated with suppression and be more dangerous to firefighters and the public. Additional fire suppression resources will be needed, including federal, state, and local agencies, to help protect life and property. Not only homes but commercial and industrial growth in and adjacent to the wildland will affect the fire management program in increasing values at risk threatened during future wildfire. Land management practices of these adjacent landowners to BLM lands could affect wildland fire management by altering fuel loadings, building values at risk susceptible to damage from a wildfire, starting human-caused fires, and anything else that increases fire regime condition class.

As the WUI increases, the need for fuels projects to reduce risk of large-scale, intense wildland fires will also increase. As the demand for fuels treatment increases so will the cost of fuels treatments. However fuels treatments should reduce fire suppression expenditure by creating a landscape less prone to large wildfires and reducing wildfires' impact to adjacent lands.

As populations increase so do areas of sensitive receptors for air quality thus potentially further limiting the ability to use planned and unplanned fire management for multiple objectives including resource benefit and as tool to manage vegetation on the landscape. The impact of this will require a greater use of mechanical fuels treatment to instead of prescribed fire to reduce air quality concerns. The social acceptance of smoke by neighboring landowners and communities will play a role in decisions on the tools to be used in fire management programs. BLM's ability to use prescribed fire and manage unplanned wildfires for multiple objectives including resource benefit could be impacted by new air quality requirements.

Increased recreation opportunities on both public and private lands can increase the number of users and access. This can increase the number of human-related fire starts that would require suppression. The landscapes of the CIAA can have an increase in human-caused wildfire by numerous other activities including use of ROWs, energy exploration, and other resource uses. Regardless of location of any human-related ignition requiring a full suppression response would further increase fire management program costs.

Oil and gas development and other energy development on both public and private lands can lead to additional WUI areas. Roads associated with oil and gas development can increase access for both industry personnel and the public. Increased access could increase human-caused fire ignitions in these areas. New development of oil and gas can require aggressive suppression to protect life, property, and infrastructure. Oil and gas development adds to safety problems for both firefighters and the public. Evacuations, unknown hazardous materials, hydrogen sulfide, pipelines, and flammable materials add to the complexity of a wildland

fire in these areas. Increased cost and time for training firefighters to respond safely to fires in oil and gas areas also need to be considered.

Along with land management practices, there are other factors that can alter historic fire regimes and increase the intensity and/or frequency of wildland fires. An increase in noxious weeds could change vegetation types that would normally not support wildland fire (salt-desert shrublands) or cheatgrass-invaded areas where the fire return interval is now every couple years. Epidemics of disease or insect infestation can also affect the flammability of the landscape by creating an abundance of dead fuels. Prolonged drought and climate change will also increase wildland fire severity and occurrence for the life of this plan.

Due to the complexity of the wildland fire environment many factors contribute to the cumulative effect of wildland fire management within the planning area. Air quality standards, increased WUI, including oil and gas development, increased recreation opportunities, resource management objectives, additional need for firefighting resources, and changes in vegetation structure all contribute to this cumulative impact. Moving into the future, there is increased potential for more frequent fires that will be larger and more severe than historical fires on this landscape, thus creating a continued need for the wildland fire management program.

4.2.12 Lands Proposed for the Protection of Wilderness Characteristics

Methods and Assumptions

This section addresses impacts from RMP management actions on lands managed to protect wilderness characteristics outside existing WSAs. Note that lands managed to protect wilderness characteristics do not represent a special designation but merely identify lands containing characteristics typically associated with wilderness. Existing conditions concerning lands managed to protect wilderness characteristics are described in Section 3.2.12. Wilderness values considered in this analysis include naturalness, opportunities for solitude, and opportunities for primitive and unconfined recreation. Impacts identified in this section are limited to potential changes in wilderness characteristics for only the identified areas.

The following assumptions were used in the analysis:

- BLM lands identified as lands managed to protect wilderness characteristics contain wilderness values (e.g., size, naturalness, and outstanding opportunities for solitude or primitive recreation).
- Impacts on lands managed to protect wilderness characteristics are analyzed based on the maintenance, enhancement, or degradation (adverse impacts) of naturalness and outstanding opportunities for solitude or primitive recreation.
- The identified areas would be managed as lands managed to protect wilderness characteristics under the *Management and Setting Prescriptions for BLM Lands outside WSAs Being Managed to Protect Wilderness Characteristics*, described in Appendix F.
- Units not managed for lands with wilderness characteristics in the alternatives would be likely to change or degrade through the life of the plan, while the natural character and opportunities for solitude and primitive and unconfined types of recreation may be indirectly afforded protections through other stipulations for other resources.
- Total acres may not match individual acres added because of rounding of individual numbers.

Environmental Consequences

Impacts on lands managed to protect wilderness characteristics would result from some of the actions included for other resources and uses. Programs not addressed below were deemed to have no impacts or only negligible impacts on lands managed to protect wilderness characteristics under any of the four alternatives.

Alternative A

Under Alternative A, BLM would not manage lands to protect wilderness characteristics outside existing WSAs. Some wilderness characteristics may be afforded indirect protections through the application of management actions (i.e., ACECs, WSRs, SRMAs, travel designations, or VRM classifications) and allowable use decisions for other resources and resource uses (e.g., designations as closed to fluid minerals leasing and application of NSO, CSU, and TL stipulations). However, no land use planning decision would be made specifically to protect wilderness characteristics in Alternative A. Therefore, while the natural character and opportunities for solitude and primitive and unconfined types of recreation may be indirectly afforded protections, they would be likely to change or degrade through the life of the plan.

Impacts from Recreation and Visitor Services Management. The implementation-level actions under Alternative A would most specifically affect the Thompson Creek unit. Climbing would be permitted on the designated bolted routes at the current climbing area, but no additional development would be permitted and mechanical devices would not be allowed. Climbing is a legitimate and appropriate use of wilderness areas, and thus would be appropriate in a land managed to protect wilderness characteristics unit. Since these were the conditions that the current land unit had when found to have wilderness characteristics, extension of these actions should continue to support lands managed to protect for wilderness characteristics.

Impacts from Comprehensive Trails and Travel Management. The implementation-level actions under Alternative A would most specifically affect the Thompson Creek unit. Since the unit's current management was found to have wilderness characteristics with this management, continuation of the travel management actions should continue to find the unit as having wilderness characteristics.

Alternative B (Proposed RMP)

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP, BLM would protect and preserve wilderness characteristics on 34,400 acres of BLM lands outside existing WSAs. Although not a special designation, this decision would apply special management and protections to the following areas identified as land units managed to protect wilderness characteristics: Castle Peak Addition, Deep Creek, Flat Tops Addition, Pisgah Mountain, and Thompson Creek.

The Deep Creek unit boundary was changed to match the Deep Creek ACEC boundary and the Deep Creek Wild and Scenic River boundary so that (1) management of the landscape would be consistent with the adjacent USFS lands, and (2) small fragmented parcels of BLM lands in the canyon would not have different management prescriptions. Therefore, the Deep Creek unit boundary was adjusted from 4,420 acres in Alternative C to 4,320 acres in the Proposed RMP. All other boundaries would remain the same as found in the Lands Managed to Protect Wilderness Characteristics assessment in Appendix F. Protecting these lands for their natural character and opportunities for solitude and primitive and unconfined types of recreation would result from applying the management and setting prescriptions and an NSO stipulation specifically for lands managed to protect wilderness characteristics units. The NSO for lands managed to protect wilderness characteristics would be a major constraint on surface use and occupancy and surface-disturbing activities, except where provided for by valid existing rights. The Proposed RMP also would administratively close lands managed to protect wilderness characteristics to fluid minerals leasing, commercial timber harvest, non-energy solid mineral leasing, and mineral material disposal to further protect wilderness characteristics. The Grand Hogback and the 100 acres of Deep Creek would not be managed for wilderness characteristics and would be likely to change or degrade through the life of the plan, while the natural character and opportunities for solitude and primitive and unconfined types of recreation may be indirectly afforded protections through stipulations for other resources.

Impacts from Soils Management Actions. Surface-disturbing activities that negatively impact soils would likewise negatively impact the naturalness of lands managed to protect wilderness characteristics. Under all alternatives, implementation of actions would comply with Colorado Public Land Health Standard 1 (Appendix J) for soils. Soils that meet this standard would in turn help maintain wilderness characteristics of the lands managed to protect wilderness characteristics by supporting native vegetation and wildlife and reducing impacts to water resources.

An NSO stipulation under the Proposed RMP and all alternatives would constrain surface occupancy and surface-disturbing activities on slopes greater than 50 percent, and a CSU stipulation would apply special design measures to new construction on slopes greater than 30 percent and areas of severe erosion hazard. In areas not covered by these stipulations, the NSO specifically for lands managed to protect wilderness characteristics would also prohibit surface disturbance and occupancy. Therefore, the included soils stipulations would indirectly, but beneficially, contribute to maintaining wilderness characteristics if surface-disturbing activities are authorized in lands managed to protect wilderness characteristics as a result of prior rights (e.g., leases under the Recreation and Public Purposes Act, leases or permits under 43 CFR 2920, and ROWs).

Implementation-level actions such as conducting monitoring will only enhance the current soil conditions if corrective action is taken. However, corrective action may be limited in the ability to bring in mechanized or motorized equipment, and other alternatives such as natural reclamation may be selected over more timely remedies in lands managed to protect wilderness characteristics units.

Impacts from Water Resource Management. Surface-disturbing activities that negatively impact water quality would likewise negatively impact the naturalness of lands managed to protect wilderness characteristics. Under all alternatives, implementation actions would comply with Colorado Public Land Health Standard 5 for water resources (Appendix J). Waters that achieve this standard would in turn help maintain wilderness characteristics of the lands managed to protect wilderness characteristics.

NSO stipulations under the Proposed RMP would prohibit surface occupancy and surface-disturbing activities within perennial streams, water bodies, riparian areas, aquatic-dependent species, and major river corridors, and a CSU stipulation would be applied to intermittent and ephemeral streams. In areas not covered by these stipulations, the NSO specifically to protect lands managed to protect wilderness characteristics would still apply. Therefore, the water quality stipulations would indirectly, but beneficially, contribute to maintaining wilderness characteristics if surface-disturbing activities are authorized in lands managed to protect wilderness characteristics based on prior rights (e.g., leases under the Recreation and Public Purposes Act, leases or permits under 43 CFR 2920, and ROWs).

Impacts from Vegetation Management. Depending on the vegetation community treated (grassland and shrubland versus woodland or coniferous forest), the length of time that evidence of mechanical treatments remains on the landscape before the soil and vegetation disturbances return to a more natural or unmodified condition would vary.

Vegetation manipulation to control insect and disease outbreaks and wildlife habitat management to control invasive species would be allowed when there is no effective alternative and when the control is necessary to maintain wilderness characteristics and maintain supplemental values. Control and manipulation methods could include hand (e.g., tools or chainsaws), chemical (e.g., spraying weeds), biological treatment, and mechanical treatment, provided it would not cause adverse impacts (apparent evidence of human intervention on the landscape) to the wilderness characteristics. When there is an impact on one wilderness characteristic, there will be an enhancement to another characteristic (which may include supplemental values) that will balance out the wilderness characteristics and leave no adverse impact. The management and setting prescriptions for lands managed to protect wilderness characteristics under this alternative would ensure that the natural character is protected if vegetation management actions are performed within those lands.

Since implementation-level actions are on a case-by-case basis or for the benefit of the habitat, they should have negligible or beneficial effects to lands managed to protect wilderness characteristics units.

Impacts from Vegetation Management—Riparian. The objective of riparian management is to manage riparian areas for PFC and to avoid or minimize loss or degradation of riparian, wetland, and associated floodplains. This level of management helps preserve and enhance the natural and beneficial values of these areas and provides habitat for fish, wildlife, and special status species. Properly functioning riparian areas would improve the overall natural vegetation condition of lands managed to protect wilderness characteristics and thus their associated biological and natural values.

An NSO stipulation under the Proposed RMP and Alternative C would prohibit surface occupancy and surface-disturbing activities within riparian and wetland zones. In areas where this stipulation does not apply, the NSO specific to lands managed to protect wilderness characteristics would also protect against surface disturbance and surface occupancy. Therefore, the water quality stipulation would indirectly, but beneficially, contribute to maintaining wilderness characteristics if surface-disturbing activities are authorized in lands managed to protect wilderness characteristics based on prior rights (e.g., leases under the Recreation and Public Purposes Act, leases or permits under 43 CFR 2920, and ROWs).

Impacts from Fisheries and Aquatic Wildlife Management. Fish and other aquatic wildlife resources (including special status species) are a special feature that contributes to an area's wilderness character. Proposed management action and allowable use decisions would comply with Colorado Public Land Health Standard 3 (Appendix J). Areas where this standard is being met are less at risk for direct impacts to aquatic life, riparian vegetation, and aquatic habitats from erosion and sedimentation.

Under the Proposed RMP and Alternative C, a variety of management actions and allowable use decisions (stipulations) would help restore, maintain, and enhance populations of native fish and other aquatic wildlife. Improved aquatic wildlife populations would enhance the natural character of lands managed to protect wilderness characteristics. Larger and healthier fish populations would expand opportunities for primitive and unconfined recreation opportunities, including wildlife study, nature study, fishing, and scientific research.

Fisheries management on these lands would emphasize natural processes for wildlife management. Stocking fish species native to the area may be permitted. Introduction of threatened, endangered, or other special status species native to North America may be allowed. The State of Colorado would continue to establish and enforce fishing regulations. The protective measures under the Proposed RMP and Alternative C would ensure that the natural character of the lands managed to protect wilderness characteristics would be protected if fisheries or aquatic wildlife are improved within these lands. However, the ability to use motorized or mechanized equipment for the work may be hindered by the lands managed to protect wilderness characteristics NSO.

Implementation-level actions would benefit the fisheries and therefore would benefit the naturalness as long as long-term surface disturbance did not occur.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife resources are a special feature that contributes to an area's wilderness character. Proposed management action and allowable use decisions would comply with Colorado Public Land Health Standard 3 (Appendix J). In areas where these standards are being

met, there is reduced risk to terrestrial wildlife from habitat loss, habitat fragmentation, habitat effectiveness, and wildlife disturbance and avoidance.

Under the Proposed RMP and Alternative C, a variety of management action and allowable use decisions (stipulations) are proposed to restore, maintain, and enhance terrestrial populations. Improved terrestrial wildlife populations would enhance the natural character of lands managed to protect wilderness characteristics. Larger and healthier wildlife populations would expand opportunities for primitive and unconfined recreation opportunities, including nature study, hunting, and scientific research.

Wildlife management on these lands would emphasize natural processes for wildlife management. Introduction of threatened, endangered, or other special status species native to North America may be allowed. The State of Colorado would continue to establish and enforce hunting regulations.

lands managed to protect wilderness characteristics overlap Priority Wildlife Habitat in the Thompson Creek unit (approximately 2,500 acres). The proposed core area and the accompanying NSO stipulation would protect and conserve terrestrial wildlife habitat and indirectly benefit wilderness characteristics. Management prescriptions would ensure that the natural character of the lands managed to protect wilderness characteristics would be protected if wildlife improvements were performed within lands managed to protect wilderness characteristics.

Implementation-level actions would benefit the naturalness of the area. However, limits may be placed on motorized or mechanical use and natural restoration may be chosen over more timely alternatives.

Impacts from Cultural Resource Management. The proposed cultural resource decisions provide protection of cultural and historic resources. Cultural and historic resources are important supplemental values to an area's wilderness characteristics. Specific guidance for management of these resources to protect wilderness characteristics allows cultural resource inventories, studies, and research. Surface examination may be permitted, as well as rehabilitation, stabilization, reconstruction, and restoration work on historic structures and limited excavations. Extensive surface collections may also be permitted if they maintain the area's wilderness character, and permanent physical protection, such as fences, will be limited to measures needed to protect resources eligible for the National Register of Historic Places. This protection would be constructed to minimize impacts on naturalness.

The proposed cultural resource decisions would protect and conserve cultural and historic properties and would indirectly benefit wilderness characteristics. Management prescriptions would ensure that the natural character of the lands managed to protect wilderness characteristics would be protected if permanent physical protections were installed.

Implementation-level actions would benefit the cultural program, as well as the supplemental values of the lands managed to protect wilderness characteristics, although increased visitor use may decrease outstanding opportunities for solitude.

Impacts from Paleontological Resource Management. The proposed paleontology decisions are to ensure that paleontological resources are available for appropriate scientific and education uses. Paleontology resources are important supplemental values to an area's wilderness characteristics. Specific guidance directs that paleontological resource projects, such as excavations, would be evaluated on a case-by-case basis. These

evaluations are intended to ensure that impacts on wilderness characteristics are temporary and that wilderness characteristics are protected over the long term.

The proposed paleontology decisions would protect paleontological resources, would offer limited opportunities for scientific and educational use, and would indirectly benefit wilderness characteristics. Management prescriptions would ensure that the natural character of lands managed to protect wilderness characteristics would be protected if paleontological resource projects such as excavations were authorized.

Implementation-level actions would benefit the paleontology program, as well as the supplemental values of the lands managed to protect wilderness characteristics, although increased visitor use may decrease outstanding opportunities for solitude.

Impacts from Visual Resource Management. Managing lands as VRM Classes III and IV would have adverse impacts on wilderness characteristics because these classes allow for moderate to major changes in the landscape, thereby allowing large visual disturbances. Specific guidance directs that lands managed to protect wilderness characteristics would be managed under VRM Class II objectives, unless otherwise managed as VRM Class I (Table 4.2.12-1).

The VRM Class I designations would protect the most outstanding visual resources in these areas. VRM Class II designations would require that the level of change to the landscape be low. The VRM Class II designations with the accompanying NSO stipulation would protect the natural character of lands managed to protect wilderness characteristics and would reduce the risks of small, localized surface-disturbing activities that may be consistent with VRM Class II designations.

Table 4.2.12-1
Visual Resource Management Classes on Lands Managed to Protect Wilderness Characteristics under the Proposed RMP (Alternative B)

Land Units	Approx. Acres by VRM Management Class			
	I	II	III	IV
Castle Peak Addition (3,900 acres)		3,900	0	0
Deep Creek (4,320 acres)	4,320	0	0	0
Flat Tops Addition (3,550 acres)	0	3,550	0	0
Pisgah Mountain (14,540 acres)		14,540	0	0
Thompson Creek (8,220 acres)	3,700	4,520	0	0

Acronyms and Abbreviations:
VRM visual resource management

Implementation-level actions would benefit visual resources, and therefore benefit the naturalness of the areas. However, road maintenance would not be allowed unless it fell under the lands managed to protect wilderness characteristics exception criteria.

Impacts from Wildland Fire Management. The proposed wildland fire management decisions are the same across all alternatives. In the short term, wildland fire suppression operations (e.g., fire line construction and location of camps) would degrade the natural character of these areas. Without ESR actions, long-term impacts on wilderness character would occur.

To offset the impacts of wildland fire suppression, the management and setting prescriptions would recognize maintaining wilderness characteristics in these areas. Specific guidance directs reducing the negative effects of wildland fire suppression: by applying minimum impact suppression tactics (MIST) by locating large fire camps outside these areas; by performing fire suppression impacts and ESR actions as defined by the resource advisor to restore visual and wilderness characteristics; and by encouraging use of natural firebreaks and roads to contain a wildland fire. Management prescriptions would ensure that the natural character of the lands managed to protect wilderness characteristics would be protected if an unplanned wildland fire would occur.

Implementation-level actions would allow unplanned fire for resource benefits within specific lands managed to protect wilderness characteristics unitsif appropriate, which could benefit the naturalness of the unit.

Impacts from Cave and Karst Resource Management. The proposed cave and karst management action and allowable use decisions are directed at protecting the surface and subsurface geologic values and other associated natural and cultural values. Management and setting prescriptions for caves would allow for appropriate access, while addressing issues and concerns relating to preservation of the caves' pristine and fragile resources. For example, protecting the geologic values specific to the high concentration of cave and karst resources within the Deep Creek unit would benefit values associated with wilderness character.

The implementation-level action of initiating a permit program as needed may help control visitor use, which in turn could help manage outstanding opportunities for solitude.

Impacts from Forestry Management. Woodland product harvest would remove vegetation and create surface and visual disturbances, thereby degrading naturalness. The noise created by vehicles accompanying these activities would adversely affect the outstanding opportunities for solitude. Wilderness characteristics may be compromised by surface-disturbing activities, such as driving cross country to view the trees, cutting the trunks of trees, leaving stumps and debris, and affecting the solitude and primitive recreation opportunities with chainsaws and surface disturbances associated with human activity.

To retain the naturalness of lands managed to protect wilderness characteristics, the management and setting prescriptions would close these areas to commercial timber harvest, firewood cutting, and special forest product harvest.

Impacts from Livestock Grazing Management. Domestic livestock grazing would continue to be permitted under all of the alternatives. BLM lands would be grazed primarily by cattle, but also by sheep and some domestic horses. The relative numbers and kinds of livestock have not varied much over the last 10 years and are not expected to vary much in the future.

To offset the impacts of inappropriate livestock use, the management and setting prescriptions for lands managed to protect wilderness characteristics may include adjustments in the numbers and kinds of livestock permitted to graze as a result of the RMP revision or amendments. Construction of grazing facilities would be permitted if they are primarily for protecting wilderness characteristics and more effectively managing resources, but not if they are intended to accommodate increased numbers of livestock. Use of motorized equipment for livestock management would be allowed only on an emergency basis.

It is not anticipated that livestock grazing would have impacts on lands managed to protect wilderness characteristics, because meeting the Land Health Standards and the management and setting prescriptions

would not permit degradation of the lands. When livestock use is properly managed, it would not affect the appearance of naturalness.

While there could be some visual evidence of livestock use in the areas (presence of livestock, feces, trampling of soil, fences, and consumption of vegetation), rangeland health and riparian conditions would be maintained through proper management under the standards and guides assessments, and the appearance of a natural condition of these areas would be maintained. For some visitors, the presence of livestock would have an adverse impact on the desired experience (connection with the natural world and experiences of solitude). However, this effect would be seasonal. At other times of the year, livestock would not be present, soils would recover, and vegetation would regrow, reducing the impact on the visitor.

Implementation-level grazing decisions would comply with Colorado's Standards for Public Land Health and Guidelines for Livestock Grazing Management (Appendix J). If livestock grazing means that the standards are not met, changes would be made to address the kind, numbers, and class of livestock, season, duration, distribution, frequency, and intensity of grazing use.

Impacts from Recreation and Visitor Services Management. To protect the wilderness characteristics, recreation and visitor services management and recreation use would be subject to management and setting prescriptions as follows: permanent recreation structures are not permitted; no new SRPs will be authorized unless they are necessary for helping people realize the primitive and unconfined recreational values (e.g., upland outfitting service); when commercial SRPs are renewed, the terms and conditions of the SRP will be modified as necessary; no competitive events would be authorized; and recreational or hobby collecting of mineral specimens when conducted without location of a mining claim may be allowed. This use would be limited to hand collection and detection equipment. Implementation-level actions would reduce user conflicts and control visitor use, which may benefit outstanding opportunities for solitude and primitive and unconfined recreation.

The Thompson Creek area has some specific land use issues that are being addressed by this RMP revision. Those issues include climbing, mountain biking, and motorized vehicle access. (See Impacts from Comprehensive Trails and Travel Management for an analysis of mountain biking and vehicle access.) Because specific recreation and visitors services management is needed in order to address existing recreation use and demand, the Proposed RMP would also designate the area as an ERMA, not as a SRMA as currently managed. Management of ERMAs would be commensurate with managing to protect wilderness characteristics.

Climbing is a legitimate and appropriate use within areas managed for the protection of wilderness characteristics. Within the climbing area the re-establishment of old routes and permanent fixed anchors at the current climbing area would be permitted, but no additional development of bolted routes is permitted which may decrease naturalness and opportunities for solitude in that particular area. The climbing area is limited to several rock fins, so the overall naturalness or solitude of the unit would not be greatly impacted. The use of mechanical devices in the climbing area may temporarily cause a decrease in naturalness, but that impact is short lived.

Impacts from Comprehensive Trails and Travel Management. OHV travel on lands managed to protect wilderness characteristics under the Proposed RMP would be designated as either closed or limited to designated routes because wilderness characteristics would be adversely affected by permitted or

inappropriate cross-country travel. All types and modes of travel, except pedestrian and equestrian, would be limited to designated routes. Table 4.2.12-2 portrays the current routes and the current types of public travel occurring on the routes, and Table 4.2.12-3 shows route designations for public travel under the Proposed RMP. The approximate change in motorized and mechanized public travel to enhance wilderness characteristics is displayed by comparing the differences by area and total.

Table 4.2.12-2
Public Travel Routes (miles) within Lands Managed to Protect Wilderness Characteristics under Alternative A

Land Units	Obliterate	Foot/Horse & Admin.	Mountain Bike	Motorcycle	ATV	Full-Sized Vehicle	Total
Castle Peak Addition	N/A	12	0	0	0	0	12
Deep Creek	N/A	2	0	0	0	7	9
Flat Tops Addition	N/A	10	0	0	0	1	11
Pisgah Mountain	N/A	0	8	0	0	8	16
Thompson Creek	N/A	1	5	0	1	10	17
Total		**25**	**13**	**0**	**1**	**26**	**65**

Acronyms and Abbreviations:
ATV all-terrain vehicle
N/A not applicable

Table 4.2.12-3
Public Travel Route Designations (miles) for Lands Managed to Protect Wilderness Characteristics under Alternative B (Proposed RMP)

Land Units	Obliterate	Foot/Horse & Admin.	Mountain Bike	Motorcycle	ATV	Full-Sized Vehicle	Total
Castle Peak Addition	0	12	0	0	0	0	12
Deep Creek	1	8	0	0	0	0	9
Flat Tops Addition	0	10	0	0	0	0	10
Pisgah Mountain	0	7	0	0	0	7	14
Thompson Creek	0	5	6	0	0	6	17
Total	**1**	**42**	**6**	**0**	**0**	**13**	**62**

[1]Flat Tops unit boundary is meant to stop at the full-sized vehicle route. The GIS layer does not match up currently because of workload and timing constraints, but will be adjusted as future resources allow.

Acronyms and Abbreviations:
ATV all-terrain vehicle

Other proposed trail and travel management decisions that either protect or maintain wilderness characteristics on lands managed to protect wilderness characteristics include closing these lands to over-snow travel, closing portions accessed by the Stagecoach Trail (BLM #8535) and Domantle Road (BLM #8513) from August 20 to November 30, and granting administrative use authorizations on a case-by-case basis only with approval from BLM.

To further protect wilderness characteristics over the life of the plan, trails and travel management would be subject to management and setting prescriptions, including not allowing the construction of new permanent or temporary routes or roads, not allowing unauthorized travel off designated routes, and minimizing motorized and mechanized routes and the restoration of unnecessary routes.

Those routes that would be designated for full-sized vehicles would remain open for that use, but BLM would not be able to perform maintenance on those routes to prevent making a wilderness road, which would not be protecting wilderness characteristics in the unit. This specifically applies to one route in the Thompson Creek unit and a couple of routes in the Pisgah Mountain unit. Land units managed to protect wilderness characteristics must be roadless. Roads are any routes that have been improved and maintained by mechanical means to insure relatively regular and continuous use. Sole use of hands and feet to move rocks or dirt without the use of tools or machinery does not meet the definition of "mechanical means." Wilderness inventory roads need not be "maintained" on a regular basis but rather "maintained" when road conditions warrant actions to keep it in a usable condition. Therefore, the routes that are designated for full-sized vehicles will not have any further mechanical improvement or maintenance to facilitate the relatively regular and continuous passage of vehicles.

The Thompson Creek unit also would allow mountain bike use within the unit on the Lorax Trail. A site-specific travel network of roads and trails available for public use and any limitations placed on that use would be included in the land use plan to the extent practical. In some areas the final travel management network of trails would be determined at the implementation level (on-the-ground), due to the complexity of the area and incomplete data. This could decrease naturalness and opportunities for solitude. However, any implementation-level route changes would be made on an interdisciplinary basis in concert with managing for the protection of wilderness characteristics.

The proposed travel designations and the management and setting would ensure that the natural character of the lands managed to protect wilderness characteristics would be maintained and possibly enhanced through the life of the plan.

Implementation-level actions would have the same impacts listed above.

Impacts from Lands and Realty Management. Discussed below are the lands and realty decisions that would impact lands managed to protect wilderness characteristics under the Proposed RMP.

Land Tenure Adjustments. Lands managed to protect wilderness characteristics would be retained for long-term management. The effects of land tenure adjustments would be a loss of these wilderness characteristics if a unit managed to protect wilderness characteristics leaves federal ownership.

Withdrawals. The Secretary of the Interior would be petitioned to withdraw lands managed to protect wilderness characteristics from the mining laws for locatable exploration or development (locatable minerals). Withdrawing lands managed to protect wilderness characteristics from mineral entry would offer long-term benefits for wilderness characteristics by reducing adverse effects that could result from mineral development.

ROWs and Other Land Use Authorizations. ROW construction, operation, and maintenance could result in both short-term and long-term impacts on wilderness characteristics. lands managed to protect wilderness characteristics would be identified as a ROW avoidance area (including sites for renewable energy, such as solar, wind, hydro, and biomass development). lands managed to protect wilderness characteristics identified as avoidance areas may not be totally unavailable but should be avoided if possible based on some resource value that may become damaged or degraded if development were allowed. The ROW avoidance, along with the NSO stipulation, would exclude surface-disturbing activities and the placement of facilities that would disrupt the natural character of the area.

To further protect wilderness characteristics, lands and realty management would be subject to management and setting prescriptions. These management and setting prescriptions may include (1) retaining in public ownership lands managed to protect wilderness characteristics; (2) renewing prior rights such as leases under the Recreation and Public Purposes Act, leases and permits under 43 CFR 2920, and ROWs; (3) allowing the BLM to acquire state and private inholdings when practicable; (4) authorizing adequate access to inholdings that are compatible with the defined values; and (5) not allowing new discretionary uses that create valid existing rights, if they would detract from the wilderness values.

Implementation-level actions will follow the Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics (Appendix F).

Impacts from Coal Management. Coal resources within the CRVFO occur primarily in the Grand Hogback Field and are estimated at 1.6 billion tons. Approximately 9,100 acres of the Grand Hogback Field are identified as suitable for coal leasing and overlap with the Grand Hogback unit. No lands in the planning area are identified as acceptable for further consideration for coal leasing in the Proposed RMP.

The implementation-level action of applying special conditions would be beneficial to the resources being protected.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the 127,335 acres of BLM mineral estate in this high-potential area that is not within the Roan Plateau planning area, 95 percent has been leased and is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling activity is predicted in the areas identified as no known potential (Table 4.2.12-4). The one unit most susceptible to fluid minerals leasing would be Thompson Creek.

Table 4.2.12-4
Potential for the Occurrence of Fluid Mineral Resources in Lands Managed to Protect Wilderness Characteristics

	Potential for Fluid Mineral Resources (Acres)		
Land Units	**Low**	**Moderate**	**High**
Castle Peak Addition	-	3,900	-
Deep Creek	4,420	-	-
Flat Tops Addition	3,550	-	-
Pisgah Mountain	10,440	4,100	-
Thompson Creek	320	7,900	6

In areas open to oil and gas leasing, the presence and noise of people, vehicles, and equipment needed for exploration, development, production, and maintenance of energy resources would impact opportunities for solitude and primitive recreation. Construction and operation of oil and gas wells and associated support facilities, including roads, surface and buried pipelines, power lines, and compressor stations, would create soil

and vegetation disturbances that would degrade wilderness characteristics. To constrain these impacts, all unleased lands would be subject to the management and setting prescriptions, including designation as closed to leasing, that would prohibit oil and gas exploration and development. Thus, no leasing would occur within the Castle Peak Addition, Deep Creek, Flat Tops Addition, Pisgah Mountain, or Thompson Creek units, and wilderness characteristics would be protected.

The Grand Hogback lies along the eastern boundary of the Piceance Basin. There currently are six active oil and gas leases within the boundaries, totaling approximately 2,240 acres. None of these leases has been drilled as of the date of this analysis. Furthermore, no APDs have been filed on these leases, which have various expiration dates no later than 2018. Several stipulations are attached to most of the leases, including an NSO stipulation for steep slopes, a CSU stipulation for erosive soils and slopes greater than 30 percent, and a CSU for VRM Class II values. While these stipulations were designed to protect these values, development may still occur if the operator can demonstrate that operations can be conducted without causing unacceptable impacts on the values through site-specific mitigation or special design measures. In addition, because it would not be managed to protect its wilderness characteristics, the Grand Hogback would not be closed to leasing, but would have certain NSOs that may indirectly benefit the wilderness characteristics.

Implementation-level actions such as reclamation would be beneficial to areas such as the Grand Hogback to retain naturalness, even though the Proposed RMP does not manage for its wilderness characteristics.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Salable mineral disposal is a discretionary decision, but there is potential to authorize mineral materials (salable, such as moss rock, topsoil, sand and gravel, scoria, and fill dirt) disposal within any of these areas. If new mining development would occur within these areas, direct loss of wilderness characteristics would be unavoidable as a result of the surface-disturbing activities. To protect wilderness characteristics, the areas would be closed to salable mineral disposal and non-energy solid mineral leasing, thus constraining potentially adverse impacts.

To further protect wilderness characteristics, solid minerals management would be subject to Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics (Appendix F). These management and setting prescriptions may include the following within lands managed to protect wilderness characteristics: (1) existing mining operations would be regulated using the 43 CFR 3809 regulations to prevent unnecessary and undue degradation of the lands; (2) existing leases would be regulated through COAs to prevent unnecessary or undue degradation; and (3) BLM would recommend that the Secretary of the Interior close these lands to mining laws for locatable exploration or development.

Implementation-level actions would direct disposal of such materials and minerals and would have negative impacts on naturalness if disposal occurred within lands managed to protect wilderness characteristics units.

Impacts from Areas of Critical Environmental Concern Management. Two ACECs would overlap with lands managed to protect wilderness characteristics (Table 4.2.12-5).

Table 4.2.12-5
Overlap of Lands Managed to Protect Wilderness Characteristics with ACECs under Alternative B (Proposed RMP)

Land Unit	Approx. Overlap (acres)	ACEC
Deep Creek	4,320	Deep Creek
Thompson Creek	3,380	Thompson Creek

Acronyms and Abbreviations:
ACEC area of critical environmental concern

The relevant and important values (presence of Harrington's penstemon and scenic and geologic values) of the ACECs are special features that contribute to an area's wilderness character. Management prescriptions to protect the relevant and important values within ACECs would offer long-term benefits for lands managed to protect wilderness characteristics that overlap with their boundaries by limiting or preventing surface disturbances.

Impacts from Wilderness Study Area Management. The Castle Peak Addition unit is adjacent to the Castle Peak WSA. The Flat Tops Addition unit is adjacent to the Hack Lake WSA. The Castle Peak and Hack Lake Additions units offer opportunities for solitude that can be considered outstanding within the unit alone or in combination with the adjacent WSAs. Deciding to protect the units for their wilderness characteristics would create a larger, contiguous, intact landscape to protect naturalness and supplemental values, would enhance opportunities for solitude, and could enhance opportunities for primitive and unconfined recreation within the existing Castle Peak WSA and Hack Lake WSA.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, Deep Creek Segments 2 (wild) and 3 (recreational) would be determined suitable for inclusion in the NWSRS. Colorado River Segments 6 and 7 (recreational) would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River segments. If monitoring indicates that the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* is not adequately protecting flow-dependent and water-dependent ORVs, the BLM/USFS would initiate a process to evaluate suitability factors and make a suitability determination. The eligibility determination for the two segments will remain in place until a suitability determination is made.

Two segments overlap with lands managed to protect wilderness characteristics (Table 4.2.12-6). The Deep Creek WSR boundary on BLM lands has been adjusted in the Proposed RMP/Final EIS to better match up with the USFS boundary along canyon rim and to match with lands managed to protect wilderness characteristics and ACEC management unit boundaries. Protection of the ORVs through the above WSR decisions is administratively and managerially compatible with protecting wilderness characteristics within lands managed to protect wilderness characteristics units.

Impacts from Transportation Facilities Management. Construction within lands managed to protect wilderness characteristics would degrade the natural and undeveloped character of the units. To protect wilderness characteristics over the life of the plan, transportation facilities management would be subject to management and setting prescriptions. These management and setting prescriptions specify that construction of new permanent or temporary routes would not be allowed. Use and construction of temporary roads,

Table 4.2.12-6
Overlap of Lands Managed to Protect Wilderness Characteristics with WSR Segments under Alternative B (Proposed RMP)

Land Unit	Approx. Overlap (acres)	WSR Segment
Deep Creek	4,320	Deep Creek 2b (wild classification)
Pisgah Mountain	1,558	Colorado River (recreational classification)

Acronyms and Abbreviations:
ACEC area of critical environmental concern
WSR Wild and Scenic Rivers

structures, and installations are allowed for emergency purposes but must be conducted to achieve the least disturbance and reclaimed as soon as possible.

Impacts from Transportation Facilities Management. Construction within lands managed to protect wilderness characteristics would degrade the natural and undeveloped character of the units. To protect wilderness characteristics over the life of the plan, transportation facilities management would be subject to management and setting prescriptions. These management and setting prescriptions specify that construction of new permanent or temporary routes would not be allowed. Use and construction of temporary roads, structures, and installations are allowed for emergency purposes but must be conducted to achieve the least disturbance and reclaimed as soon as possible.

Alternative C

Impacts from Managing to Protect Wilderness Characteristics. Alternative C would be the same as the Proposed RMP, except that it would also include the Grand Hogback and about 100 additional acres in Deep Creek that are on the eastern boundary next to the developments, for a total of 45,900 acres. Alternative C would provide for more protection for more acres of lands managed to protect wilderness characteristics than the Proposed RMP.

Impacts from Soils Management. Alternative C would be the same as the Proposed RMP, except that both the Grand Hogback and the additional 100 acres of Deep Creek units would be protected by stipulation CRVFO-NSO-23 - *Lands Managed for the Protection of Wilderness Characteristics* as well.

Implementation-level impacts would be the same as the Proposed RMP.

Impacts from Water Resource Management. Impacts would be similar to the Proposed RMP, although NSOs and CSU stipulations have changed names and had minor changes.

NSO stipulations under Alternative C would prohibit surface occupancy and surface-disturbing activities within streamside zones and major river corridors, and a CSU stipulation would be applied to hydrologic features. Therefore, the water quality stipulations would indirectly, but beneficially, support maintaining wilderness characteristics if surface-disturbing activities are authorized in lands managed to protect wilderness characteristics based on prior rights (e.g., leases under the Recreation and Public Purposes Act, leases or permits under 43 CFR 2920, and ROWs).

Impacts from Vegetation Management. Impacts would be the same as the Proposed RMP, except that the Grand Hogback and Deep Creek additional 100 acres would have to meet the lands managed to protect wilderness characteristics exception criteria in addition to other NSO exception criteria for vegetation manipulation.

Impacts from Vegetation Management—Riparian. Alternative C would be the same as the Proposed RMP.

Impacts from Fisheries and Aquatic Wildlife Management. Alternative C would be similar to the Proposed RMP, except that names and small changes have occurred to stipulations between the Proposed RMP and Alternative C. Both the Grand Hogback and the additional 100 acres of Deep Creek areas would be protected by stipulation CRVFO-NSO-23 - *Lands Managed for the Protection of Wilderness Characteristics* as well.

Impacts from Terrestrial Wildlife Management. These impacts would be the same as the Proposed RMP, except under Alternative C, lands managed to protect wilderness characteristics overlap wildlife core areas in Thompson Creek (approximately 2,500 acres) and in West Rifle Creek/Grand Hogback (approximately 500 acres). The Pisgah Mountain unit and Castle Peak Addition unit overlap with the Greater Sage Grouse Habitat ACEC. The proposed core areas and ACECs and the accompanying NSO stipulations would protect and conserve terrestrial wildlife habitat and indirectly benefit wilderness characteristics. Management prescriptions would ensure that the natural character of the units would be protected if wildlife improvements were performed.

Impacts from Cultural Resource Management. Impacts under Alternative C would be the same as the Proposed RMP.

Impacts from Paleontological Resource Management. Impacts under Alternative C would be the same as the Proposed RMP.

Impacts from Visual Resource Management. Impacts would be the same as the Proposed RMP, except for the changes below (Table 4.2.12-7).

Table 4.2.12-7
VRM Classes in Lands Managed to Protect Wilderness Characteristics under Alternative C

Land Unit	Approx. Acres by VRM Management Class			
	I	II	III	IV
Castle Peak Addition (3,900 acres)		3,900	0	0
Deep Creek (4,420 acres)	2,400	2,020	0	0
Flat Tops Addition (3,550 acres)	0	3,550	0	0
Grand Hogback (11,360 acres)		11,360	0	0
Pisgah Mountain (14,540 acres)		14,540	0	0
Thompson Creek (8,220 acres)	3,700	4,520	0	0

Acronyms and Abbreviations:
VRM visual resource management

Impacts from Wildland Fire Management. Impacts would be the same as the Proposed RMP.

Impacts from Cave and Karst Resource Management. Impacts would be the same as the Proposed RMP.

Impacts from Forestry Management. Impacts would be the same as the Proposed RMP.

Impacts from Livestock Grazing Management. Impacts would be the same as the Proposed RMP.

Impacts from Recreation and Visitor Services Management. Impacts would be the same as the Proposed RMP with the following exception. Thompson Creek would be designated an ERMA. The ERMA would support primitive recreation activities, which would support lands managed to protect wilderness characteristics. Alternative C would not allow new routes to be established or the re-establishment of old routes, so naturalness would be protected. It may also increase naturalness because all existing fixed anchors would be removed. Climbing would decrease, which would increase opportunities for solitude, but decrease opportunities for primitive recreation.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those discussed in the Proposed RMP, with the following changes.

Alternative C includes fewer motorized and mechanized routes open for use within the lands managed to protect wilderness characteristics (Table 4.2.12-8 and Table 4.2.12-9). Therefore, proliferation of routes by users would be less likely to occur in Alternative C than in the Proposed RMP. However, any user-created route found within a lands managed to protect wilderness characteristics unit would be closed off and rehabilitated by natural processes or other alternatives. Specifically, the implementation of the travel routes identified in Alternative C in the Thompson Creek unit would limit all travel to foot or horse only, therefore benefitting the naturalness of the area and possibly increasing opportunities for solitude.

Table 4.2.12-8
Public Travel Routes (miles) within Lands Managed to Protect Wilderness Characteristics under Alternative A

Land Unit	Obliterate	Foot/Horse & Admin.	Mountain Bike	Motorcycle	ATV	Full-Sized Vehicle	Total
Castle Peak Addition	N/A	12	0	0	0	0	12
Deep Creek	N/A	2	0	0	0	7	9
Flat Tops Addition	N/A	10	0	0	0	1	11
Grand Hogback	N/A	1	0	0	0	5	6
Pisgah Mountain	N/A	0	8	0	0	8	16
Thompson Creek	N/A	1	5	0	1	10	17
Total		**26**	**13**	**0**	**1**	**31**	**71**

Acronyms and Abbreviations:
ATV all-terrain vehicle
N/A not applicable

Table 4.2.12-9
Public Travel Route Designations (miles) for Lands Managed to Protect Wilderness Characteristics under Alternative C

Land Unit	Obliterate	Foot/Horse & Admin.	Mountain Bike	Motorcycle	ATV	Full-Sized Vehicle	Total
Castle Peak Addition	0	12	0	0	0	0	12
Deep Creek	0	9	0	0	0	0	9
Flat Tops Addition	0	10	0	0	0	0	10
Grand Hogback	2	3	0	0	0	1	6
Pisgah Mountain	0	1	7	0	0	8	16
Thompson Creek	1	16	0	0	0	0	17
Total	**3**	**51**	**7**	**0**	**0**	**9**	**70**

[1]Flat Tops unit boundary is meant to stop at the full-sized vehicle route. The GIS layer does not match up currently because of workload and timing constraints, but will be adjusted as future resources allow.

Acronyms and Abbreviations:
ATV all-terrain vehicle

Impacts from Lands and Realty Management. Impacts would be the same as the Proposed RMP, except the Grand Hogback would be withdrawn and be identified as a ROW avoidance area because of its lands managed to protect wilderness characteristics management.

Impacts from Coal Management. Coal resources within the CRVFO occur primarily in the Grand Hogback Field and are estimated at 1.6 billion tons. Approximately 9,100 acres of the Grand Hogback Field are identified as suitable for coal leasing and overlap with the Grand Hogback unit. However, no coal leases are currently authorized, and coal is not expected to be commercially developed during the life of the plan. If coal were to be leased, it would be with an NSO stipulation that protects wilderness characteristics from surface-disturbing activities, so there would be no impacts on wilderness characteristics.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as the Proposed RMP, plus the following impacts discussed below. Oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the 127,335 acres of BLM mineral estate in this high-potential area that is not within the Roan Plateau planning area, approximately 88 percent has been leased and is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling activity is predicted in the areas identified as no known potential (Table 4.2.12-10). The two units most susceptible to fluid minerals leasing would be Thompson Creek and the Grand Hogback.

The Grand Hogback lies along the eastern boundary of the Piceance Basin. There currently are six active oil and gas leases within the boundaries, totaling approximately 2,240 acres. None of these leases has been drilled as of the date of this analysis. Furthermore, no APDs have been filed on these leases, which have various expiration dates no later than 2018. Several stipulations are attached to most of the leases, including an NSO stipulation for steep slopes, a CSU stipulation for erosive soils and slopes greater than 30 percent, and a CSU

Table 4.2.12-10
Potential for the Occurrence of Fluid Mineral Resources on Lands Managed to Protect Wilderness Characteristics

	Acres with Potential for Fluid Mineral Resources		
Land Unit	**Low**	**Moderate**	**High**
Castle Peak Addition	-	4,000	-
Deep Creek	4,400	-	-
Flat Tops Addition	3,500	-	-
Grand Hogback	-	6,100	5,600
Pisgah Mountain	11,600	4,100	-
Thompson Creek	340	7,900	6

for VRM Class II values. While these stipulations were designed to protect these values, development may still occur if the operator can demonstrate that operations can be conducted without causing unacceptable impacts on the values through site-specific mitigation or special design measures.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. Impacts would be the same as the Proposed RMP except the Grand Hogback would have the same protections as a lands managed to protect wilderness characteristics.

Impacts from Areas of Critical Environmental Concern Management. Six ACECs would overlap with lands managed to protect wilderness characteristics (Table 4.2.12-11).

Table 4.2.12-11
Overlap of Lands Managed to Protect Wilderness Characteristics with ACECs under Alternative C

Land Unit	Approx. Overlap (acres)	ACEC
Castle Peak Addition	1,930	Greater Sage Grouse Habitat
Deep Creek	2,400	Deep Creek
Flat Tops Addition	15	Sheep Creek Uplands
Grand Hogback	8,100	Grand Hogback
Pisgah Mountain	4,580	Greater Sage Grouse Habitat
Thompson Creek	3,380	Thompson Creek

Acronyms and Abbreviations:
ACEC area of critical environmental concern

The relevant and important values (greater sage grouse, presence of Harrington's penstemon and scenic and geologic values) of the ACECs are special features that contribute to a unit's wilderness character. Management prescriptions to protect the relevant and important values within ACECs would offer long-term benefits for lands managed to protect wilderness characteristics that overlap with their boundaries by limiting or preventing surface disturbances.

Implementation-level actions would help protect ACEC values, which in turn may benefit naturalness for the lands managed to protect wilderness characteristics.

Impacts from Wilderness Study Area Management. Impacts would be the same as the Proposed RMP.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The interim protections would apply to lands within 0.25 mile of either side of the stream segment. Four segments overlap with lands managed to protect wilderness characteristics (Table 4.2.12-12).

Table 4.2.12-12
Overlap of Lands Managed to Protect Wilderness Characteristics with WSR Segments under Alternative C

Land Unit	WSR Segment
Deep Creek	Deep Creek (wild classification)
Flat Tops Addition	Hack Creek (scenic classification)
Pisgah Mountain	Colorado River (recreational classification)
Thompson Creek	Thompson Creek (wild classification)

Acronyms and Abbreviations:
ACEC area of critical environmental concern
WSR Wild and Scenic Rivers

Protection of the ORVs would prevent land uses that would adversely affect the natural character of lands managed to protect wilderness characteristics within 0.25 mile from the high water mark on each riverbank. Protection of the ORVs through the above WSR decisions is administratively and managerially compatible with protecting wilderness characteristics within the units.

Impacts from Transportation Facilities Management. Impacts would be the same as the Proposed RMP, except the Grand Hogback and Deep Creek additional 100 acres would be protected by stipulation CRVFO-NSO-23 - *Lands Managed for the Protection of Wilderness Characteristics* as well..

Alternative D

Under Alternative D, BLM would not manage any lands to protect their wilderness characteristics outside existing WSAs. Although indirect protection of wilderness characteristics would result under this alternative through closures and restrictive stipulations related to other resources, these would generally be fewer in number and smaller in extent than under the other alternatives. Consequently, Alternative D would be likely to result in the least protection of wilderness characteristics among the four alternatives.

Impacts from Recreation and Visitor Services Management. Under Alternative D, both Hack Lake and Thompson Creek will have RMA Designations. Hack Lake will be designated an ERMA, and Thompson Creek will be designated a SRMA. The ERMA designation of Hack Lake will allow for multiple resource/program management goals, while identifying recreation as one of those goals. The SRMA designation of Thompson Creek would specifically identify Thompson Creek as having recreation management goals as a priority. This means that climbing would take precedence in RMZ 1, day hiking would take precedence in RMZ 2, and mountain biking would take precedence in RMZ 3.

Implementation-level actions of re-establishing old routes and fixed anchors would occur at the rock crag, and other permanent fixed anchors would be permitted throughout the RMZ 1. It would also allow for mechanical drills to be used. Climbing is a legitimate and appropriate use of wilderness areas, and thus would

be appropriate in lands managed to protect wilderness characteristics. The use of the power tools may have temporary negative effects within the land unit managed to protect wilderness characteristics, but those would be short lived in nature. An increase in the level of climbing activity and number of climbing routes may cause the outstanding opportunities for solitude and the naturalness of the area to diminish in those specific climbing route areas. Also, the implementation-level actions of creating a travel network of roads and trails available for public use for mountain biking in RMZ 3 could diminish the naturalness and outstanding opportunities for solitude in the area.

Impacts from Comprehensive Trails and Travel Management. Alternative D would increase the amount of vehicular and mechanized routes within the units. Implementation-level decisions within the Thompson Creek unit would designate all existing routes as mechanized routes and create a site-specific travel network for mountain biking. This would decrease the unit's naturalness and opportunities for solitude.

Cumulative Impacts

The cumulative impact analysis boundary includes lands managed to protect wilderness characteristics and WSAs within the CRVFO administrative area as well as designated wilderness on neighboring federal lands.

Currently, approximately 27,700 acres are designated as WSAs within the CRVFO. The neighboring KFO contains 9,120 acres of designated WSAs. Neither the CRVFO nor the KFO contains a designated wilderness. In the neighboring Grand Junction Field Office, the Black Ridge Wilderness and the Dominguez Canyon Wilderness were designated in 2000 and 2009. The WRNF manages eight designated wilderness areas totaling approximately 754,500 acres, or one-third of the forest, the largest proportion of any national forest in Colorado (USFS 2002). The 2002 forest plan revision noted there were 298,000 acres available for wilderness recommendations. The ROD for the WRNF forest plan emphasized balancing opportunities for active management with retention of the undeveloped character of roadless areas (USFS 2002). The WRNF ROD assigned 82,000 acres to recommended wilderness allocations, representing approximately 28 percent of the total 298,000 acres noted in the ROD as available for wilderness recommendation. The final revised forest plan for the Routt National Forest did not include any recommended wilderness allocations.

Many groups and congressional representatives have proposed the designation of additional wilderness in Colorado, which includes BLM lands within the CRVFO and surrounding national forests. Representative Diana DeGette had proposed legislation (H.R. 4289) in the US House of Representatives that would designate additional federal lands on the WRNF and surrounding BLM lands as components of the National Wilderness Preservation System (DeGette 2010). The 2011 Colorado Wilderness Act included the following BLM lands managed by the CRVFO: Thompson Creek, Pisgah Mountain, Maroon Bells-Snowmass Addition, the Grand Hogback, the Flats Tops Addition and Deep Creek, Castle Peak, and Bull Gulch. Another wilderness bill is in Congress for lands in southwest Colorado. Another proposal, called the Hidden Gems Wilderness Campaign, is seeking designation of new wilderness areas on the WRNF, Gunnison National Forest, and BLM lands. That campaign includes Eagle Mountain, Thompson Creek, Bull Gulch, Castle Peak, and Pisgah Mountain within the CRVFO. Representative Jared Polis had proposed legislation (H.R. 6280 – Eagle and Summit County Preservation Act) for Eagle and Summit Counties that includes the Hidden Gems Wilderness Campaign proposal. In addition, Senator Mark Udall is proposing the Central Mountain Outdoor Heritage Proposal for Eagle, Pitkin, and Summit Counties that includes parts of the Hidden Gems Wilderness Campaign proposal. (For references, see Appendix F, Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics.)

Under all alternatives, WSAs in the planning area would be managed under the management policies for WSAs (BLM Manual 6330 – Management of Wilderness Study Areas) (BLM 2012c) until Congress either designates or releases all or portions of the WSAs from further consideration for wilderness. As a result, there are no present or future actions, or combination of actions, likely to have significant cumulative effects on the wilderness characteristics in WSAs.

Alternatives A and D do not propose to manage any BLM lands to protect their wilderness characteristics outside existing WSAs. Some wilderness characteristics may be afforded indirect protections, but no land use planning decision would be made to specifically protect wilderness characteristics. While the natural character and opportunities for solitude and primitive and unconfined types of recreation may be indirectly afforded protections, they would probably change or degrade through the life of the plan.

Only the Proposed RMP and Alternative C would include specific management prescriptions for lands managed to protect wilderness characteristics to protect and preserve wilderness values outside WSAs. Although these prescriptions would not be a special designation, implementing the management and setting prescriptions for lands managed to protect wilderness characteristics under these alternatives would protect wilderness characteristics on 34,400 to 45,900 acres not included within the 27,760 acres of WSAs. While most of the region's WSAs and designated wilderness areas are in higher-elevation locations, the Proposed RMP and Alternative C would protect wilderness characteristics in some mid-elevation areas, representing a broader range of ecosystems. In addition, the location of most of the identified lands managed to protect wilderness characteristics adjacent to existing WSAs, or areas that the WRNF has recommended or will recommend to Congress for designation as wilderness, would allow the Proposed RMP and Alternative C to protect wilderness characteristics on larger contiguous blocks and intact landscapes.

Two factors—an overall population increase in the region over the life of the plan and a growth in regional tourism based on available outdoor opportunities and scenic landscapes—are expected to continue the current trend of increased demand for a variety of recreation in a variety of recreation settings. Preserving and protecting lands managed to protect wilderness characteristics through management prescriptions specific to lands managed to protect wilderness characteristics would expand opportunities to enjoy naturalness, solitude, opportunities for primitive recreation, and supplemental values.

Beyond the visitor to BLM lands, the Proposed RMP and Alternative C would enhance long-term, non-market values (social, scientific, educational, ecological, and scenic values) as well as economic values in the region. These alternatives would promote existence values (simply knowing wilderness exists) and bequest values (protecting an area for future generations).

4.2.13 Cave and Karst Resources

Methods and Assumptions

This section addresses impacts from RMP management actions on cave and karst resources. Existing conditions concerning cave and karst resources are described in Section 3.2.13. Human contact with caves through exploration, recreation, or vandalism can alter the resources directly as a result of physical damage to cave features and formations or disturbance-related impacts on bats or other cave biota. Indirect impacts on cave resources can result from disruption of cave hydrology, particularly for active ("wet") caves. Management activities on the overlying surface that affect the hydrology of caves or that compromise their isolation and integrity can have essentially permanent adverse impacts.

The following comparative analysis of impacts on cave and karst resources from other management activities under the four alternatives was based on the following assumptions:

- BLM lands would be managed to protect and maintain, to the extent practical, significant caves.
- New cave and karst resources would be identified continuously, whether through federal inventories or the result of other activities, such as cave exploration, research, and surveys.
- Unmanaged cave use has the potential to permanently damage fragile sensitive cave and karst resources.
- Traditional recreational uses within the planning area would continue to increase as a result of overall population growth of the region, increase in the amount of outdoor and nature-based recreation, and technological advances that make caving more accessible to a growing number of people.

Under all alternatives, BLM's management would have the objective of protecting significant cave and karst values, per the standards identified by the Colorado Cave Survey.

The following subsections describe potential impacts on cave and karst resources from other resources and uses under the four alternatives analyzed. A cumulative impact summary is presented after the discussion of Alternative D.

Environmental Consequences

Impacts on cave and karst resources would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no impacts or only negligible impacts on cave and karst resources under any of the four alternatives.

Cave and karst resources would be managed under all alternatives to conform to the cave management objective; that is, all significant caves would be managed to allow for appropriate access while addressing issues and concerns related to preserving pristine and fragile resources, wildlife values, scientific and research values, and visitor safety. The Federal Caves Resources Protection Act (FCRPA) defines a cave as significant if it meets at least one of the following criteria: size, mineral formations, endemic or other unusual species or subspecies, seasonally important habitat for non-endemic species or subspecies, archaeological or paleontological site, historical or religious significance, hydrologic connectivity to other caves or springs, unusual geologic strata or processes, recreationally important, or pristine in that human contact has been minimal or nonexistent.

To date, two caves within the CRVFO have been found to meet the FCRPA significance criteria: La Sunder limestone cave and Anvil Points claystone cave. The Anvil Points claystone cave is in the Roan Plateau planning area and therefore is not addressed in this analysis.

Meeting the management objective outlined above would entail applying the following prescriptions:

- Physical—Manage all significant caves to maintain the current level of remoteness (backcountry in nature) from motorized and mechanized vehicles and to preserve the natural appearance of the cave. Prohibit construction of new facilities, roads, or trails to access the caves. Allow for only minor modifications (e.g., tape, signage, and rescue caches) for scientific purposes and to accommodate safe use. Maintain low evidence of use and other people.
- Social—Manage visitor frequency, visitor numbers, and season of use, in coordination with the Colorado Cave Survey, through monitoring and subsequent implementation decisions described through cave management plans for each significant cave, group of caves, or complex of caves.
- Targeted Activities and Outcomes—Focus all management actions on specific activity outcomes for caving and research. Outcomes will be for participants to enjoy and learn about cave and karst resources. Specific benefit outcomes will be for environmental benefits, such as increased environmental stewardship, and the preservation and protection of unique biological, paleontological, archaeological, and mineralogical aspects. Social benefits will be to provide environmental learning and appreciation of cave and karst systems.
- Operational—Continue to allow appropriate access while addressing issues and concerns relating to visitor safety and preservation of the caves' values. If issues or concerns arise, apply necessary managerial controls, such as closures, permits, trip requirements, and gating, in coordination with the Colorado Cave Survey. Administer and authorize research, inventory, work projects, and digging trips. Provide information and education materials to authorized visitors. Do not market or promote cave and karst resources.

Alternative A

Impacts from Cave and Karst Resource Management. The primary means under Alternative A for protecting significant cave and karst resources (not including the Roan Plateau) would be GS-NSO-16, which includes the Deep Creek cave area and some adjacent BLM lands. The establishment of this NSO (total area of approximately 5,100 acres) under current management was based on the high concentration of caves along both the north and south sides of the canyon, including La Sunder cave, classified as significant under the FCRPA criteria. A portion of the NSO containing approximately 2,400 acres along the Deep Creek canyon, but not including adjacent federal lands outside the canyon, is included within the Deep Creek ACEC and SRMA areas. The NSO stipulation for the Deep Creek cave area protects the entrances, subsurface features, and overlying ground surface of 10 distinct caves clustered along the canyon sideslopes. This coverage protects upgradient hydrology, important for the continued health of the cave system. The NSO also extends to 5,000 feet beneath the ground surface, precluding the potential for inadvertent damage to the cave and karst system by directional drilling from outside the NSO boundaries to access underlying federal mineral estate. However, this NSO does not apply to seven additional caves that are outside that area, including one in the Hack Lake area of the Flat Tops but mostly in Glenwood Canyon. The latter are small, dry caves relatively lacking in distinctive cave features.

The continuation of current management under Alternative A also includes designation of the Deep Creek ACEC, which includes nearly half of the total NSO area, as a right-of-way exclusion area, meaning that the BLM would not approve ROW grants. The combination of the NSO and the ROW exclusion designation would preclude future development of salable and leasable minerals. Additionally, management under Alternative A includes a recommendation that the Deep Creek SRMA and (under all alternatives) the Deep Creek ACEC be withdrawn from locatable mineral claims. BLM can only recommend this action, which is covered under the General Mining Law of 1872 and outside BLM's purview. Further protection is provided by designation of the ACEC as closed to motorized travel, including over-snow travel.

The effect of the NSO stipulation for the entire area, in combination with the ROW exclusion and recommendation for withdrawal from locatable mineral claims and closure to unauthorized motorized travel in the ACEC portion of the area, under Alternative A, is to protect caves and karsts.

Impacts from Vegetation Management. Vegetation management actions would generally not affect cave resources. A potential exception would include use of chemical herbicides to treat weeds on the surface overlying the cave complex, if situations exist where the herbicides could enter a cave without filtration through overlying soil and geologic material. Before herbicides would be used in the Deep Creek NSO area, BLM would ensure that the application would not pose a risk of contamination to any cave.

Impacts from Comprehensive Trails and Travel Management. Unauthorized motorized travel, including over-snow travel, would be prohibited in the Deep Creek ACEC area, reducing potential impacts on sensitive cave features and hibernating bats by minimizing human visitation, particularly during the winter.

Impacts from Land and Realty Management. Designation of the Deep Creek ACEC and SRMA as a ROW exclusion area would reduce or eliminate most or all of the potential for adverse impacts related to utility corridors.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The application of GS-NSO-16 to approximately 5,100 acres in the Deep Creek cave area, including the surface and the subsurface to a depth of 5,000 feet, will protect the cave and karst values.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The recommendation for withdrawal of the Deep Creek ACEC and SRMA area from locatable minerals claims would protect the cave and karst resources in this area if the recommendation is applied.

Impacts from Health and Safety Management. No impacts would be anticipated. However, placement of a locked gate across selected caves with the greatest potential for visitation, including the largest cave (La Sunder), has reduced the potential for injury or mortality to members of the public by limiting visitation to qualified cavers.

Alternative B (Proposed RMP)

Impacts to cave and karst resources from management of other resources would be the same as or similar to those under Alternative A except as follows.

Impacts from Cave and Karst Resource Management. Management actions described in the introduction to this section would apply under the Proposed RMP, except as follows: Existing stipulation GS-NSO-16, which includes 5,100 acres of surface and subsurface resources to a depth of 5,000 feet, would be replaced with new stipulation CRVFO-NSO-28 for ACECs and CRVFO-NSO-24 for cave and karst occurrences. The first stipulation would include 4,300 acres in the Deep Creek ACEC but excludes most of the subsurface features and cave hydrology. New stipulation CRVFO-NSO-24 would protect known cave resources (17 caves, including seven outside the Deep Creek area), including their surface and subsurface features to a depth of 5,000 feet. The seven additional caves protected by CRVFO-NSO-24 under the Proposed RMP include one in the Hack Lake area on the Flat Tops but are mostly in Glenwood Canyon along the Interstate 70 corridor. Taken in total, CRVFO-NSO-24 encompasses 5,300 acres on BLM-managed lands and another 100 acres on fee surface and federal minerals. The level of protections in the Proposed RMP is similar in scale and intent to the protections provided under Alternative A.

Implementing a permit program at significant caves to provide a basis for restricting and monitoring cave use and for compiling information returned by permittees on cave condition and the presence or absence of bats provides opportunities for people to engage in caving, research, and scientific exploration at significant caves.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those under Alternative A. Additional protection for bats would result from closing the Deep Creek cave area to mechanized travel and from an expanded area of motorized travel prohibition, thereby reducing disturbance, the number of casual visitors, and the potential for vandalism to the caves.

Impacts from Land and Realty Management. Impacts would be similar to those under Alternative A. There would be additional measures to protect bats by closing the Deep Creek cave area to salable and leasable minerals.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The application of CRVFO-NSO-28 to the 4,300 acres of the Deep Creek ACEC and of CRVFO-NSO-24 to 5,300 acres would protect cave and karst values from fluid mineral development. The level of protection is comparable in scale and intent to the protections in Alternative A's CRV-NSO-16.

Impacts from Renewable Energy Management. The measures described above for fluid minerals and locatable minerals (including CRVFO-NSO-24 and CRVFO-NSO-28) and for lands and reality (designation of a ROW exclusion area for the Deep Creek ACEC) would also avoid impacts from renewable energy developments, including both surface (wind, solar) and subsurface (geothermal). The level of protection is comparable in scale and intent to the protections in Alternative A's CRV-NSO-16.

Impacts from Managing to Protect Wilderness Characteristics. Managing lands for wilderness characteristics under the Proposed RMP and Alternative C would support the protection of cave and karst resources. Motorized access has resulted in vandalism at Anvil Points cave, and a similar risk could be posed to other cave resources if motorized access were allowed near known cave entrances. In addition to deliberate vandalism, increased casual cave use resulting from the easier access by motorized vehicles could degrade cave resources through inattention to proper caving methods (e.g., disease introduction, physical damage to cave features, and disturbance to cave fauna).

Alternative C

Impacts to cave and karst resources from soils management, water management, vegetation management, VRM management, wildland fire management, forestry management, livestock grazing management, R&VS management, and management of locatable minerals would be the same as or similar to those under Alternative A. Impacts to cave and karst resources from comprehensive trails and travel management, lands and realty management, and renewable energy resources management would be the same as or similar to those under the Proposed RMP. Impacts from all other resource management would be as described below.

Impacts from Cave and Karst Resource Management. Alternative C would retain almost the same level of protection of caves in the Deep Creek cave area as under Alternative A, through an NSO that includes 5,100 acres of BLM surface incorporating the cave entrances, underground features, and a large portion of the upgradient hydrology. The NSO extends to a depth of 5,000 feet below the ground surface. In addition, a new stipulation also applied under the Proposed RMP would include a 40-acre area around the entrance of all 17 identified caves (680 acres total), including 10 in the Deep Creek cave area, a cave at Hack Lake on the Flat Tops, and small, dry caves in Glenwood Canyon. Alternative C adds further protection for the Deep Creek cave area through designation as closed to fluid minerals leasing for both the 2,400-acre Deep Creek ACEC and 4,400 acres managed for wilderness characteristics.

Implementing a permit program at significant caves to provide a basis for restricting or monitoring cave use and for compiling information returned by permittees on cave condition and the presence or absence of bats allows for providing opportunities for people to engage in caving, research, and scientific exploration at significant caves.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). New stipulation CRV-NSO-54 would replace existing stipulation GS-NSO-16. These identical stipulations include 5,100 acres and protect cave entrances, underground features, and upgradient hydrology and underground features, and the designation as closed to fluid minerals leasing for the Deep Creek ACEC (2,400 acres) and for the 4,400-acre Deep Creek unit managed for wilderness characteristics. Closing areas to fluid minerals leasing would preclude directional drilling to access the underlying federal mineral estate for fluid mineral or geothermal development. As in the Proposed RMP and Alternative D, this alternative would also include stipulation CRV-NSO-44, which protects the entrances of 17 caves, including 10 in the Deep Creek area and seven outside the area, mostly in Glenwood Canyon, by applying a 40-acre NSO at each (680 acres total). Although the seven additional caves are generally dry and small, they provide potential roosting areas for bats.

Impacts from Managing to Protect Wilderness Characteristics. Managing lands for wilderness characteristics under the Proposed RMP and Alternative C would support the protection of cave and karst resources. Motorized access has resulted in vandalism at Anvil Points cave, and a similar risk could be posed to other cave resources if motorized access were allowed near known cave entrances. In addition to deliberate vandalism, increased casual cave use resulting from the easier access by motorized vehicles could degrade cave resources through inattention to proper caving methods (e.g., disease introduction, physical damage to cave features, and disturbance to cave fauna).

Alternative D

Impacts to cave and karst resources from lands and realty management, fluid minerals management, and renewable energy management would be the same as or similar to those under the Proposed RMP. Impacts from all other resource management actions would be the same as or similar to those for Alternative A, except as described below.

Impacts from Cave and Karst Resource Management. Under Alternative D, the only specific management action for cave and karst resources would be CRV-NSO-44, which totals 680 acres and includes 40 acres at each of 17 caves (10 in the Deep Creek area and seven outside that are mostly in Glenwood Canyon). Although the Proposed RMP also lacks protections specifically for caves other than CRV-NSO-44, it includes some indirect protection under GS-NSO-49 for the 2,400-acre Deep Creek ACEC. Therefore, Alternative D would provide the least protection for cave and karst areas among the four alternatives.

Implementing a permit program at significant caves to provide a basis for restricting or monitoring cave use and for compiling information returned by permittees on cave condition and the presence or absence of bats allows for providing opportunities for people to engage in caving, research, and scientific exploration at significant caves.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to the Proposed RMP and Alternative C, except that motorized access would be permitted on two routes south of Deep Creek and west of the cave areas, providing fewer protective measures for bats and cave resources. Impacts from motorized use could include vandalism to cave infrastructure (gates) and damage from casual cave use if visitation increased. Motorized vehicles would have to access the routes through adjacent private land, which is permissible under Alternative D but not under the Proposed RMP and Alternative C.

Cumulative Impacts

Unlike many of the resources administered by the CRVFO, cave and karst resources are localized features, generally unaffected by management actions or land uses related to other resources, and with a small, highly specialized group of users. In general, cave and karst resources are affected primarily by direct impacts on the cave resources, particularly physical damage from uninformed or uncaring recreationists. Cave formations are created so slowly that any damage to them could be considered permanent, and great care must be taken by cavers to avoid impacts. Consequently, the only cave on BLM lands designated as significant within this plan—the La Sunder cave in the Deep Creek cave area—has already been protected by a locked gate. The Anvil Points claystone cave in the Roan Plateau planning area, also designated as significant, lacks similar protection from physical damage, but has an NSO for no ground-disturbing activities in the area encompassing the cave opening, subsurface features, and watersheds overlying the cave. While the lesser caves in the Deep Creek area and along portions of Glenwood Canyon attract some use by cavers or untrained visitors, they lack the same degree of sensitive resources in terms of cave formations (stalactites, stalagmites, cave popcorn, and soda straws). Potential indirect impacts are related primarily to interruption of the hydrologic regime that led to the creation of the caves and, in some cases, their continued viability and the continued growth of cave formations.

Most management actions and land uses discussed in Chapters 3 and 4 will continue into the future. Cumulative impacts from future federal, state, local, or private actions that are reasonably certain to occur generally have very limited bearing on cave and karst resources within the CRVFO planning area. Had BLM not already taken steps to protect La Sunder Cave from unregulated public access, the greatest cumulative

impact would probably be related to the general population growth in the region and a corresponding increase in caving as a sport. More users, whether skilled cavers or the public, create greater risk of harm from inadvertent damage to cave formations as well as the unauthorized collection of samples of cave formations, vandalism, disease introduction, or merely touching sensitive formations.

No future actions are planned under any of the alternatives that would substantially affect the degree to which caves are vulnerable to damage associated with the growth in the human population of the region and of caving as a sport. Qualitatively, the more restrictive travel designations under the Proposed RMP and Alternative C would provide some increased protection compared with Alternative D by placing greater restrictions on mechanized and motorized travel. This travel is only slightly more likely to occur to a substantial degree under Alternative D, and the actual difference among alternatives in this regard is likely to be small—barring an evolution in OHV technology or new routes that allow greater access to the cave areas. Changing demographics would be unlikely to have a differential impact on cave resources across the alternatives. However, the more protective alternatives would be better able to address the increased pressure of multiple use and increased visitation in and around cave resources as the human population increases. .

Cumulative impacts associated with the indirect impact on caves from interruption of cave hydrology are potentially of greatest risk under future alternatives because this damage can occur from an activity conducted on the surface of the ground at a considerable upgradient distance. In this regard, Alternative A and the Proposed RMP are more protective than the other alternatives in a cumulative sense, as they contain stronger NSO stipulations for oil and gas projects or other land developments that would preclude long-term surface- or subsurface-disturbing activities (to a depth of 5,000 feet) extending upgradient from the Deep Creek caves. This NSO would protect the upgradient cave hydrology from impacts related to drilling for oil and gas, geothermal resources if any, other minerals, or water. Therefore, the federal mineral estate upgradient from the Deep Creek caves would be removed from these potentially damaging activities under Alternative A and the Proposed RMP to a greater degree than under Alternatives C and D.

The Deep Creek area, which is on the edge of the White River Uplift (Flat Tops Wilderness) and underlain by very old limestones and metamorphic basement rocks, is unlikely to contain oil, gas, or other mineral resources, with the possible exception of unidentified geothermal sources. Consequently, with the protections provided under the Proposed RMP and Alternatives A, C, and D, cave resources are unlikely to be impacted by cumulative anthropogenic changes from accessing subsurface resources.

4.3 IMPACTS ON RESOURCE USES

4.3.1 Forestry

This analysis addresses the potential impacts on forestry caused by implementing the management actions under the alternatives described in Chapter 2. Particular focus was placed on potential changes in the quantity or quality of forest and woodland products available for harvest from designated forest management units. The analysis focused on those management actions that would affect the quantity or quality of products within the CRVFO area. In the absence of quantitative data, best professional judgment was used, and impacts are sometimes described by using ranges of potential impacts or in qualitative terms.

Methods

The RMP designates four forest management units within the planning area: King Mountain, Black Mountain, Castle Peak, and Seven Hermits. These units represent the four largest contiguous and productive forests within the planning area. Intensive forest management with an emphasis on the production of commercial wood products is limited to forests and woodlands within forest management units.

The resource area includes thousands of acres of forest and woodlands outside designated forest management units. These areas are designated for management of other resources, are isolated, or are minimally productive for forest management. However, these factors do not preclude management of forest and woodlands outside the designated units to meet other resource management objectives (e.g., hazardous fuels reduction and wildlife habitat enhancement), while potentially generating forest and woodland products. Forest products generated from these management activities were not included in the estimated PSQ provided for each alternative.

The impacts on forestry are defined as management actions or activities that alter the quality or quantity of wood products available for forest management actions within these units—either directly or through their effects on stand health. When applicable, impacts on forest and woodlands outside the forest management units will be mentioned specifically as they relate to potential augmentation of forest and woodland products to the estimated PSQ.

When possible, mitigation measures were incorporated into the analysis to reduce the adverse impact on forest and woodland areas.

Assumptions

The assumptions used in this analysis include the following:

- Silvicultural treatments will be designed to balance forest and woodland productivity, stand health, economic value, and ecosystem health
- Silvicultural treatment type and distribution will vary in forest and woodland areas, depending on the desired outcomes.
- No comprehensive forest or woodland inventory or age and species classifications are available for the planning area.
- Generally, higher stocking rates exist today compared with historical conditions. In addition, the overall age structure of the forests and woodlands is increasing within the planning area. Historical conditions (including periodic disturbances caused by wildfire, disease, and insect infestations) and

projected long-term shifts in climatic conditions will be considered in designing silvicultural treatments to ensure sustainability in both harvest levels and stand health.

- Insect and disease mortality is higher today than it was in the past. Epidemic or near-epidemic levels of insect outbreaks, primarily mountain pine beetle, will continue for the near term and will significantly change the composition, structure, and function of the forested areas within the planning area. Probable annual harvest levels under each alternative are based on live trees. Trees killed by the mountain pine beetle deplete the live growing stock inventory of trees, though they may provide salvage harvest opportunities.
- Demand for forest and woodland products is not anticipated to grow substantially during the planning period. The supply of forestry and woodland products would continue to exceed demand.
- Several traditional woodland products (e.g., firewood, Christmas trees, posts, and poles) could be harvested from forest and woodlands outside designated forest management units.

Environmental Consequences

Allowable uses and management actions potentially affecting forests and woodland as well as forest products, primarily include surface-disturbing activities and conservation-oriented management actions. As forests, woodlands, and forest products are impacted by the alternatives, these resources can in turn affect other resources. The impacts of forest and woodland management on other resource topics (i.e., physical, biological, and wildland fire and fuels management) are discussed under their respective subsections in this chapter.

Forest management treatments are anticipated on a small portion of the resource area, making all impacts in regard to forest management minor. The combined acreage for all forest management units is less than 1 percent of the total planning area. Though they represent a small portion of the field office, these forests and woodlands have provided sufficient forest products to meet the limited local demand. As the forestry program continues to evolve and improve forest and woodland health, the quantity of forest products should continue to meet future demand.

The types of impacts projected to occur to forests, woodlands, and forest products because of the four alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, the relative impacts on forests, woodlands, and forest products from surface-disturbing activities and resource protective management actions are described under individual alternatives.

Impacts on forestry and woodlands would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no impacts or only negligible impacts on forestry and woodlands under any of the four alternatives.

Alternative A

Impacts from Forestry Management. Insect and disease mortality are higher today than in the past. Epidemic or near-epidemic levels of insect outbreaks, primarily mountain pine beetle, will continue for the foreseeable future and will significantly change the composition, structure, and function of the forested areas within the planning area. Future timber harvest would focus on improving forest and woodland health. Long-term benefits from vegetation treatments would be realized as removal of dead, dying, insect and disease affected, and thinning overstocked forest and woodlands would improve stand productivity and would reduce wildland fire potential through fuels reduction. These long-term improvements in forest stand health would

eventually produce more forest products of higher quality. Retention of sufficient coarse woody debris, snags, appropriately sized clear cuts, selection cutting, and other forestry techniques helps ensure regeneration, biodiversity, and nutrient cycling after a harvest.

Alternative A would place a moderate emphasis on management of forest and woodlands to minimize losses, or damage, from insects and disease.

Impacts from Soils Management. In general, decisions for managing soil resources would also improve forest and woodland health by providing for overall ecosystem health through continued implementation of the *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado* (BLM 1997a). Stipulations designed to protect soil resources on unstable areas and during periods when soils are saturated have the potential to limit forest and woodland treatment methods and seasonal timing, resulting in short-term minor adverse impacts by potentially increasing costs associated with vegetation treatments in these areas. The forest management units do not include any identified debris flow areas, which would preclude forest management activities. Areas with unstable soil are localized and impact only a small percentage of the acres available for forest management. Therefore, the direct impacts that soils decisions would cause on forest and woodland products harvesting under Alternative A would be minimal.

Impacts from Water Resources Management. Management of water resources would enhance forest and woodland health by providing for overall ecosystem health. None of the forest management units includes high water resource values or municipal watersheds, which would limit or modify forest management activities. Streamside buffer zone restrictions could limit the size of a forest product harvest or restrict an area from harvest. Actions under water quality and watershed resources would have a low impact on the overall forest and woodland management program.

Impacts from Fish and Wildlife Management. Wildlife habitat improvement projects could indirectly improve forest and woodland health and increase the availability of some woodland products, depending on the treatment method used. Proposed decisions for fish and wildlife could also adversely affect forest and woodland management by restricting some harvest by location or season. Forest management actions could be modified to comply with fish and wildlife stipulations and restrictions to minimize disturbance, as well as to maintain connectivity between large contiguous blocks of wildlife habitat.

Forest and woodland vegetation within forest management units provide habitat for a variety of wildlife species, including elk, deer, black bears, and wild turkeys. None of the units includes designated critical habitat for any terrestrial wildlife species. Seasonal or spatial restrictions for mule deer and elk could adversely affect the success of commercial product harvest and forest health projects.

Much of the big game critical winter range is mapped within sagebrush and pinyon-juniper woodlands outside higher elevation forest management units. The reduction of pinyon-juniper encroachment into sagebrush ecosystems improves foraging habitat in big game critical winter range. The clearing of pinyon-juniper would generate woody biomass and forest products that could augment the amount of forestry products harvested to meet the PSQ.

BLM Instruction Memorandum No. 2008-050 (BLM 2008o) provides guidance toward meeting BLM's responsibilities under the MBTA and EO 13186. The guidance directs CRVFO to promote the maintenance and improvement of habitat quantity and quality. Limited specific bird count or species data exist for the

forest management units and responses of individual bird species to forest and woodland management activities are often habitat and species specific.

Forest and woodland vegetation within forest management units provides both foraging and nesting habitat for a variety of migratory birds that summer, winter, or migrate through the area. The habitat diversity provided by the broad expanses of sagebrush, mixed mountain shrub, oakbrush, aspen, pinyon-juniper woodlands, other types of coniferous forests, and riparian and wetland areas support many bird species. Management of migratory birds could adversely affect the treatment boundaries and access roads, and potentially influence the type, size, timing, and location of a forestry project or treatment, which could fragment habitat, interfere with nesting season, or contribute to the intentional take of native bird species. The potential impact on forest management would be relatively the same for all alternatives regarding compliance with the MBTA and EO 13186.

Bald eagles, which are increasing in numbers throughout their range, were removed from the federal threatened and endangered species list in 2007, but they are still protected under the MBTA. Bald eagles are not known to winter in higher elevation upland forest and woodland habitat found in the forest management units. However, upland habitats within units next to waterways may be used as scavenging areas, primarily for winter-killed animals. Management for bald eagle habitat within forest management units is not anticipated to have an impact on forest and woodland management.

Forest and woodland vegetation within forest management units also provides potential habitat for many species of raptors (e.g., red-tailed hawks, Cooper's hawks, American kestrels, and owls) not on the USFWS list of Birds of Conservation Concern. Current raptor surveys are not available for the area. Short-term impacts regarding the timing or location of vegetation treatments may result from temporary surface-use restrictions, seasonal restrictions, or other surface-development restrictions within buffers for raptors and bald eagle roost sites located within forests and woodlands.

Fish and amphibian decisions could impact management of forest and woodland projects. Protection and mitigation measures to reduce soil compaction and displacement from forest and woodland vegetation treatments could directly impact the location, size, and timing of individual forestry and woodland treatments. BMPs designed to mitigate erosion are commonly implemented under all alternatives.

Implementation of the protective and mitigation measures and management decisions for fish and wildlife management are similar across all alternatives. Fish and wildlife management decisions under Alternative A are aimed at maintaining the current fish and wildlife habitat condition and trends. Therefore, Alternative A would be the least restrictive of the alternatives on timing, size, and location of forest and woodland vegetation treatment.

Impacts from Special Status Species Management. Forest and woodland vegetation provide important habitat for several special status species; therefore, management of sensitive, threatened, and endangered species and their habitats would impact forestry activities. Forest management actions could be modified to comply with wildlife stipulations and restrictions to minimize disturbance, as well as to maintain connectivity between large, contiguous blocks of critical wildlife habitat. Management measures could affect the economic viability of projects by limiting the intensity of management, the amount and type of products removed, the tools used, and the timing of activities. These effects would vary from minor to prohibitive. In addition,

requirements for biological inventories in localized areas of concern would result in short-term delays or increased costs of forest management treatments.

The Lynx Conservation Assessment and Strategy (LCAS) provides direction on the types of activities and the amount of habitat that can be modified in lynx habitat. Because lynx habitat includes cool moist forests of lodgepole pine, spruce, or Douglas-fir, treatments in these habitat types could be restricted. Thinning high-density medium to large trees would be the least restricted treatment in lynx habitat, as long as suitable habitat is maintained. Thinning small-diameter trees would be the most restricted type of activity. Small-diameter thinning treatments in lodgepole pine stands would be heavily restricted to retain forage habitat for lynx. This restriction could slow growth and productivity, lengthening the amount of time needed to grow large-diameter pine trees in these stands. The size and location of openings created through forest management could be restricted, but openings may be considered beneficial if forage habitat for lynx is limited.

Alternative A has approximately 30,000 acres of lynx habitat that has been mapped across all four forest management units. Lynx habitat makes up approximately 72 percent of all forest management unit acres available for intensive forest and woodland management. The adverse impact from managing lynx habitat would be moderate under Alternative A.

King Mountain Forest Management Unit includes 630 acres of core greater sage-grouse habitat under Alternative A. Management of sage-grouse habitat would focus on reducing pinyon-juniper woodland encroachment into sagebrush ecosystems. Sage-grouse habitat enhancement treatments designed to clear pinyon-juniper vegetation would provide an opportunity to recover woody biomass for production of various forest products and would contribute to the PSQ.

The bulk of greater sage-grouse habitat is mapped outside forest management units. Approximately 4,400 acres of priority greater sage-grouse habitat and 1,700 acres of general greater sage-grouse habitat overlap with the forest management units. Most of these mapped areas include vegetation transition zones between sagebrush and pinyon-juniper woodland ecosystems. As mentioned above, the encroachment of pinyon-juniper woodland on sage bush ecosystems contributes to the loss of sage-grouse habitat. Clearing pinyon-juniper to enhance and maintain sage-grouse habitat would generate woody biomass and forest products that could augment the amount of forestry products harvest to meet the PSQ. In general, the primary commercial forests (lodgepole pine and co-occurring conifers) were excluded from consideration as greater sage-grouse habitat.

Management of special status plant species and communities could limit or preclude timber harvest activities in places where these species occur. Special status species within the planning area are not commonly found in forested ecosystems. The exception would be the presence of Harrington's penstemon, found in sagebrush and woodland ecosystems. Approximately 790 acres have been mapped as core Harrington's penstemon habitat in the northeastern corner of the Seven Hermits Forest Management Unit. Woodland management actions within the core habitat area would be modified to minimize soil-disturbing activities to avoid impact on existing populations of penstemon. An additional adverse impact is the requirement for biological inventories in localized areas of concern and could result in short-term delays or increased costs of woodland management treatments. Impacts on woodland management within forest management units under Alternative A would be minor, given the limited area (less than 2 percent) that would require protecting and mitigation for Harrington's penstemon.

All forest and woodland management activities would comply with protection and recovery plans for individual special status species. Treatment would be designed to avoid, mitigate, or improve designated key and core habitat. Implementation of the protective and mitigation measures and management decisions for special status species management are similar across all alternatives. Special status species management decisions under Alternative A are aimed at maintaining the current habitat condition and trends. Therefore, Alternative A would be the least restrictive on timing, size, and location of forest and woodland vegetation treatment compared with the other alternatives.

Impacts from Cultural Resource Management. Without a complete inventory of all public lands within the decision area, the exact number, kind, and variability of cultural resources will be unknown. Direct long-term adverse impacts on forest management occur in localized areas where new cultural resource sites are discovered. While not typically found in forested areas, cultural sites are typically small and isolated, thereby resulting in minor effects on forest management. These effects include restricting or relocating treatment boundaries and access roads and potentially influence the type, size, and location of a forestry project or treatment. In addition, requirements to complete a cultural survey before disturbance could delay implementation and increase the costs of planning and preparing forestry projects.

None of the forest management units is known to contain or have the conditions that would indicate they support potential concentration of cultural resources. Any discovered cultural resources within forest management units are anticipated to make up a relatively small percentage of the total acres available to forest management. Thus, actions under cultural resources would have a minor impact on the overall forest management program.

Impacts from Visual Resources Management. Changes in forest management are anticipated from VRM classification. None of the forest management units is required to meet VRM Class I objectives, which is the most restrictive. However, under Alternative A, approximately 34,200 acres (82 percent) of the units would be managed to meet VRM Class II objectives. The majority of those acres are within the King Mountain and Castle Peak Forest Management Units. VRM Class II management objectives require that the visual resource contained within these forested and woodland areas be maintained, or that changes to the visual resource not be noticeable to the casual observer. VRM constraints would restrict timber harvests in these areas. Managing 34,200 acres to meet VRM Class II objectives could alter the size, type, and location of forest and woodland product harvest or forest health projects. Other forested areas within the forest management units would be managed as VRM Class III and IV, which would impose few restrictions on forest and woodland management actions.

Alternative A has the most acres and the greatest percentage of VRM Class II management within forest management units. Thus, under Alternative A, forestry would be impacted the most from meeting and maintaining Visual Resource Management Objectives, especially for Class II viewsheds.

Impacts from Wildland Fire Management. Fire management can affect forestry activities. The Upper Colorado River Interagency Fire Management Plan (BLM 2012d) provides the fire management strategies for wildland fire suppression, unplanned fire managed for resource benefits, prescribed or planned fire, and non-fire fuels treatments. The CRVFO is managed under Fire Management Units (FMUs) for the purpose of wildland fire and prescribed vegetation and fuels management. All proposed FMUs designate whether fire is allowed or not allowed.

An emphasis on wildfire suppression would minimize the potential loss of forest products for commercial or noncommercial use—provided the harvests occur. Without those harvests, wildfire suppression may perpetuate overstocked forests and a generally older age-class structure. This change in stocking and structure could ultimately result in larger wildfires.

Vegetation and hazardous fuel reduction treatments designed to reduce wildland fire intensity and severity through reduction and removal of forest and woodland vegetation can impact forest and woodland management. Effective vegetation treatments and hazardous fuels reduction can reduce the potential loss of forest and woodland products caused by wildland fire.

Although vegetation and hazardous fuels reduction may be implemented across the landscape to protect a variety of resource values, more typically treatments are targeted to reduce wildland fire intensity and severity within the WUI. As with areas outside the interface, these treatments can mitigate the potential loss of forest and woodlands from wildland fire, while providing an opportunity for use and harvest of commercial and noncommercial forest products.

Impacts from Livestock Grazing Management. Lands available for livestock grazing are open and permitted in all forest management units. Livestock management actions would include implementation of the *Colorado Standards for Public Land Health and Guidelines for Livestock Management* (BLM 1997a), which require meeting standards for vegetation health, wildlife habitat, and riparian habitat. Livestock grazing intensity within forested landscapes has been moderate to light throughout the planning area. Impacts from livestock grazing management are attributed to decreased competition from herbaceous plants that compete with tree seedlings for water, sunlight, and nutrition. In limited incidents where livestock concentrate, there could be an increase in the grazing of tree saplings and seedlings in regenerating harvest or treatment sites, causing the trees to grow in a bush-type manner with stunted or stagnant growth. In all cases, impacts from livestock grazing on forests and woodlands are limited in size and scope.

Impacts from Recreation and Visitor Services Management. Current recreation management would have little to no large-scale effects on the harvest of forest and woodland products. Developed recreation sites within the planning area are generally small, concentrated along river corridors, and are not located in higher elevation forest management units. The majority of current recreation activity occurring within these units is of a dispersed nature, with little recreation occurring in woodland zones, except for seasonal big game hunting and OHV operation. Recreational pursuits in forested areas are generally compatible with most forest management activities, including forest health objectives and some forms of timber harvesting. Recreational activities within forestlands could result in localized, adverse impacts from accidental fires, soil erosion from off-road vehicle use, introduction of invasive weed species, introduction of damaging insects from firewood, and incidental vegetation damage.

Impacts from Comprehensive Trails and Travel Management. Proposed decisions for route designations are expected to have little impact on access to designated forest management unitss. Main arterial and secondary travel routes for motorized vehicles will remain open in all units. Vehicle routes closed to the public could be authorized for use under administrative authorization for planning, preparing , implementing, and monitoring all forest management activities. In addition, construction of temporary roads to access forest management activities could be used to supplement the route designations to be implemented under this alternative. Improvement of user-created routes and development of new routes to access timber harvest

areas may increase recreational user access, which brings the potential for negative forest health impacts listed in the R&VS section above.

However, the proposed decision for route designations for areas outside designated forest management units could impact collection and harvest of forest and woodland products by limiting road access. Travel restrictions under Alternative A are the least of any alternative and therefore would impose the least impact on forest and woodland product collection and harvest outside forest management units. The limited travel restrictions under Alternative A would also have relatively higher potential impacts on forest health from increased recreational user-created risks.

Impacts from Lands and Realty Management. ROWs and land use permits can result in adverse impacts on forest and woodland management when the associated actions require clearing forests and woodlands to accommodate the approved development. Some forestry operations may be restricted to avoid damage to ROW infrastructure. Conventional realty actions within the resource area include roads, communication sites, and utility transmission corridors. Forest and woodland vegetation in these areas would be cleared and taken out of production for the life of the development. The long-term impact of the lost forest and woodland vegetation is concentrated in specific areas and limited across the landscape. The cumulative impact of lost forest and woodland cover could result in less than 0.01 percent of woodland acres taken out of production each year. The impact from realty actions would have an overall minor impact on forest and woodland management.

Impacts from Fluid Mineral Management (Oil and Gas, Oil Shale, and Geothermal Resources). The planning area includes large acres of woodlands (pinyon and juniper) outside forest management units, which are in the western portion of the planning area. This area has been classified as having a high potential for fluid mineral development. Impacts from oil and gas resource development on woodland management include removal of forest cover for the construction of well pads, associated production facilities, roads, and pipelines. These areas would be taken out of production for the life of the well or improvement. The long-term impact of the lost woodland vegetation is dispersed across the landscape. Cumulatively, this impact could result in hundreds of woodland acres taken out of production each year. However, this loss does not represent more than 1 percent of the total woodland vegetation for the resource area. The impact from oil and gas development would have an overall minor impact on forest and woodland management.

Impacts from Renewable Energy Management—Biomass. Recent studies indicate that Colorado has a fair biomass resource potential. This biomass resource potential is based on the supply from five general categories of biomass: urban residues, mill residues, forest residues, agricultural residues, and energy crops. The CRVFO area has a source of potential biomass from forest residue from within and outside designated forest management units. Forest residues include underutilized logging material, imperfect commercial trees, dead wood, and other noncommercial trees that need to be thinned from crowded, unhealthy, fire-prone forests. However, because of the distance from biomass processing facilities, these residues are usually more expensive to recover than urban and mill residues and are not economically feasible for commercial energy development.

New tax credits or incentives, increased monetary valuation of environmental benefits, increased transportation efficiency, and sustained high prices for fossil fuels could make biomass from forest residue more economically feasible during the life of the RMP. The improved economic feasibility of energy development from forest biomass would result in an increased demand for residual forest products.

Alternative A would have the greatest PSQ available to meet the anticipated demand for biomass energy from forest residue.

Impacts from Wilderness Study Area Management. WSAs would be managed according to BLM Manual 6330, 6330 Management of Wilderness Study Areas (BLM 2012c) until Congress either designates each WSA as wilderness or releases it from consideration and it reverts to multiple-use management as described in the RMP. Since all four WSAs (Bull Gulch, Castle Peak, Eagle Mountain, and Hack Lake) are managed as WSAs under all alternatives, there would be little variation in the impacts of WSA management on forests and woodlands. The restrictions on using motorized equipment and constructing roads in WSAs would effectively eliminate commercial forestry operations or large-scale forest health projects within the WSAs. Based on their small size, remote locations, or limited commercial tree species, Eagle Mountain, Bull Gulch, and Hack Lake would not be viable commercial forestry sites even if released by Congress from WSA status. Even if Congress released the Castle Peak WSA from consideration for wilderness designation, management direction (VRM, Travel, and Recreation), the Proposed RMP, and Alternatives C and D would still not allow for viable commercial forestry operations. Under Alternative A, there would be no similar restrictions after Congressional release of the Castle Peak WSA, and commercial forestry operations may be a viable option in some areas of the former WSA. Therefore, Alternative A may have the least impact on forestry operations, should Congress release the Castle Peak WSA. Lacking current Congressional direction to release the WSAs, however, the impacts of WSAs on forestry operations can be considered similar across all alternatives.

Alternative B (Proposed RMP)

Impacts to forestry from management of other resources would be the same as or similar to those under Alternative A, except as described below.

Impacts from Forestry Management. Tree morality from insect and disease is higher today than in the past. Epidemic or near-epidemic levels of insect outbreaks, primarily mountain pine beetle, will continue for the foreseeable future and will significantly change the composition, structure, and function of the forested areas within the planning area. Future timber harvest would focus on improving forest and woodland health. Long-term benefits from vegetation treatments would be realized as removal of dead, dying, insect and disease affected, and overstocked forest and woodlands would improve stand productivity and would reduce the potential for wildland fire through fuels reduction. These long-term improvements in forest stand health would eventually produce more forest products of higher quality. Retention of sufficient coarse woody debris, snags, appropriately sized clear cuts, selection cutting, and other forestry techniques helps ensure regeneration, age-class diversity, biodiversity, and nutrient cycling following a harvest.

The Proposed RMP would emphasize salvage or accelerated harvest following adverse events to regenerate stands and capture the economic value of forest products before that value is lost. Alternative D would be the most aggressive of all the alternatives to implement forest health treatments that address the impacts of insect and disease.

Impacts from Fish and Wildlife Management. Wildlife habitat treatment projects could indirectly improve forest and woodland health and increase the availability of some woodland products, depending on the treatment method used. Proposed decisions for fish and wildlife could also adversely affect forest and woodland management by restricting some harvest by location or season. Forest management actions would potentially be modified to comply with fish and wildlife stipulations and restrictions to minimize disturbance, as well as to maintain connectivity between large contiguous blocks of wildlife habitat.

Forest and woodland vegetation within forest management units provide habitat for a variety of wildlife species, including elk, deer, black bears, and wild turkeys. None of the units includes designated critical habitat for any terrestrial wildlife species. Seasonal or spatial restrictions for mule deer and elk could impact the success of commercial product harvest and forest health projects.

Much of the big game critical winter range is mapped within sagebrush and pinyon-juniper woodlands outside higher elevation forest management units. The reduction of pinyon-juniper encroachment into sagebrush ecosystems improves foraging habitat in big game critical winter range. Clearing pinyon-juniper would generate woody biomass and forest products that could augment forestry products harvest to meet the PSQ.

In the Proposed RMP, approximately 6,100 acres of mapped greater sage-grouse habitat coincides with FUs. (4,400 acres of priority habitat and 1,700 acres of general habitat). The principal tree species for commercial harvest (lodgepole pine and associated conifers) do not provide habitat for greater sage-grouse, and sage-grouse restrictions are not anticipated to substantially affect PSQ. The effects of protective measures for sage-grouse would be more likely to occur with specific timing and location considerations for harvesting and hauling commercially viable tree species. Management of sage-grouse habitat would focus on reducing pinyon-juniper woodland encroachment into sagebrush ecosystems. Sage-grouse habitat enhancement treatments designed to clear pinyon-juniper vegetation would provide an opportunity to recover woody biomass for production of various forest products and would contribute to the PSQ.

BLM Instruction Memorandum No. 2008-050 (BLM 2008o) provides guidance toward meeting BLM's responsibilities under the MBTA and EO 13186. The guidance directs CRVFO to promote maintenance and improvement of habitat quantity and quality. Limited specific bird count or species data exist for the forest management units, and responses of individual bird species to forest and woodland management activities are often habitat and species specific.

Forest and woodland vegetation within forest management units provides both foraging and nesting habitat for a variety of migratory birds that summer, winter, or migrate through the area. The habitat diversity provided by the broad expanses of sagebrush, mixed mountain shrub, oakbrush, aspen, pinyon-juniper woodlands, other types of coniferous forests, and riparian and wetland areas supports many bird species. Management of migratory birds could adversely affect the treatment boundaries, access roads and potentially influence the type, size, timing, and location of a forestry project or treatment, which could fragment habitat, interfere with nesting season, or contribute to the intentional take of native bird species. The potential impact on forest management would be relatively the same for all alternatives regarding compliance with the MBTA and EO 13186.

Bald eagles, increasing in numbers throughout their range, were removed from the federal threatened and endangered species list in 2007 but remain protected under the MBTA and the Bald and Golden Eagle Protection Act. Bald eagles are not known to winter in higher elevation upland forest and woodland habitat found in the forest management units. However, upland habitats within the units next to waterways may be used as scavenging areas, primarily for winter-killed animals. Management for bald eagle habitat within forest management units is not anticipated to have an impact on forest and woodland management.

Forest and woodland vegetation within forest management units also provides potential habitat for many species of raptors (red-tailed hawks, Cooper's hawks, American kestrels, and owls) not on the USFWS list of Birds of Conservation Concern. Current raptor surveys are not available for the area. Short-term impacts

regarding the timing or location of vegetation treatments may result from temporary surface use restrictions, seasonal restrictions, or other surface development restrictions within buffers for raptors, and bald eagle roost sites within forests and woodlands.

Fish and amphibian decisions could impact management of forest and woodland projects. Protection and mitigation measures for fish and amphibian species could directly impact the location, size, and timing of individual forestry and woodland treatments. BMPs designed to mitigate erosion and avoid riparian areas are commonly implemented in all alternatives.

Implementation of the protective and mitigation measures and management decisions for fish and wildlife management in forests and woodlands would be similar across all alternatives. Fish and wildlife management decisions under the Proposed RMP are focused on strategically managing fish and wildlife habitats, with an emphasis on protecting critical habitat. Therefore, the Proposed RMP would be somewhat more restrictive on timing, size, and location of forest and woodland vegetation treatments compared with Alternative A.

Impacts from Special Status Species Management. Forest and woodland vegetation provide important habitat for several special status species. Therefore, management of sensitive, threatened, and endangered species and their habitats would impact forestry activities. Forest management actions could be modified to comply with wildlife stipulations and restrictions to minimize disturbance, as well as to maintain connectivity between large contiguous blocks of critical wildlife habitat. Management measures could affect the economic viability of projects by limiting the intensity of management, the amount and type of products removed, the tools used, and the timing of activities. These effects would vary from minor to prohibitive. In addition, requirements for biological inventories in localized areas of concern would result in short-term delays or increased costs of forest management treatments.

The LCAS provides direction on the types of activities and the amount of habitat that can be modified in lynx habitat. Because lynx habitat includes cool moist forests of lodgepole pine, spruce, or Douglas-fir, treatments in these habitat types could be restricted. Thinning high-density medium to large trees would be the least restricted treatment in lynx habitat as long as suitable habitat is maintained. Thinning small-diameter trees would be the most restricted type of activity to retain forage habitat for lynx. Thinning could slow growth and productivity, lengthening the amount of time needed to grow large-diameter pine trees in these stands. The size and location of openings created through forest management could be restricted, but openings may be considered beneficial if forage habitat for lynx is limited.

The Proposed RMP has approximately 18,900 acres of lynx habitat that has been mapped across all four forest management units. Lynx habitat makes up approximately 68 percent of all forest management units available for intensive forest and woodland management. The adverse impact from managing lynx habitat would be moderate under the Proposed RMP.

Management of special status plant species and communities could limit or preclude timber harvest activities in places where such species occur. Special status species within the planning area are not commonly found in forested ecosystems. The exception would be the presence of Harrington's penstemon found in sagebrush and woodland ecosystems. Approximately 800 acres have been mapped as core Harrington's penstemon habitat in the northeastern corner of the Seven Hermits Forest Management Unit. Under the Proposed RMP, the core habitat is designated and managed as an ACEC. The area available for intensive forest and woodland management within the Seven Hermits Forest Management Unit would therefore be reduced by 800 acres. All

forest and woodland management activities would comply with protection and recovery plans for individual special status species. Treatment would be designed to avoid, mitigate, or improve designated key and core habitat. Implementation of the protective and mitigation measures and management decisions for special status species management are similar across all alternatives. Special status species management decisions under the Proposed RMP are focused on strategically managing special status species habitats with an emphasis on protecting key and core habitat. Therefore, the Proposed RMP would be slightly more restrictive on timing, size, and location of forest and woodland vegetation treatment compared with Alternative A.

Impacts from Visual Resources Management. Changes in forest management are anticipated from VRM classification. None of the forest management units is required to meet VRM Class I objectives, which are the most restrictive. However, under the Proposed RMP, approximately 21,300 acres of forest management units would be managed to meet VRM Class II objectives. The majority of those acres are within the King Mountain and Castle Peak Forest Management Units. VRM Class II management objectives require that the visual resource contained within these forested and woodland areas be maintained or that changes to the visual resource not be noticeable to the casual observer. VRM constraints would restrict timber harvests in these areas. Managing 21,300 acres to meet VRM Class II objectives could alter the size, type, and location of forest and woodland product harvest or forest health projects. Other forested areas within the forest management units would be managed as VRM Class III and IV, which would impose few restrictions on forest and woodland management actions.

The Proposed RMP has the second most acres and percentage of VRM Class II management within forest management units. Thus, the Proposed RMP would be impacted slightly less than under Alternative A and measurably more than under Alternative D from meeting and maintaining VRM objectives, especially for Class II viewsheds.

Impacts from Managing to Protect Wilderness Characteristics. The Proposed RMP and Alternative C identify lands to be managed for wilderness characteristics east of the Castle Peak WSA. This identification, which includes management prescriptions specific to the protection and preservation of wilderness characteristics, would result in the reduction of approximately 2,600 acres from the Castle Peak FMU. Managing lands for wilderness characteristics would have an adverse impact on commercial forest and woodland harvests by reducing the quantity of forest and woodland products available under the Proposed RMP and Alternative C. From a forest ecosystem health perspective, however, managing lands for wilderness characteristics could reduce adverse impacts that can accompany motorized recreation such as accidental fires, soil erosion from off-road vehicle use, introduction of invasive weed species, introduction of damaging insects from firewood, and incidental vegetation damage.

Impacts from Wildland Fire Management. The prohibitive implementation of wildfire use strategies would minimize the potential loss of forest products for commercial or noncommercial use. Both FMUs B and C prohibit wildfire use, whereas FMU D allows for the potential management of wildfires under wildfire use strategies. Under the Proposed RMP and Alternatives C and D, approximately 2,900 forest management acres would be managed under FMU D. All of those acres are within the Castle Peak Forest Management Unit.. The impact from implementation of wildfire use strategies and the potential loss of forest products would be minimal under the Proposed RMP and Alternatives C and D. Suppression of wildfire (FMUs B and C) generally supports the protection of forest products for harvest. If those harvests do not occur in a timely

manner, however, fuel loading can increase and stand health can decrease to a point where wildfires are more likely and more damaging.

Impacts from Recreation and Visitor Services Management. The Proposed RMP is the only alternative that designates King Mountain as a SRMA. The King Mountain SRMA designation overlaps the King Mountain Forest Management Unit. The recreation management objectives for the King Mountain SRMA were determined to be compatible with most forestry activities, including forest health objectives and some forms of timber harvesting. No adjustment to the acres of the King Mountain Forest Management Unit were necessary. Although management objectives for SRMA and forest management units were compatible, and no reduction in forest management unit acres was necessary, there is the potential for limiting the intensity, timing, location, and size of vegetation treatments. The impact from designating King Mountain as a SRMA would have an overall minor impact on forest and woodland management, and would not have a measurable effect on the quantity of forest and woodland products available under the Proposed RMP.

Impacts from Comprehensive Trails and Travel Management. Proposed decisions for route designations are expected to have little impact on access to designated forest management units. Main arterial and secondary travel routes for motorized vehicles would remain open in all units. Vehicle routes closed to the public could be authorized for use under administrative authorization for the planning, preparation, implementation, and monitoring of all forest management activities. In addition, construction of temporary roads to access forest management activities could be used to supplement the route designations to be implemented under the Proposed RMP. Improvement of user-created routes and the development of new routes may increase recreational user access, which brings the potential for negative forest health impacts, including accidental wildfires, soil erosion from off-road vehicle use, introduction of invasive weed species, introduction of damaging insects from firewood, and incidental vegetation damage.

The proposed decision for route designations for areas outside designated forest management units could impact collection and harvest of forest and woodland products by limiting road access. Travel restrictions under the Proposed RMP would be moderately restrictive compared with Alternatives A and D, and could have a slightly greater impact on forest and woodland product collection and harvest outside forest management units.

Impacts from Renewable Energy Management—Biomass. Recent studies indicate that Colorado has a fair biomass resource potential. This biomass resource potential is based on the supply from five general categories of biomass: urban residues, mill residues, forest residues, agricultural residues, and energy crops. The CRVFO has a source of potential biomass from forest residue from within and outside designated forest management units. Forest residues include underutilized logging material, imperfect commercial trees, dead wood, and other noncommercial trees that need to be thinned from crowded, unhealthy, fire-prone forests. However, because of the distance from biomass processing facilities, these residues are usually more expensive to recover than urban and mill residues and presently are not economically feasible for commercial energy development.

New tax credits or incentives, increased monetary valuation of environmental benefits, increased transportation efficiency, and sustained high prices for fossil fuels could make biomass from forest residue more economically feasible during the life of the RMP. The improved economic feasibility of energy development from forest biomass would result in an increased demand for residual forest products. The

Proposed RMP and Alternative C would have 0.9 MMBF PSQ available to meet the anticipated demand for biomass energy from forest residue.

Impacts from Areas of Critical Environmental Concern Management. Management actions for protection of relevant and important values of ACECs may affect the availability of forest and woodland products for harvest. The Proposed RMP would designate Mayer Gulch as an ACEC for the protection and conservation of sensitive plants. The ACEC designation would result in the reduction of approximately 800 acres from the Seven Hermits Forest Management Unit. The Proposed RMP would also designate Abrams Creek ACEC, which would further reduce commercial forestry operations by 300 acres. Some of these acres would not be available regardless of the ACEC designation as a result of riparian protections. The impact from designating Mayer Gulch and Abrams Creek as ACECs would have an overall minor impact on forest and woodland management and does not substantially affect the quantity of forest and woodland products available under the Proposed RMP.

Impacts from Wilderness Study Area Management. WSAs would be managed according to BLM Manual 6330--*Management of BLM Wilderness Study Areas* (BLM 2012c), until Congress either designates each WSA as wilderness or releases it from consideration and it reverts to multiple-use management as described in the RMP. Since all four WSAs (Bull Gulch, Castle Peak, Eagle Mountain, and Hack Lake) are managed as WSAs under all alternatives, there would be negligible variation in the impacts of WSA management on forests and woodlands. The restrictions on using motorized equipment and constructing roads in WSAs would effectively eliminate commercial forestry operations or large-scale forest health projects within the WSAs. Based on their small size, remote locations, or limited commercial tree species, Eagle Mountain, Bull Gulch, and Hack Lake would not be viable commercial forestry sites even if released by Congress from WSA status. If Congress released the Castle Peak WSA from consideration for wilderness designation, management direction (e.g., VRM, Travel, and Recreation) in the Proposed RMP and Alternatives C and D would still not allow for viable commercial forestry operations at these sites.

Alternative C

Impacts to forestry from special status plants management and ACECs management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources would be the same as or similar to those under Alternative A except as described below.

Impacts from Forestry Management. Tree morality from insect and disease is higher today than in the past. Epidemic or near-epidemic levels of insect outbreaks, primarily mountain pine beetle, will continue for the foreseeable future and will significantly change the composition, structure, and function of the forested areas within the planning area. Future timber harvest would focus on improving forest and woodland health. Long-term benefits from vegetation treatments would be realized as removal of dead, dying, insect and disease affected, and overstocked forest and woodlands would improve stand productivity and would reduce wildland fire potential through fuels reduction. These long-term improvements in forest stand health would eventually produce more forest products of higher quality. Retention of sufficient coarse woody debris, snags, appropriately sized clear cuts, selection cutting, and other forestry techniques help ensure regeneration, age-class diversity, biodiversity, and nutrient cycling following a harvest.

Alternative C would place the least emphasis on salvage harvest operations and forest health treatments to capture economic value lost from insects and disease.

Impacts from Fish and Wildlife Management. Wildlife habitat treatment projects could indirectly improve forest and woodland health and increase the availability of some woodland products, depending on the treatment method used. Proposed decisions for fish and wildlife could also adversely affect forest and woodland management by restricting some harvests by location or season. Forest management actions could be modified to comply with fish and wildlife stipulations and restrictions to minimize disturbance, as well as to maintain connectivity between large contiguous blocks of wildlife habitat.

Forest and woodland vegetation within forest management units provide habitat for a variety of wildlife species, including elk, deer, black bears, and wild turkeys. None of the forest management units includes designated critical habitat for any terrestrial wildlife species. Seasonal or spatial restrictions for mule deer and elk could impact the success of commercial product harvest and forest health projects.

Much of the big game critical winter range is mapped within sagebrush and pinyon-juniper woodlands outside higher elevation forest management units. The reduction of pinyon-juniper encroachment into sagebrush ecosystems improves foraging habitat in big game critical winter range. The clearing of pinyon-juniper would generate woody biomass and forest products that could augment the amount of forestry products harvest to meet the PSQ.

BLM Instruction Memorandum No. 2008-050 provides guidance toward meeting BLM's responsibilities under the MBTA and EO 13186. The guidance directs the CRVFO to promote the maintenance and improvement of habitat quantity and quality. Limited specific bird count or species data exist for the forest management units, and responses of individual bird species to forest and woodland management activities are often habitat and species specific.

Forest and woodland vegetation within forest management units provide both foraging and nesting habitat for a variety of migratory birds that summer, winter, or migrate through the area. The habitat diversity provided by the broad expanses of sagebrush, mixed mountain shrub, oakbrush, aspen, pinyon-juniper woodlands, other types of coniferous forests, and riparian and wetland areas support many bird species. Management of migratory birds could adversely affect the treatment boundaries and access roads and could influence the type, size, timing, and location of a forestry project or treatment, which could fragment habitat, interfere with nesting season, or contribute to the intentional take of native bird species. The potential impact on forest management would be relatively the same for all alternatives regarding the compliance with the MBTA and EO 13186.

Bald eagles, which are increasing in numbers throughout their range, were removed from the federal threatened and endangered species list in 2007; however, bald eagles are still protected under the MBTA. Bald eagles are not known to winter in higher elevation upland forest and woodland habitat found in the forest management units. However, upland habitats within forest management units next to waterways may be used as scavenging areas, primarily for winter-killed animals. Management for bald eagle habitat within forest management units is not anticipated to have an impact on forest and woodland management.

Forest and woodland vegetation within forest management units also provide potential habitat for many species of raptors (red-tailed hawks, Cooper's hawks, American kestrels, and owls) not on the USFWS list of Birds of Conservation Concern. Current raptor surveys are not available for the area. Short-term impacts regarding the timing or location of vegetation treatments may result from temporary surface use restrictions,

seasonal restrictions, or other surface development restrictions within buffers for raptors and bald eagle roost sites within forests and woodlands.

Fish and amphibian decisions could impact management of forest and woodland projects. Protection and mitigation measures to reduce soil compaction and displacement from forest and woodland vegetation treatments could directly impact the location, size, and timing of individual forestry and woodland treatments. Best management practices designed to mitigate erosion are commonly implemented under all alternatives. Alternative C provides for the protection of the upper reaches of Rock and Abrams Creeks under a WSR designation to protect outstanding and remarkable values for fish. Approximately 100 acres were removed from the Black Mountain Forest Management Units and 350 acres were removed from the Seven Hermits Forest Management Unit. The direct impact on forest and woodland management is discussed under impacts from WSR designation for Alternative C.

Implementation of the protective and mitigation measures and management decisions for fish and wildlife management would be similar across all alternatives. Fish and wildlife management decisions under Alternative C emphasize the conservation of fish and wildlife by proactively identifying, protecting, and improving habitats. Therefore, Alternative C would be the most restrictive on timing, size, and location of forest and woodland harvests and treatments compared with the other alternatives.

Impacts from Special Status Species Management. Forest and woodland vegetation provide important habitat for several special status species. Therefore, the management of sensitive, threatened, and endangered species and their habitats would impact forestry activities. Forest management actions could be modified to comply with wildlife stipulations and restrictions to minimize disturbance and maintain connectivity between large contiguous blocks of critical wildlife habitat. Management measures could affect the economic viability of specific projects by limiting the intensity of management, the amount and type of products removed, the tools used, and the timing of activities. These effects would vary from minor to prohibitive. In addition, requirements for biological inventories in localized areas of concern would result in short-term delays or increased costs of forest management treatments.

The LCAS provides direction on the types of activities and the amount of habitat that can be modified in lynx habitat. Because lynx habitat includes cool moist forests of lodgepole pine, spruce, or Douglas-fir, treatments in these habitat types could be restricted. Thinning high-density medium to large trees would be the least restrictive treatment in lynx habitat as long as suitable habitat is maintained. Thinning small-diameter trees would be the most restricted type of activity. Small-diameter tree thinning in lodgepole pine stands would be heavily restricted to retain forage habitat for lynx. This restriction could slow growth and productivity, lengthening the amount of time needed to grow large-diameter pine trees in these stands. The size and location of openings created through forest management could be restricted, but openings may be considered beneficial if forage habitat for lynx is limited.

Alternative C has approximately 18,900 acres of lynx habitat that has been mapped across all four forest management units. Lynx habitat makes up approximately 68 percent of all forest management units available for intensive forest and woodland management. The adverse impact from managing lynx habitat would be moderate under Alternative C.

All forest and woodland management activities would comply with protection and recovery plans for individual special status species. Treatment would be designed to avoid, mitigate, or improve designated key

and core habitat. Implementation of the protective and mitigation measures and management decisions for special status species management are similar across all alternatives. Special status species management decisions under Alternative C emphasize protection of special status species through proactively identifying, protecting, and improving habitats. Therefore, Alternative C would be the most restrictive on timing, size, and location of forest and woodland vegetation treatment compared with the other alternatives.

Impacts from Visual Resources Management. Changes in forest management are anticipated from VRM classification. None of the forest management units is required to meet VRM Class I objectives, which are the most restrictive. However, under Alternative C, approximately 13,500 acres would be managed to meet VRM Class II objectives. The majority of those acres are within the Castle Peak Forest Management Unit. VRM Class II management objectives require that the visual resource contained within these forested and woodland areas be maintained or that changes to the visual resource not be noticeable to the casual observer. VRM constraints would restrict timber harvests in these areas. Managing 13,500 acres to meet VRM Class II objectives could alter the size, type, and location of forest and woodland product harvest or forest health projects. Other forested areas within the forest management units would be managed as VRM Class III and IV, which would impose few restrictions on forest and woodland management actions.

Alternative C has the lowest percentage of VRM Class II management within forest management units. Thus, Alternative C would have the least impact of all alternatives from meeting and maintaining VRM objectives, especially for Class II viewsheds, during forestry actions.

Impacts from Managing to Protect Wilderness Characteristics. The Proposed RMP and Alternative C identify lands to be managed for wilderness characteristics east of the proposed Castle Peak WSA. This identification, which includes management prescriptions specific to the protection and preservation of wilderness values, would result in the reduction of approximately 2,600 acres from the Castle Peak FMU. Managing lands for wilderness characteristics would have an adverse impact on commercial forest and woodland harvests by reducing the quantity of forest and woodland products available under the Proposed RMP and Alternative C. From a forest ecosystem health perspective, however, managing lands for wilderness characteristics could reduce adverse impacts that can accompany motorized recreation such as accidental fires, soil erosion from off-road vehicle use, introduction of invasive weed species, introduction of damaging insects from firewood, and incidental vegetation damage.

Impacts from Comprehensive Trails and Travel Management. Proposed decisions for route designations are expected to have little impact on access to and within designated forest management units. Main arterial and secondary travel routes for motorized vehicles would remain open in all forest management units. Vehicle routes closed to the public could be authorized for use under administrative authorization for planning, preparing, implementing, and monitoring all forest management activities. In addition, construction of temporary roads to access forest management activities could be used to supplement the route designations to be implemented under this alternative. Improvement of user-created routes and the development of new routes to access timber harvest areas may increase recreational user access, which brings the potential for negative forest health impacts, including accidental wildfires, soil erosion from off-road vehicle use, introduction of invasive weed species, introduction of damaging insects from firewood, and incidental vegetation damage.

The proposed decision for route designations for areas outside designated forest management units could impact collection and harvest of forest and woodland products by limiting road access. Travel restrictions

under Alternative C are the most restrictive of any alternative, and therefore would pose the greatest impact on forest and woodland product collection and harvest outside forest management units. However, Alternative C would also provide the most protection for forest and woodlands from damage associated with motorized recreational access via designated routes.

Impacts from Renewable Energy Management—Biomass. Recent studies indicate that Colorado has a fair biomass resource potential, based on the supply from five general categories of biomass: urban residues, mill residues, forest residues, agricultural residues, and energy crops. The CRVFO has a source of potential biomass from forest residue from within and outside designated forest management units. Forest residues include underutilized logging material, imperfect commercial trees, dead wood, and other noncommercial trees that need to be thinned from crowded, unhealthy, fire-prone forests. However, because of the sparseness and remote location for biomass processing facilities, these residues are usually more expensive to recover than urban and mill residues and presently are not economically feasible for commercial energy development.

New tax credits or incentives, increased monetary valuation of environmental benefits, increased transportation efficiency, and sustained high prices for fossil fuels could make biomass from forest residue more economically feasible during the life of the RMP. The improved economic feasibility of energy development from forest biomass would result in an increased demand for residual forest products. Alternative C provides an estimated 0.9 MMBF PSQ to meet the anticipated demand for biomass energy from forest residue. This amount is comparable to the Proposed RMP, but lower than Alternatives A and D.

Impacts from Areas of Critical Environmental Concern Management. Management actions for protection of relevant and important values of ACECs may affect the availability of forest and woodland products for harvest. Alternative C would designate Mayer Gulch as an ACEC for the protection and conservation of sensitive plants. The ACEC designation would result in the reduction of approximately 800 acres from the Seven Hermits Forest Management Unit. Alternative C would also designate Abrams Creek ACEC, which would further reduce commercial forestry operations by 300 acres. Some of these acres would not be available regardless of the ACEC designation as a result of riparian protections. The impact from designating Mayer Gulch and Abrams Creek as ACECs would have an overall minor impact on forest and woodland management and would not substantially affect the quantity of forest and woodland products available under Alternative C. Alternative C's Greater Sage-Grouse ACEC would provide additional constraints for forestry actions in locations where sage-grouse habitat occurs near haul roads or harvest areas. Since the primary commercially viable forest species do not provide habitat for sage-grouse, there is unlikely to be a substantive effect on the overall PSQ.

Impacts from Wilderness Study Area Management. WSAs would be managed according to BLM Manual 6330, *Management of Wilderness Study Areas* (BLM 2012c), until Congress either designates each WSA as wilderness or releases it from consideration and it reverts to multiple-use management as described in the RMP. Since all four WSAs (Bull Gulch, Castle Peak, Eagle Mountain, and Hack Lake) are managed as WSAs under all alternatives, there would be little variation in the impacts of WSA management on forests and woodlands. The restrictions on using motorized equipment and constructing roads in WSAs would effectively eliminate commercial forestry operations or large-scale forest health projects within the WSAs. Based on their small size, remote location, or limited commercial tree species, Eagle Mountain, Bull Gulch, and Hack Lake would not be viable commercial forestry sites even if released by Congress from WSA status. If Congress released the Castle Peak WSA from consideration for wilderness designation, management direction (e.g.,

VRM, Travel, and Recreation) in the Proposed RMP and Alternatives C and D would still not allow for viable commercial forestry operations.

Impacts from Wild and Scenic Rivers Management. Alternative C designates two Wild and Scenic River segments that would impact the management of forest and woodland management. The Rock Creek WSR suitability determination would reduce approximately 100 acres from the Black Mountain Forest Management Unit. Another approximately 350 acres would be reduced from the Seven Hermit Forest Management Unit as a result determining Abrams Creek as suitable for inclusion into the NWSRS. Together, it would reduce the total forest management unit acreage by approximately 450 acres, which is approximately 1.5 percent of the overall forest management unit acres under Alternative C. Some of these acres may be unavailable for harvest regardless of the WSR suitability determinations as a result of riparian area protections. The impact of the Rock Creek and Abrams Creek WSR suitability determinations would have a minor impact on forest and woodland management, and would not measurably affect the quantity of forest and woodland products available under Alternative C.

Alternative D

Impacts to forestry from fish and wildlife management, forest resources management, and WSA management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources would be the same as or similar to those under Alternative A, except as described below.

Impacts from Special Status Species Management. Forest and woodland vegetation provide important habitat for several special status species. Therefore, management of sensitive, threatened, and endangered species and their habitats would impact forestry activities. Forest management actions could be modified to comply with wildlife stipulations and restrictions to minimize disturbance as well as to maintain connectivity between large contiguous blocks of critical wildlife habitat. Management measures could affect the economic viability of projects by limiting the intensity of management, the amount and type of products removed, the tools used, and the timing of activities. These effects would vary from minor to prohibitive. In addition, requirements for biological inventories in localized areas of concern would result in short-term delays or increased costs of forest management treatments.

The LCAS provides direction on the types of activities and the amount of habitat that can be modified in lynx habitat. Because lynx habitat includes cool moist forests of lodgepole pine, spruce, or Douglas-fir, treatments in these habitat types could be restricted. Thinning high-density medium to large trees would be the least restrictive treatment in lynx habitat as long as suitable habitat is maintained. Thinning small-diameter trees would be the most restricted type of activity. Small-diameter tree thinning in lodgepole pine stands would be heavily restricted to retain forage habitat for lynx. This restriction could slow growth and productivity, lengthening the amount of time needed to grow large-diameter pine trees in these stands. The size and location of openings created through forest management could be restricted, but openings may be considered beneficial if forage habitat for lynx is limited.

Alternative D has approximately 18,900 acres of lynx habitat that has been mapped across all four forest management units. Lynx habitat makes up approximately 68 percent of all forest management unit acres available for intensive forest and woodland management. The adverse impact from managing lynx habitat would be moderate under Alternative D.

All forest and woodland management activities would comply with protection and recovery plans for individual special status species. Treatment would be designed to avoid, mitigate, or improve designated key and core habitat. Implementation of the protective and mitigation measures and management decisions for special status species management are similar across all alternatives. Decisions related to management of special status species under Alternative D are aimed at maintaining the current habitat condition and trends. Therefore, Alternative D is similar to Alternative A, but would be the least restrictive on timing, size, and location of forest and woodland vegetation treatments compared with the other alternatives.

Impacts from Visual Resources Management. Changes in forest management are anticipated from VRM classification. None of the forest management units is required to meet VRM Class I objectives, which are the most restrictive. However, under Alternative D, approximately 16,100 acres would be managed to meet VRM Class II objectives. The majority of those acres are within the Castle Peak Forest Management Unit. VRM Class II management objectives require that the visual resource contained within these forested and woodland areas be maintained or that changes to the visual resource not be noticeable to the casual observer. VRM constraints would restrict timber harvests in these areas. Managing 16,100 acres to meet VRM Class II objectives could alter the size, type, and location of forest and woodland product harvest or forest health projects. Other forested areas within the forest management units would be managed as VRM Class III and IV, which would impose fewer restrictions on forest and woodland management actions.

Impacts from Comprehensive Trails and Travel Management. Proposed decisions for route designations are expected to have little impact on access to and within designated forest management units. Main arterial and secondary travel routes for motorized vehicles will remain open in all forest management units. Vehicle routes closed to the public could be authorized for use under administrative authorization for the planning, preparing, implementing, and monitoring all forest management activities. In addition, construction of temporary roads to access forest management activities could be used to supplement the route designations to be implemented under this alternative. Improvement of user-created routes and the development of new routes may increase recreational user access, which brings the potential for negative forest health impacts, including accidental wildfires, soil erosion from off-road vehicle use, introduction of invasive weed species, introduction of damaging insects from firewood, and incidental vegetation damage.

The proposed decision for route designations for areas outside designated forest management units could impact collection and harvest of forest and woodland products by limiting vehicle access. Travel restrictions under Alternative D are the least restrictive of the action alternatives and therefore would pose the least impact on forest and woodland product collection, harvest, and treatments outside forest management units. The limited travel restriction under Alternative D could also cause negative impacts to forest health from motorized recreation access.

Impacts from Renewable Energy Management—Biomass. Recent studies indicate that Colorado has a fair biomass resource potential. This biomass resource potential is based on the supply from five general categories of biomass: urban residues, mill residues, forest residues, agricultural residues, and energy crops. The CRVFO has a source of potential biomass from forest residue from within and outside designated forest management units. Forest residues include underutilized logging material, imperfect commercial trees, dead wood, and other noncommercial trees that need to be thinned from crowded, unhealthy, fire-prone forests. However, because of the sparseness and remote location for biomass processing facilities, these residues are usually more expensive to recover than urban and mill residues and presently are not economically feasible for commercial energy development.

New tax credits or incentives, increased monetary valuation of environmental benefits, increased transportation efficiency, and sustained high prices for fossil fuels could make biomass from forest residue more economically feasible during the life of the RMP. The improved economic feasibility of energy development from forest biomass would result in an increased demand for residual forest products. Of the four alternatives, Alternative D would provide the second largest PSQ to meet the anticipated demand for biomass energy from forest residue.

Cumulative Impacts

The cumulative impacts of past, present, and reasonably foreseeable future actions described in Chapter 3 would have long-term beneficial and adverse impacts on forest and woodland resources. The greatest adverse impact on the management and availability of forest and woodland products results from protective special designations. Special designations or managing lands for wilderness characteristics would close areas to timber and woodland management. Alternative C has the highest acreage managed under special designations. The scope of special designations under the Proposed RMP and Alternatives A and D varies from 27,800 to 135,000 acres across the planning area, and many of these areas would be closed to forest and woodland management and harvest. Only a fraction of those designations would affect the forest management units where the bulk of the field office's commercially viable timber is found. Barring a marked increase from the currently limited local demand for forest products, even the most restrictive management scenario is expected to provide sufficient forest and woodland products to meet demand. Management decisions for air quality, soil and water, fish and wildlife, special status species, and cultural resources, and associated protective and mitigation measures, cumulatively have a long-term, adverse impact on management and availability of forest and woodland products. Management for these natural and cultural resources is most protective under Alternative C, which emphasizes identifying, protecting, and improving resource values. Alterative C would be the most restrictive on timing, size, and location of forest and woodland vegetation treatments compared with the other alternatives. Alternatives A and D strive to maintain the natural and cultural resource condition and trends while focusing on resource utilization and therefore would be the least restrictive on forest and woodland treatments and harvests. The Proposed RMP is focused on strategically managing natural and cultural resources, with an emphasis on protecting key and core resource values, and is somewhat more restrictive than Alternatives A and D.

Forest and woodland product harvests can be a secondary benefit of managing for fuels reduction, forest and woodland health (insect and disease control), and enhancement of wildlife and special status species habitat.. Given the limited organizational resources and the limited commercial timber resources in the CRVFO, forest products resulting from treatments for other purposes (e.g., fuels reduction or wildlife habitat improvements) are expected to be the primary driver for forestry operations for the foreseeable future.

Fire management plans for the BLM, USFS districts, and local communities that emphasize fuel load reductions, vegetation treatments, and woodland salvaging would reduce the risks of large-scale wildland fires and subsequent long-term loss of forest resources and productivity within the CRVFO area. Forestry operations such as stand thinning and disease control would improve stand health conditions and increase productivity. The economic and stand health benefits derived from harvests and treatments would be greatest under Alternatives A and D, which could treat the most acres annually. The proactive management of wildlife and special status species habitat within forest and woodland vegetation on BLM, USFS, state, county, and private lands could also provide forest and woodland products as a secondary benefit. Habitat enhancement treatments that involve the harvest of forest and woodland vegetation would be greatest under the Proposed RMP and Alternative D.

The following conclusion is formed from meaningful differences between cumulative beneficial and adverse impacts on the management and availability of forest and woodland products: Alternative A allows for greater potential sale quantity and acres managed and so would provide greater long-term economic benefits and stand health benefits. Economic benefits from forest product harvests and direct stand health treatments are expected to be further reduced under Alternative C than under the other alternatives.

4.3.2 Livestock Grazing

This section describes the potential impacts on livestock grazing from implementing management actions for the livestock grazing program as well as other resource programs. Existing conditions concerning livestock grazing are described in Section 3.3.2. Impacts on resources and resource uses from implementing the livestock grazing program are discussed in the specific resource sections of this chapter. Impacts on livestock grazing are generally the result of activities and management from other resources and uses. Management actions can affect livestock grazing by constraining the permittees or BLM's ability to manage rangeland forage levels, the ability to construct range improvement projects, and human disturbance and harassment of livestock. Management actions can also benefit livestock grazing by improving forage levels and limiting disturbances. Impacts are assessed in both a quantitative and qualitative manner. Where the effects are quantifiably different, they are identified under the discussion of each alternative.

Direct impacts on livestock grazing are anticipated from actions that restrict livestock grazing or that affect the allotment permittees in terms of lease conditions, such as allowable AUMs and season of use. Indirect impacts include those that change rangeland health and productivity or that change livestock grazing management.

Methods and Assumptions

The analysis was based on the following assumptions:

- All new and existing leases and permits would be subject to terms and conditions determined by the authorized officer to be appropriate to achieve the management and resource condition objectives for the public lands and to meet Land Health Standards.
- Livestock operators would work toward achieving the Colorado Standards for Public Land Health on grazing allotments. In some cases, changes to terms and conditions may be necessary to achieve Land Health Standards. Modifications could include a temporary or permanent loss of AUMs available for livestock grazing.
- Construction of range improvements (i.e., fences, spring developments, and reservoirs) would result in localized loss of vegetation throughout their useful life.
- Vegetation would be reestablished through reclamation practices along pipelines within 2 years but would consist mostly of early seral seeded species (grasses). Sagebrush and grass communities would be reestablished within 10 years, and juniper and lodgepole pine communities would be reestablished within 20 years. Livestock are often attracted to these areas.
- Range improvements would continue to be carried out in the planning area as needed.
- Range improvements generally lead to better livestock distribution and management, which would maintain or improve rangeland condition and health.
- By definition in the plan, livestock grazing is not a surface-disturbing activity, although livestock grazing could affect the surface in areas where livestock concentrate.
- Grazing preference is attached to base property owned or controlled by a permittee or lessee.
- When forage levels are impacted by other resources or resource uses (i.e. fuels treatments, oil and gas development, or special designations) the amount of available AUMs can change.

- Areas that are treated with interim reclamation efforts would be invaded by weeds, which would be successfully eradicated.
- Actual use would increase if additional AUMs were made available for livestock.

Environmental Consequences

Impacts on livestock grazing would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on livestock grazing under any of the four alternatives.

Alternative A

Impacts from Livestock Grazing Management. This alternative would continue to authorize grazing on 488,300 acres (approximately 97 percent of BLM lands in the CRVFO) and approximately 39,200 AUMs. Livestock grazing management would have beneficial impacts by providing a forage source for grazing permittees to achieve economic stability and preserve the open spaces that working ranges provide. Programs that ranchers use to improve their management, such as brush control, grass seedings, salt distribution, and water development, also benefit wildlife species, and carefully controlled grazing plans are designed to enhance the vigor and diversity of vegetation systems. Colorado Standards for Public Land Health would be achieved under all alternatives. Where current livestock grazing is the reason the standards are not achieved, changes would be made to make significant progress in meeting those standards. Monitoring data would support these changes, which may be an adverse impact in the short term by requiring more management efforts from the permittee, but would be beneficial in the long term by improving rangeland health. Although this alternative makes the most AUMs available for livestock grazing, 59 allotments are currently vacant and would likely remain vacant (see Appendix I).

Impacts from Soil and Water Resources Management. Implementing appropriate stipulations to minimize detrimental effects that ground-disturbing activities could cause to soils and to maintain or enhance riparian areas would help to reduce soil erosion, surface runoff, sedimentation in streams, and stream channel characteristics. These stipulations may impact the size, location, and timing of range improvement projects. Adjustments in grazing systems would be made in cases where livestock grazing is a significant causal factor in not meeting Land Health Standards for soil and water resources. These impacts would be similar across all alternatives.

Impacts from Vegetation and Wildland Fire Management. Vegetation management and fire and fuels management actions under Alternative A would mostly benefit livestock grazing. Actions to improve vegetation communities in forests, rangelands, and riparian areas would indirectly benefit livestock grazing by improving the quantity and quality of forage. Actions to prevent and control invasive and noxious weeds using integrated weed management techniques would improve conditions in areas where valuable forage production is limited by competition from weed species. In some cases, grazing permittees would be responsible for controlling weeds that occur from new range improvement projects. Wildland fire management would help to prevent large-scale, severe wildfires and in most cases increase the usable forage for livestock. Impacts may occur if livestock are excluded from certain areas or where range improvement projects are prohibited. In some cases, livestock grazing may be deferred for 2 years to allow revegetation projects to become established. Although deferring grazing would be beneficial in the long term, it may be adverse in the short term. Impacts would be similar across all alternatives.

Impacts from Fish, Wildlife, and Special Status Species Management. Management actions to enhance wildlife habitat could affect livestock grazing by improving vegetation conditions and indirectly maintaining or improving forage production. However, stipulations to protect special status species and fish habitat could restrict placement and design of certain range improvement projects. This alternative contains the least amount of these restrictions or management actions.

Impacts from Cultural Resource Management. Management actions to protect cultural resources would affect relatively small, localized areas and would not have a measurable impact on livestock forage. In some cases, evaluating, mitigating, and protecting cultural resources would result in a modification or relocation of range improvements. This alternative contains the least amount of restrictive stipulations involving cultural resources.

Impacts from Visual Resource Management. New range improvements would meet VRM Class objectives under Alternative A. VRM Class I and II would be aimed at greater retention of existing landscape character than would Class III and IV. The class designation could affect range improvement design or prohibit construction of some range improvements, such as pipelines and water storage tanks. This alternative would have the least amount of Class I and Class II areas and would be the least restrictive to range improvement project construction

Impacts from Recreation and Visitor Services Management. Management actions to improve recreational opportunities would have direct and indirect impacts on livestock grazing. This alternative designates the most SRMAs (eight) and is the only alternative designating RMAs (eight), totaling approximately 124,000 acres. In most cases, these designations would increase and support a certain type of recreational experience. Impacts would be greatest where the SRMAs and RMAs are located close to communities and are more heavily used. Recreation directly impacts livestock grazing operations through disturbance, displacement, and harassment of livestock, vandalism to range projects, gates left open, damaged or removed forage, and spread of weeds. The NSO associated with protecting special recreational experiences would impact placement and design of range improvement projects. Indirect impacts occur when recreational groups have general conflicts with livestock grazing management practices that interfere with recreational opportunities. In some cases, these interest groups can impact decisions on grazing management.

Although there are more SRMAs and RMAs in this alternative, impacts from recreation under the Proposed RMP and Alternative D may be more intense close to communities (i.e., Eagle, Gypsum, Carbondale) and may locally increase direct and indirect impacts stated above.

Impacts from Comprehensive Trails and Travel Management. Travel management actions under Alternative A would maintain the most acres (295,900) as open to overland travel and the least acres (123,000) as limited to designated routes. This alternative allows for the greatest area of possible disturbance of all alternatives. Seasonal closures would limit motorized travel during the fall and winter in some areas. Livestock grazing permittees would continue to maintain access to range improvement projects for maintenance and grazing administration.

Impacts from Lands and Realty Management. Generally, lands and realty actions impact livestock grazing when ROWs are granted to individuals, groups, or corporations that reduce the amount of available forage for livestock. In some cases, a ROW can conflict with grazing management programs and restrict placement or design of range improvement projects. Impacts are more severe when a ROW results in the suspended use of

the area by livestock until vegetation can be reestablished. In some cases, a ROW can have beneficial impacts on livestock grazing when forage levels or access to remote parts of the allotment are improved (e.g., pipelines). Generally, impacts on livestock grazing from realty actions are associated with energy development.

Disposals, acquisitions, or exchanges would also impact livestock grazing. Depending on the situation, those impacts would be adverse or beneficial or both.

Impacts from Energy and Minerals Management. Of all mineral and energy development, fluid mineral development is most likely to cause direct and indirect adverse impacts on livestock grazing. Management actions under Alternative A would open the most acres (672,500) of federal mineral estate to oil and gas leasing and development. Impacts associated with surface-disturbing activities (e.g., pipelines, roads, and well pads) would disturb soils, remove vegetation, increase the potential for the introduction and proliferation of weeds, increase livestock and human interactions and disturbance, increase the displacement of livestock, and alter management practices. In some cases, livestock movement would be hindered and livestock would be limited to undeveloped areas of the allotment. The opposite is also true. For example, new pipelines and roads can increase the opportunity and ability of livestock to move around on the allotment. Although improvement of roads could facilitate livestock management, it also increases traffic and in some cases improves public access into areas that were previously limited in use.

Indirectly, livestock grazing benefits from mineral and energy development by allowing grazing permittees more flexibility in their operations by providing an alternative source of income (e.g., mitigation money, mitigation services, ROW agreements, grazing leases, and royalties).

Impacts from Special Designations (Areas of Critical Environmental Concern, Wilderness Study Areas, Wild and Scenic Rivers) Management. Management actions under Alternative A would designate six ACECs. These areas would be managed to protect their relevant and important values. This alternative would manage for fewer ACECs than under the Proposed RMP and Alternative C.

There would be four WSAs throughout all alternatives. These areas would be managed to preserve their wilderness characteristics under the interim management policy until Congress either designates these lands as wilderness or releases them for other purposes. If released, these areas would continue to be managed for their recreational opportunities.

Under Alternative A, all stream segments determined to be eligible would be managed under interim protections to preserve the free-flowing condition, water quality, ORVs, and tentative classification. However, policy guidance directs BLM to proceed with suitability determinations rather than just making eligibility determinations.

None of these designations or determinations would exclude livestock grazing if standards and guidelines are being achieved. These designations could affect range improvement design or prohibit construction of some range improvements, such as pipelines and water storage tanks necessary to properly manage or improve livestock practices. In some cases, these designations can improve the vegetation resource by excluding motorized use or surface-disturbing developments, which would benefit livestock grazing.

Alternative B (Proposed RMP)

Impacts to livestock grazing from soils management and water resources management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Livestock Grazing Management. Impacts would be similar to those described under Alternative A. This alternative would make approximately 441,600 acres and 35,500 AUMs available for livestock grazing. Management actions on 63 grazing allotments would result in closures, combining allotments, making reserve allotments, and making allotments available. In some cases, more land would be available for grazing because allotments would be combined, and in some cases less land would be available as a result of closures. Impacts would be generally positive since closures do not directly impact current permittees (see Appendix I). Only one closure would result in negative impacts to existing grazing permittees (County Line).

Impacts from Soil and Water Resources Management. Impacts would be similar to Alternative A except that additional stipulations would be applied to intermittent, ephemeral, and perennial streams. These stipulations may affect the location and placement of range improvement projects such as water developments.

Impacts from Vegetation and Wildland Fire Management. Impacts would be similar to those under Alternative A, although under the Proposed RMP and Alternatives C and D, more descriptive measures would be taken to improve the quantity and quality of the vegetation resource. Actions to hold permittees responsible for monitoring and controlling noxious weeds resulting from construction activities, actions to protect and restore riparian and wetland areas by reducing livestock numbers or reducing the season of use, and actions to improve the vegetation resource that result in 2 or more years of livestock grazing rest would have negative impacts to livestock grazing permittees.

Impacts from Fish, Wildlife, and Special Status Species Management. Management actions to enhance wildlife habitat could affect livestock grazing by improving vegetation conditions and indirectly maintaining or improving forage production. However, stipulations to protect fish, wildlife, and special status species could restrict placement and design of certain range improvement projects. The level of protection under the Proposed RMP and Alternative C is similar, and would be the most restrictive to livestock grazing management. Under the Proposed RMP, five ACECs would be created to help protect core conservation populations of Harrington's penstemon and other special status species. Current and historical habitat for threatened, endangered, proposed, and candidate plants would have a surface-disturbing buffer of 200 meters, and sensitive plants would have a buffer of 100 meters, further impacting placement and design of range improvements and possibly affecting grazing use patterns.

Impacts from Cultural Resource Management. Management actions to protect cultural resources would affect relatively small, localized areas and would not have a measurable impact on livestock forage. In some cases, evaluating, mitigating, and protecting cultural resources would result in a modification or relocation of range improvements; for example, surface occupancy and surface-disturbing activities would be prohibited within 100 meters of historic properties.

Impacts from Visual Resource Management. Decisions in the Proposed RMP would be similar to Alternative A and would result in similar impacts to placement and design of range improvement projects. This alternative would designate the most acres as VRM Class I and Class II and would have the largest potential impact to livestock grazing. Although this alternative has the potential to impact the most acres, many of those acres are steep slopes or have other special designations that may require range improvement modifications, special designs, or mitigations.

Impacts from Recreation and Visitor Services Management. Decisions to improve recreational opportunities would have direct and indirect impacts on livestock grazing. The Proposed RMP designates five SRMAs, totaling approximately 62,800 acres and six ERMAs totaling 40,900 acres. SRMAs are managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMAs is commensurate with the management of other resources and resource uses.

Impacts would be potentially the greatest where the SRMAs and ERMAs are located close to communities and are more heavily used. For example, this alternative would designate fewer SRMAs (although slightly more acres) than under Alternative A, but the creation of The Crown SRMA would close motorized routes and add new mountain bike trails because the SRMA would emphasize mountain biking. This alternative would make the area even more attractive to mountain bikers, who are numerous in the local communities. Recreation use would increase in the SRMA. The increased recreation use would likely increase conflicts with livestock grazing operations by disturbing, displacing, or harassing livestock; making range projects available to vandals; leaving gates open; damaging or removing forage; and spreading weeds.

The NSO stipulation applied to all SRMAs would impact placement and design of range improvement projects. Indirect impacts may be intensified when recreational users have conflicts with livestock grazing management practices that interfere with the targeted recreational opportunities. In some cases, these interest groups can impact decisions on grazing management. On the other hand a citizens' group may form to help oversee management of the SRMA and they may be able to resolve or reduce the level of conflict between livestock grazing and recreation visitors.

Impacts from Managing to Protect Wilderness Characteristics. Management actions under this alternative would prohibit surface occupancy and surface-disturbing activities on 34,400 acres of BLM lands managed for the protection of wilderness characteristics. This alternative is the same as Alternative C, except that the Grand Hogback would not be managed for the protection of wilderness characteristics, although portions would still be managed as an ACEC. These proposed decisions may impact the placement and design of range improvement projects.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, all travel would be limited to designated routes. (See tables in the comprehensive trails and travel management section [Section 4.3.4] for acres and miles of route designations.) Limiting overland travel would help improve the quantity and quality of forage across the CRVFO. Livestock grazing permittees would continue to maintain access to range improvement projects for maintenance and grazing administration. Routes without public access would be closed to motorized travel and open only to pedestrian and equestrian or administrative use.

Impacts from Lands and Realty Management. Generally, impacts would be similar to Alternative A, except that 219,800 BLM surface acres would be identified as ROW avoidance areas and 39,400 acres as ROW exclusion areas. Although these designations would help to protect the forage resource, they may impact the placement and design of range improvement projects that require a ROW.

Impacts from Energy and Minerals Management. The oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the 147,500 acres of BLM mineral estate in this high potential area for the occurrence of gas resources, 129,900 have been leased and are currently being developed.

The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling is likely to occur in areas of medium and low potential, and no drilling is predicted in the areas identified as no-known potential.

Impacts from energy and mineral development under this alternative would be similar to those described under Alternative A. Under the Proposed RMP, 2,500 fewer acres with a high potential for the occurrence of gas resources would be open to oil and gas leasing and development than under Alternatives A and D. Under this alternative, anticipated development activities (federal wells and surface disturbance) would be similar to Alternative D. This potential level of development would result in more impacts to the forage resource available to livestock than Alternative C and slightly fewer impacts than Alternatives A and D which have a reduced amount of stipulations and other protective management decisions.

Impacts from Special Designations (Areas of Critical Environmental Concern, Wilderness Study Areas, Wild and Scenic Rivers) Management. Management actions under the Proposed RMP would include designating 11 ACECs. These areas would be managed to protect their relevant and important values. This alternative would manage for more ACECs than under Alternatives A and D.

The four WSAs would be managed to preserve their wilderness characteristics under BLM Manual 6330 – Management of Wilderness Study Areas, the until Congress either designates these lands as wilderness or releases them for other purposes. If released, these areas would continue to be managed for their recreational opportunities.

Under the Proposed RMP, BLM would determine that Deep Creek Segments 2 (wild) and 3 (recreational) are suitable for inclusion into the NWSRS. All other segments but the Colorado River segments would be determined not suitable and would be released from further protection under the Wild and Scenic River Act. BLM would defer a suitability determinations on the Colorado River segments and would apply management action and allowable use decisions proposed under the Proposed RMP along with the adoption of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to protect the free-flowing condition, water quality, ORVs, and tentative classifications. The stakeholders group management plan would protect the ORVs through a cooperative water delivery mechanism. If monitoring indicated a decline in the condition of the ORVs, BLM would start the formal suitability process to designate the Colorado River segments for inclusion into the NWSRS. Segments managed as wild would be more likely to affect livestock grazing by constraining range improvements. This alternative would manage fewer stream segments as eligible or suitable and thus would likely have fewer impacts on livestock grazing than Alternatives A and C.

None of these designations would exclude livestock grazing if standards and guidelines are being achieved. These designations could affect range improvement design or prohibit construction of some range improvements, such as pipelines and water storage tanks necessary to properly manage or improve livestock practices. In some cases, these designations can improve the vegetation resource by excluding motorized use or surface-disturbing developments, which would benefit livestock grazing.

Alternative C

Impacts to livestock grazing from soils management and water resources management would be the same as or similar to Alternative A. Impacts to livestock grazing from cultural resource management would be the same as or similar to the Proposed RMP . Impacts from management of other resources and land uses would be as described below.

Impacts from Livestock Grazing Management. Impacts would be similar to those described under Alternative A. This alternative would make approximately 427,800 acres and 35,500 AUMs available for livestock grazing. Management actions would result in the closure of 58 grazing allotments. Only one closure would result in negative impacts to existing grazing permittees (County Line).

Impacts from Soil and Water Resources Management. Impacts would be similar to the Proposed RMP.

Impacts from Vegetation and Wildland Fire Management. Impacts would be similar to those under the Proposed RMP .

Impacts from Fish, Wildlife, and Special Status Species Management. Impacts would be similar to those described under the Proposed RMP, except that only three ACECs would be created to help protect special status species. Forage allocations for livestock uses would be considered after other uses such as priority wildlife habitat.

Impacts from Cultural Resource Management. Management actions to protect cultural resources would be similar to the Proposed RMP, except surface-disturbing activities would be prohibited within 200 meters (instead of 100 meters) of historic properties.

Impacts from Visual Resource Management. Management actions would be similar to Alternative A and would result in similar impacts to the placement and design of range improvement projects. This alternative would designate fewer acres as Class I and Class II than the Proposed RMP, but more than all other alternatives.

Impacts from Managing to Protect Wilderness Characteristics. Management actions under Alternative C would prohibit surface occupancy and surface-disturbing activities on 45,800 acres of BLM lands managed for wilderness characteristics. For this reason, Alternative C would be the most restrictive to range improvement projects and grazing management practices.

Impacts from Recreation and Visitor Services Management. Impacts would be similar to those described under Alternative A, except that there would be only two SRMAs. The Crown would be managed as an ERMA instead of a SRMA and would be protected with a CSU instead of an NSO, which would be less limiting to other uses and placement and design of range improvement projects. Other areas formerly managed as SRMAs or RMA would be managed as ERMAs.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those described under the Proposed RMP, except that there would be fewer designations for motorized and mechanized uses. This alternative would designate the greatest amount of trails for pedestrian and equestrian use only.

Impacts from Lands and Realty Management. Generally, impacts would be similar to Alternative A, except that 196,800 BLM surface acres would be identified as ROW avoidance areas and 39,900 acres as ROW exclusion areas. Although these designations would help to protect the forage resource, they may impact placement and design of range improvement projects that require a ROW. This alternative designates the most ROW avoidance and exclusion areas.

Impacts from Energy and Minerals Management. Impacts from energy and mineral development under Alternative C would be similar to those described above. This alternative would open the least amount of acres (521,500 acres) to oil and gas development. Under this alternative, anticipated development activities within areas with a high potential for the occurrence of gas resources would be less than other alternatives. This alternative would result in fewer impacts to the forage resource available to livestock mainly in the unleased portions of the Grand Hogback Unit managed to protect wilderness characteristics.

Impacts from Special Designations (Areas of Critical Environmental Concern, Wilderness Study Areas, Wild and Scenic Rivers) Management. Management actions under Alternative C would include designating 16 ACECs, for a total of 79,800 acres. These areas would be managed to protect their relevant and important values. This alternative would manage for the most ACECs.

There would be four WSAs, for a total of 27,700 acres throughout all alternatives. These areas would be managed to preserve their wilderness characteristics under the interim management policy until Congress either designates these lands as wilderness or releases them for other purposes. If released, these areas would continue to be managed for their recreational opportunities.

Under Alternative C, all eligible stream segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The interim protections would apply to lands within 0.25 mile of either side of the stream segment. Two segments would be classified as wild, while the other segments would be would be classified as scenic or recreational. Segments classified as wild would be more likely to affect livestock grazing or range improvements due to the increase level of constraints on land uses.

None of these designations would exclude livestock grazing if standards and guidelines were being achieved. These designations could affect range improvement design or prohibit construction of some range improvements, such as pipelines and water storage tanks necessary to properly manage or improve livestock practices. In some cases, these designations can improve the vegetation resource by excluding motorized use or surface-disturbing developments, which would benefit livestock grazing.

Alternative D

Impacts to livestock grazing from soils management and water resources management would be the same as or similar to Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Livestock Grazing Management. Impacts would be the same or similar to those described under Alternative A. This alternative would make approximately 442,200 acres and 36,500 AUMs available for livestock grazing. Management actions on 59 grazing allotments would result in closures, combining allotments, making reserve allotments, and making allotments available. In some cases, more land would be available for grazing because allotments would be combined, and in some cases less land would be available as a result of closures (see Appendix I). Three closures would result in negative impacts to existing grazing permittees. (County Line, Alkali Creek Common, Dry Creek Pete and Bill). Closing the Dry Creek Pete and Bill allotment would have a significant adverse effect on two grazing permittees who use the allotment to access other private leases and USFS permits.) Although this alternative would result in the least amount of closures, it would directly impact more existing permittees than any other alternative by closing allotments that are not currently vacant.

Impacts from Soil and Water Resources Management. Impacts would be similar to Alternative A.

Impacts from Vegetation and Wildland Fire Management. Impacts would be similar to those under the Proposed RMP .

Impacts from Fish, Wildlife, and Special Status Species Management. Impacts would be similar to the Proposed RMP and Alternative C but with fewer restrictive management actions. No ACECs would be created to protect special status species

Impacts from Cultural Resource Management. Impacts would be the same as those described under the Proposed RMP .

Impacts from Visual Resource Management. Management actions would be similar to Alternative A and would result in similar impacts to the placement and design of range improvement projects. This alternative would designate fewer acres as Class I and Class II than the Proposed RMP and Alternative C, but slightly more than Alternative A.

Impacts from Recreation and Visitor Services Management. Impacts would be the similar to those described under the Proposed RMP, except there would be seven SRMAs totaling approximately 63,600 acres. Although this acreage would be less than what is included under Alternative A, placement and management of three new SRMAs (The Crown, Fisher, and Hardscrabble/East Eagle) would increase the amount of mountain bike use and create the greatest amount of conflicts with livestock grazing.

Impacts from Comprehensive Trails and Travel Management. Under this alternative, all travel would be limited to designated routes. (See tables in comprehensive trails and travel management section [Section 4.3.4] for acres and miles of route designations.) Limiting overland travel would help improve the quantity and quality of forage across the CRVFO. More areas would be designated for motorized and mechanized uses and less area would be designated as pedestrian and equestrian only. Livestock grazing permittees would continue to maintain access into range improvement projects for maintenance and grazing administration. Unlike the Proposed RMP and Alternative C, this alternative would allow motorized uses for public landowners who have legal access.

Impacts from Lands and Realty Management. Generally, impacts would be similar to those under Alternative A, except that 105,100 BLM surface acres would be identified as ROW avoidance areas and 39,100 acres as ROW exclusion areas. Although these designations would help to protect the forage resource, they may impact placement and design of range improvement projects that require a ROW. This alternative designates the least ROW avoidance and exclusion areas.

Impacts from Energy and Minerals Management. Impacts from management actions for energy and minerals development under this alternative would be similar to those under Alternative A, except that 648,400 acres of federal mineral estate would be open to leasing and development. Under Alternative D, it is anticipated that there would be more disturbance because of the reduced number of stipulations and other protective management decisions. Thus Alternative D results in the closure of additional allotments not closed in any other alternative because of the anticipated additional disturbance from energy development and other land uses, and would be the most impacting to livestock grazing.

Impacts from Special Designations (Areas of Critical Environmental Concern, Wilderness Study Areas, Wild and Scenic Rivers) Management. Management actions would designate three ACECs, for a total of 20,200 acres. These areas would be managed to protect their relevant and important values. This alternative would manage for the fewest ACECs.

Alternative D would include four WSAs for a total of 27,724 acres. These areas would be managed to preserve their wilderness characteristics under the interim management policy until Congress either designates these lands as wilderness or releases them for other purposes. If released, these areas would continue to be managed for their recreational opportunities.

Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. Thus no impacts would occur to livestock grazing from WSR decisions in Alternative D.

None of these designations would exclude livestock grazing if standards and guidelines are being achieved. These designations could affect range improvement design or prohibit construction of some range improvements, such as pipelines and water storage tanks necessary to properly manage or improve livestock practices. In some cases, these designations can improve the vegetation resource by excluding motorized use or surface-disturbing developments, which would benefit livestock grazing.

Cumulative Impacts

Cumulative impacts in the planning area could result from surface-disturbing activities, the presence and abundance of grazing wildlife, increased recreational demands, and protections for sensitive resources. Urban development, energy production, and the conversion of private lands to other uses could reduce livestock numbers and forage available for livestock. Big game winter range encompasses a significant amount of private and BLM lands. If private lands were to become less desirable and less conducive to wildlife use through development, BLM lands would become more important for wintering wildlife habitat, further impacting the amount of forage available for livestock grazing. Restrictions placed on public lands may drive more development on privately owned surface land, and the expected increase in population would add to the future development demands on private ranches. Areas close to communities would be impacted the most.

Range improvements, including water developments, fencing, and vegetation treatments, have been critical in the past management of livestock. Maintenance of existing projects and the continued ability to identify needs for improved grazing systems with range improvements will be critical in the future. Grazing management systems have allowed livestock managers to better distribute livestock across the landscape, resulting in improvements in resource conditions. Protective stipulations in the planning area may result in restrictions on the type, location, design, and extent of future range improvements. In extreme cases, livestock grazing may be eliminated where land health standards cannot be achieved.

In the future, land values may result in ranch ownership and control by corporations or other groups. The property would be leased for base property, or ranch managers would be hired to manage livestock grazing operations. Ranches incorporating diverse enterprises are more likely to succeed, especially in the face of changing climate, growing populations, and fluctuating markets. Ranch properties that are successful will have implemented management plans that incorporate energy development, that benefit from wildlife production, that allow for recreational opportunities, and that provide sufficient forage for livestock production. The BLM management actions across all alternatives would have a minor incremental impact on the overall cumulative impact on the resource in the planning area.

4.3.3 Recreation and Visitor Services

This section discusses impacts on R&VS from management of other resources and resource uses. Current R&VS management is described in Section 3.3.3 and is carried forward as Alternative A. Travel management is discussed under Section 3.3.4. A detailed management framework (proposed objectives, RSCs, management action and allowable use decisions, implementation-level actions and BMPs for SRMAs, and ERMAs proposed in the Proposed RMP and Alternatives C and D) can be found in Appendix K—Draft R&VS Prescriptions for Proposed Special and Extensive Recreation Management Areas. An RMA-specific analysis follows the program-specific impact analysis.

Assumptions

The R&VS analysis is based on the following assumptions:

- BLM lands are designated as SRMAs, designated as ERMAs, or left undesignated. Both types of RMAs offer quality and highly valued recreation opportunities. Within SRMAs, R&VS management is recognized as the predominant land use focus, where specific recreation opportunities and RSCs are managed and protected on a long-term basis. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions. Since management of ERMAs is commensurate with management of other resources and resource uses, all R&VS decisions must be compatible with other resource objectives.
- RMPs are required to identify the necessary management action and allowable use decisions for R&VS and other programs. Management action and allowable use decisions are generally described as decisions needed to achieve program objectives or constrain non-compatible land use activities. These decisions (including stipulations) are analyzed in terms of their impact on participation in recreation activities, recreation objectives (i.e., recreation opportunities), maintenance or enhancement of RSCs, or recreation management.
- It is important to note that the 1999 Oil & Gas Leasing & Development RMP amendment also used the term "recreation management areas (RMAs)" to describe areas where an NSO stipulation would be applied in order to protect the nonmotorized recreation opportunities. The stipulation was applied in the following areas: King Mountain, Siloam Springs, Castle Peak, Bull Gulch (the portion of the Bull Gulch WSA not within the Bull Gulch SRMA), Sunlight Peak, Fisher Creek, and the Pisgah Mountain. The stipulation protected the physical recreation setting (naturalness and remoteness) by restricting surface-disturbing and inconsistent activities. The stipulation for these areas did not amend the RMP and establish the lands as SRMAs. However, areas covered by the stipulation are discussed because recognition of the recreation values is relevant to understanding recreation and other program proposals and analysis.
- The CRVFO visitor study (Virden et al. 2008) and public comments indicated one of the most important contributions to recreation satisfaction was the experience of being able to enjoy "close to home or frequent access to outdoor physical activity." This type of comment was considered to have determinative effect on realizing desired recreation benefits, such as "living a more outdoor-oriented lifestyle," "escaping everyday responsibilities for a while" or "enjoying frequent access to outdoor physical activity."
- The CRVFO visitor study (Virden et al. 2008) and public comments indicated the other important contribution to satisfaction was retaining the current naturalness of BLM lands, along with a similar

degree of remoteness and access. These RSCs were considered to have a determinative effect on activity participation and the realization of recreation outcomes.

- The CRVFO visitor study (Virden et al. 2008) and public comments indicated that crowding was currently not an issue in surveyed areas. However, visitation is assumed to increase, fostered by the outdoor recreation opportunities in the region, the desire of visitors and residents to have an outdoor-oriented lifestyle, the promotion of regional outdoor recreation-tourism opportunities, and growing resident populations. These factors would eventually weigh on social RSCs, especially near towns and near destination resorts in the Vail Valley and the Roaring Fork Valley.
- NSO stipulations are considered a major constraint on surface-disturbing activities and surface use and occupancy. CSU stipulations are considered a moderate constraint on surface-disturbing activities and surface use and occupancy. Physical RSCs are best maintained by application of NSO stipulations. It is assumed that the more acres protected by either stipulation, the greater the benefit to managing recreation settings to meet R&VS objectives.
- NSO stipulations for other resources and resource uses (1) would not affect casual or dispersed recreation activities; (2) would constrain recreation-related surface-disturbing activities such as trail or facility development; and (3) would indirectly help retain the current physical RSCs such as naturalness and remoteness of BLM lands.
- Special designations, either legislative or administrative, would probably attract more visitors and result in higher use levels. In a region that is already renowned and marketed for its outdoor recreation amenities, a special identification (e.g., suitable WSR segments) or designation (e.g., SRMA) likely would lead to increased visitation. Areas that are currently receiving a custodial level of management would consequently need more intensive recreation oversight and monitoring (e.g., more visitor facilities, more signs, increased staff presence and enforcement, and increased user controls).
- Public comments indicated that some people believe SRMA designations would attract larger numbers of people, which might cause negative impacts to natural and cultural resources, as well as displacing established, dispersed outdoor recreation activities.
- Overlapping designations for other resources are less problematic with ERMAs than SRMAs, because recreation objectives and management of ERMAs are commensurate with, and considered in context with, management of other resources and resource uses.
- The demand for SRPs would increase during the life of the plan.
- Recreation use and management would conform to *Standards for Public Land Health* (BLM 1997a). These standards describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape.

Methods

- Visitors seek a diverse range of setting-dependent outdoor recreation opportunities. They choose different areas in which to recreate based on the qualities and conditions of the area and because they want to realize a specific set of recreation experiences and benefits. For example, primitive camping in a backcountry valley by a remote lake offers a different experience from camping in a highly developed campground adjacent to a rural reservoir. Therefore, the physical, social, and operational components of the recreation area, along with their defining characteristics, offer a method to

describe and qualitatively analyze the impacts to the qualities and conditions of the recreation area, as follows:

- Physical Component – The physical qualities of the landscape defined by remoteness, naturalness, and visitor facilities.
- Social Component – The social qualities associated with use defined by contacts, group size, and evidence of use.
- Operational Component – The operational conditions to manage recreation use defined by access, visitor services, and management control.

- The end product of recreation management is the experiences and benefits (i.e., outcomes) people realize from participating in recreation activities.
- The RMAs are classified as either SRMAs or ERMAs. The RMAs are land units where R&VS objectives are recognized as a primary resource management consideration, and specific management is required to protect the recreation opportunities. The RMA designation is based on recreation demand and issues, recreation setting characteristics, resolving use and user conflicts, compatibility with other resource uses, and resource protection needs.
- SRMAs are administrative units where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. SRMAs are managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. The SRMAs may be subdivided into RMZs to further delineate specific recreation opportunities. Within SRMAs, R&VS management is recognized as the predominant LUP focus, where specific recreation opportunities and recreation setting characteristics are managed and protected on a long-term basis.
- ERMAs are administrative units that require specific management consideration to address recreation use, demand, or R&VS program investments. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Management of ERMAs is commensurate with the management of other resources and resource uses.
- Off-highway vehicle riders and drivers include users of motorcycles, ATVs, side-by-sides, and 4x4s. Participants generally prefer a relatively natural or natural-appearing environment. Motorized vehicle closures and limitations would have adverse impacts on this group's recreational activity. Adverse impacts are generally considered to increase as the acres or the miles of routes affected increases. Improved roads for other public land uses, such as gas development, may offer additional access but not contribute to an improved recreation opportunity.
- Mountain bikers generally prefer a relatively natural or natural-appearing environment. They also prefer single-track trails instead of roads and routes not shared with motorized vehicles. Mechanized vehicle closures and limitations would have adverse impacts on this group's recreational activity. Adverse impacts are generally considered to increase as the acres or the miles of routes affected increase.
- Hikers, runners, backpackers, and equestrians prefer a natural-appearing environment with a low level of human-caused disturbance. They also prefer trails instead of roads and routes not shared with motorized and mechanized vehicles. Closures to human use, including equestrian use, would have an

adverse impact on this group's recreational activity. Adverse impacts are generally considered to increase as the acres or the miles of routes affected increases.

- Previously SRMAs were identified where BLM lands were experiencing heavy recreation use or where BLM plans to make large investments in staff, funding, facilities, or time. All remaining BLM lands were identified as part of a large nonspecific ERMA called the Glenwood Springs ERMA and custodially managed. Alternative A proposes to continue the management direction set forth in existing documents, resulting in the current prevailing RSCs and trends.
- In contrast to Alternative A, the designation and management direction for the Proposed RMP and Alternatives C and D apply 2011 BLM Instruction Memorandum No. 2011-004 (BLM 2010a), which clarified and refined land use planning guidance for R&VS. The guidance established three potential classifications for R&VS: SRMAs, ERMAs, and undesignated lands.
- Impact analyses and conclusions were based on interdisciplinary team knowledge of resources and the planning area, reviews of existing literature, and information from other agencies. Effects were quantified, where possible. In the absence of quantitative data, best professional judgment was used to qualitatively analyze the impacts. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

Environmental Consequences

Impacts on R&VS would result from management action and allowable use decisions for resources, resource uses, and special designations. Proposed R&VS management action and allowable use decisions would generally create beneficial impacts for the recreation use and enjoyment of BLM lands. Some proposed decisions would provide a benefit for targeted recreation activities and a negative impact to non-targeted recreational activities (i.e., SRMA designations). In addition, proposed R&VS program actions may restrict recreation use to protect public health and safety (e.g., firearm use restrictions), reduce user conflicts, or protect natural and cultural resources. These impacts are discussed in the sections titled "Impacts from Recreation and Visitor Services Management" and in the recreation management area analysis. Variations in proposed management action and allowable use decisions are in accordance with the theme of the alternatives. Land uses and resources not addressed below were deemed to have no, or only negligible, impacts on R&VS under any of the four alternatives. The analysis addresses decisions proposed and summarized in Chapter 2, Table 2-2, as well as the appendices.

Alternative A

Impacts from Recreation and Visitor Services Management. Under Alternative A, the CRVFO would continue to manage eight SRMAs (Bocco Mountain, Bull Gulch, Deep Creek, Gypsum Hills, Hack Lake, Red Hill, Thompson Creek and the Upper Colorado River) totaling 60,400 acres (Table 4.3.3-1). The remaining BLM lands would continue to be managed as part of a large nonspecific ERMA (Glenwood Springs ERMA). All areas would be managed under direction set forth in the current RMP and amendments. However, the proposed management direction in Alternative A is inconsistent with revised BLM R&VS planning guidance transmitted in 2010 by Instruction Memorandum No. 2010-092 (BLM 2010b).

An NSO stipulation would protect the physical RSCs for nonmotorized recreation activities in other areas (Bull Gulch – portion of the WSA outside the SRMA, Castle Peak, Fisher Creek, King Mountain, Pisgah Mountain, Siloam Springs and Sunlight Peak).

Table 4.3.3-1
Summary of Existing and Proposed Recreation Management Areas by Alternative

Area	Alternative A (Existing)	Alternative B (Proposed RMP)	Alternative C	Alternative D
Bocco Mountain	SRMA	ERMA	-	SRMA
Bull Gulch	SRMA/ **RMA	-	-	-
Castle Peak	*ERMA/ **RMA	-	-	-
The Crown	*ERMA	SRMA	ERMA	SRMA
Deep Creek	SRMA	-	-	-
Eagle River	*ERMA	ERMA	ERMA	ERMA
Fisher Creek	*ERMA/ **RMA	-	ERMA	SRMA
Gypsum Hills	SRMA	ERMA	-	-
Hack Lake	SRMA	-	ERMA	ERMA
Hardscrabble/E. Eagle	*ERMA	SRMA	ERMA	SRMA
King Mountain	*ERMA/ **RMA	SRMA	ERMA	ERMA
New Castle	*ERMA	ERMA	ERMA	ERMA
Pisgah Mountain	*ERMA/ **RMA	-	-	-
Red Hill	SRMA	SRMA	SRMA	SRMA
Siloam Springs	*ERMA/ **RMA	-	-	-
Silt Mesa	*ERMA	ERMA	ERMA	ERMA
Sunlight Peak	*ERMA/ **RMA	-	-	-
Thompson Creek	SRMA	ERMA	ERMA	SRMA
Upper Colorado River	SRMA	SRMA	SRMA	SRMA

- Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
* BLM lands identified as part of a large nonspecific ERMA called the Glenwood Springs ERMA and custodially managed
**Undesignated areas referred to as an RMA in the 1999 Oil & Gas Leasing & Development amendment because an NSO stipulation was applied to these lands in order to protect the nonmotorized recreation opportunities (see Assumptions).

Acronyms and Abbreviations:

ERMA extensive recreation management area
SRMA special recreation management area

Under all alternatives, camping restrictions would protect resources, reduce conflicts, and reduce long-term camping (squatting) on BLM lands. It is anticipated that there would also be a decrease in littering and unsanitary conditions. Alternative C and then the Proposed RMP propose the most camping restrictions followed by Alternatives D and A.

Under all alternatives, specifically applied firearm use restrictions would address one of the CRVFO's more pressing urban interface issues. Firearm use restrictions would curb inappropriate recreational target shooting and improve public safety by reducing the potential for accidental shootings. Firearm use restrictions would also reduce the associated litter including clay pigeons; spent shells; and paper, metal, plastic, and glass objects brought onto BLM lands for targets. Alternative C then the Proposed RMP propose the most areas where recreational target shooting is restricted followed by Alternatives D and A.

RMP's address the types, activities, and locations where SRPs would be issued or not issued. The SRPs are discretionary implementation actions. Across the alternatives, SRPs would be issued or not issued based on their ability to support R&VS management objectives, the proposed designations, and the desired RSCs, along with considerations for visitor health and safety, resource protection, and use and user conflicts.

Under all alternatives, an NSO stipulation would be applied to Rifle Mountain Park and major river corridors to protect high scenic and recreation values from surface-disturbing activities and use.

Under all alternatives, the CRVFO would implement recreation fees as provided by the guidelines in the Federal Lands Recreation Enhancement Act to help maintain visitor services and facilities if budgets decline or recreation demand increases.

Recreation Setting Characteristics. Highways, roads (city, county, improved, dirt, or 4x4), and trails (ATV, motorcycle, mountain bike, horse, or foot) influence RSCs and visitors' experiences. The quantity of routes and the types of public use permitted on those routes influence the physical qualities of the landscape and indirectly affect the social conditions of an area. Remoteness refers to the extent to which individuals perceive themselves removed from the sights and sounds of human activities (US Forest Service 1990). Therefore, this analysis considered roads and trails, their existence, the type of use, and how they are administered. For a large planning area, a baseline (Alternative A) can be used to compare the action alternatives using GIS (Table 4.3.3-1). From this baseline, proposed public travel designations for each alternative can be evaluated as reducing or increasing remoteness. The classes are named only to help display a spectrum of distances from types of routes. For example, the primitive class does not relate specifically to wilderness or WSA designations. Since BLM has no jurisdiction on private, state, county, or municipal roads; rural and urban classifications do not generally change across alternatives.

Table 4.3.3-2 shows the quantitative changes in RSC classes by alternative. Table 4.3.3-2 displays how the theme and accompanying management actions (e.g., special designations and travel designations) of each alternative impact the physical RSC of remoteness (as defined by the approximate distance from open or designated public routes exclusive of administrative use). For example, Alternatives A and D emphasize producing recreation opportunities in combination with other land uses in less remote recreation settings. The physical character of the landscape would be more remote under the Proposed RMP and Alternative C. Alternative D would provide the most acres where mountain biking occurs in isolation from motorized vehicles.

Impacts on naturalness are determined by the presence and amount of human-caused changes (e.g., roads, trails, fences, pipelines, power lines, livestock developments, residential or commercial development, energy development, ditches, and ROWs). Since roads and trails occur by themselves or in combination with other human-made impacts, similar conclusions can be drawn for an estimation of the physical characteristic of naturalness.

The social RSCs (contacts, group size, and evidence of use) that characterize the interaction or indication of visitors are likely to parallel the changes in remoteness. One exception may be areas that are closed to motorized use but emphasize mountain biking. SRMAs, such as The Crown, Red Hill, or Hardscrabble/East Eagle, may actually see an increase in use as a result of the popularity of mountain biking in areas without motorized vehicles.

The social RSCs (contacts, group size, and evidence of use) that characterize the interaction of visitors are likely to parallel the changes in remoteness. One exception may be areas that are closed to motorized use but emphasize mountain biking. SRMAs, such as The Crown, Red Hill, or Hardscrabble/East Eagle, may actually see an increase in use with the increase in backcountry acres.

Table 4.3.3-2
Physical Recreation Setting Characteristic—Remoteness—Based on Travel Management Designations

	Classification in Acres					
Alternative	**Primitive More than 0.5 mile from either mechanized or motorized routes**	**Backcountry within 0.5 mile of mechanized routes**	**Middle country within 0.5 mile of four-wheel drive vehicle, ATV, and motorcycle routes**	**Front country within 0.5 mile of passenger vehicle routes (including county and private routes)**	**Rural within 0.5 mile of paved/primary roads and highways**	**Urban within 0.5 mile of streets and roads within municipalities and along highways**
A	73,700	17,500	3,300	336,600	49,200	24,900
B (Proposed RMP)	112,500	14,800	6,200	297,600	49,200	24,900
C	126,300	10,600	6,300	287,900	49,200	24,900
D	80,100	28,500	5,900	316,600	49,200	24,900

Acronyms and Abbreviations:
ATV all-terrain vehicle

Impacts from Soils Management. Under all alternatives, RMP decisions and implementation actions for recreation would comply with "Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in Colorado" (BLM 2000c), whereby recreation routes, trails, and developments are not developed on highly erosive soils.

Across all alternatives, an NSO stipulation would be placed on the debris flow hazard zone around the City of Glenwood Springs. In all alternatives, NSO stipulations would prohibit surface occupancy and surface-disturbing activities on slopes greater than 50 percent. The CSU stipulations apply special design measures to new construction on erosive soils and slopes greater than 30 percent. The intentions of the stipulations were to apply similar measures to other public land activities to reduce erosion and maintain soil site stability. The language under Alternative A for soils stipulations was adapted from oil and gas stipulations, unlike the Proposed RMP and Alternatives C and D stipulations that specifically address all surface-disturbing activities.

Across all alternatives, at the implementation level, stipulations to reduce the impact of surface-disturbing activities on soils would create the same or similar impacts on recreation use, RSCs, and recreation management. During implementation of the land use plan, the stipulations may limit placement and construction of recreation facilities or trails. On the other hand, the stipulations would help retain the naturalness of the existing physical landscape, especially on highly visible slopes.

Impacts from Water Resource Management. Under all alternatives, RMP decisions and implementation actions for recreation would comply with "Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in Colorado" (BLM 2000c), whereby recreation is managed to achieve or exceed applicable water quality standards.

NSO stipulations for major river corridors would conserve scenic values, recreation opportunities, and physical RSCs along the Colorado, Roaring Fork, Crystal, Frying Pan, Eagle, and Piney Rivers. NSO stipulations to protect domestic watershed areas also would conserve scenic values, recreation opportunities, and physical RSCs south of the town of Rifle and north of the town of New Castle.

Stipulations proposed for water quality and the protection of groundwater would also benefit recreational uses by maintaining the quality and quantity of public water sources, waterways, and springs.

Impacts from Vegetation Management. Under all alternatives, RMP decisions and implementation actions for recreation would comply with "Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in Colorado" (BLM 2000c), whereby recreation is managed to protect riparian areas, maintain sufficient vegetation on upland areas, and protect against the establishment or spread of noxious weeds. Across all alternatives, at the implementation-level, stipulations to reduce the impact of surface-disturbing activities on riparian areas would create similar impacts on R&VS. The NSO stipulation would restrict intensive or large-scale human use or occupation (e.g., group use events) but not casual or dispersed recreation activities. The stipulations would limit the construction or adjust the placement of recreation facilities or trails unless the exception criteria are met. On the other hand, the stipulations would help retain the naturalness of the existing physical landscape along waterways and springs.

In all alternatives, visitors would temporarily be displaced from vegetation treatment areas; however, the size of the vegetation treatments within the CRVFO are generally small (hundreds of acres) and have only localized, short-term, negative impacts on visitors. Depending on the vegetation community treated (grassland and shrubland versus a woodland or coniferous forest), the length of time the treatment remains evident would vary before the treatment area returned to a more natural condition. Since most vegetation treatments are directed at creating or maintaining healthy, productive plant and animal communities, the long-term benefit would occur for wildlife-related activities. Recreation-related project proponents that create surface disturbances would be responsible for monitoring and controlling noxious weeds under all alternatives.

Impacts from Fisheries and Aquatic Wildlife Management. Under all alternatives, RMP decisions and implementation actions for recreation would comply with *Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in Colorado* (BLM 2000c), whereby recreation is managed to protect wildlife habitat by preserving connectivity and minimizing wildlife disturbances by limiting recreational use by type, season, intensity, distribution, or duration. This alternative contains no specific management action or allowable use decisions for aquatic species except for an NSO stipulation based on a 2-mile radius of the Rifle Falls and Glenwood Springs fish hatcheries to protect the quality and quantity of surface water and underground aquifers. The NSO stipulations would constrain intensive or large-scale human use or occupation (e.g., group use events) but not casual or dispersed recreation activities. Since the stipulation protects fish hatcheries, it benefits angling for trout.

Impacts from Terrestrial Wildlife Management. Under all alternatives, RMP decisions and implementation actions for recreation would comply with *Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in Colorado* (BLM 2000c), whereby recreation is managed to protect wildlife habitat by preserving connectivity and minimizing wildlife disturbances by limiting recreational use by type, season, intensity, distribution, or duration.

Generally, decisions that benefit wildlife and their habitat are considered beneficial to visitors in the long term because most visitors enjoying seeing wildlife as part of their visit to BLM lands. However, big game management can be controversial where it conflicts with other resource activities, such as logging, grazing, suburban developments, and public access (WGFD 2004a), and non-wildlife related recreation activities. Some wildlife closures that limit motorized or mechanized activities or access, such as winter big game closures, negatively impact recreation activities on an area-specific basis.

Alternative A closes the fewest areas and acres to motorized recreation activities to protect wintering big game and other wildlife. Alternative A has a 15-day longer closure (December 1 to April 30) than under the Proposed RMP and Alternatives C and D (December 1 to April 15); however, the closure under the Proposed RMP and Alternatives C and D applies to both motorized and mechanized recreation activities.

The winter wildlife closures have a minor impact on winter motorized recreation, since these areas have traditionally not been popular winter destinations as a result of the accumulation of lower amounts of snow, shorter season of snow cover, the vegetation types, and the proximity of better winter recreation opportunities on the adjacent WRNF. Mechanized activities are not affected by the closures under Alternative A; however, mechanized activities are included in the seasonal closure under the Proposed RMP and Alternatives C and D. The 15-day shorter closure should reduce impacts on mountain biking, since low elevations areas can be snow-free and dry by April 15.

In all alternatives, stipulations to protect wildlife species or habitat would restrict intensive or large-scale human use or occupation (e.g., group use events) but not casual or dispersed recreation activities. NSO stipulations would indirectly help retain the current naturalness and remoteness of BLM lands; however, the stipulations would be a localized constraint on recreation-related surface-disturbing (construction) activities in SRMAs and ERMAs, unless the exception criteria are met. Alternatives A and D are the least constraining.

Garfield Creek, Basalt, and West Rifle Creek SWAs were acquired by the state not only to protect wildlife habitat but also to provide the public with opportunities to hunt, fish, and watch wildlife. Alternative A applies an NSO stipulation and the Proposed RMP and Alternative C would close areas to fluid mineral leasing, all of which are considered major constraints on surface-disturbing activities, which in this situation would benefit recreation opportunities to hunt, fish, and watch wildlife. Alternative D would apply a less constraining CSU stipulation.

In all alternatives, TL stipulations (e.g., big game birthing areas, raptors, osprey, waterfowl and shorebird habitat, and rookeries) would be applied to protect wildlife species, areas, or habitat by restricting large-scale human use or occupation during crucial seasons. However, the TLs would not preclude casual or dispersed recreation activities. The TL stipulations would be a seasonal constraint on recreation-related surface-disturbing or construction activities unless the exception criteria are met. Alternative C would be the most constraining, followed by the Proposed RMP. Alternatives A and D are the least constraining.

In all alternatives, the BLM Field Manager could enact temporary closure or restriction orders to resolve management conflicts and protect persons, property, public lands and resources (including wintering wildlife) using 43 CFR Subpart 8364 (Closures and Restrictions). This would negatively but temporarily displace visitors.

In all alternatives, recreation construction activities that remove vegetation would be subject to a seasonal condition of approval that would protect BCC habitat during the nesting season. The COA would apply to activities that would take place between May 15 and July 15. The COA would consider the scale and type of the project, the length of time of disturbance, potential species present, weather conditions, elevation, type of motorized equipment, and habitat types. An exception may be granted if nesting surveys indicate no nesting BCC species within 10 meters of the area to be disturbed.

Impacts from Special-Status Species Management—Fish and Other Aquatic Wildlife. Under all alternatives, RMP decisions and implementation actions for recreation would comply with *Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in Colorado* (BLM 2000c), whereby recreation is managed to protect habitat for federal and state threatened and endangered species. In all alternatives, recreation would be similarly affected by management for threatened and endangered species because law, direction, and policy require that listed species be protected.

The placement of recreation sites or facilities could be impacted if biological surveys found any special status species in the area of proposed recreation-related developments. As opposed to the Proposed RMP and Alternatives C and D, Alternative A does not contain any TL stipulations for special status fish and other aquatic wildlife species.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Under all alternatives, RMP decisions and implementation actions for recreation would comply with *Recreation Guidelines to Meet Public Land Health Standards on BLM Managed Lands in* Colorado (BLM 2000c), whereby recreation is managed to protect habitat for federal and state threatened and endangered species. In all alternatives, recreation would be similarly affected by management for threatened and endangered species because law, direction, and policy require that listed species be protected.

NSO stipulations for a variety of special status species and their habitats would restrict intensive or large-scale human use or occupation and some recreation developments, but not casual or dispersed recreation activities. The NSO stipulations would indirectly help retain the existing physical RSCs. The acres of NSO stipulations and ACECs vary across alternatives with Alternative C and the Proposed RMP having the most acres and Alternatives A and D having the fewest acres within ACECs and NSO stipulations. Across alternatives, the overall impact would be similar, localized, and possibly mitigated through site-specific design, engineering, or relocation of the recreation developments or events. At the implementation-level, placement of recreation sites or facilities could be impacted if biological surveys found any special status species in proposed recreation-related developments.

Impacts from Cultural Resource Management. Current federal laws and BLM policy to protect cultural resources would have similar long-term impacts on recreation use and recreation surface-disturbing projects under all alternatives. The minor changes across alternatives in NSO stipulations would cause a negligible impact on RSCs and recreation opportunities. Cultural resource management actions generally would enhance recreational opportunities and provide benefits by protecting resources and educating the public about cultural resources. Management actions for cultural resources could preclude development of recreational facilities in some areas, but any restrictions are expected to be minimal. Management actions involving interpretive programs, signage, markers, and other elements for historic trails, other historic sites, and important prehistoric sites would enhance educational opportunities and increase public awareness and stewardship over the long term. In all alternatives, the on-the-ground negative impact would be similar, localized, and possibly mitigated through site-specific engineering or relocation of the recreation development.

Impacts from Visual Resource Management. Across all alternatives, areas designated as VRM Class I would provide the most protection to the physical RSCs. The character of the landscape in VRM Class I or II areas would be maintained, which would retain the existing degree of naturalness. Moderate to major modifications to the character of the landscape could occur in areas designated as VRM Class III or IV. Visually evident impacts may alter the RSC and at some levels impair the visitors' recreation experience.

However, at the implementation level, recreation projects in VRM Class I and Class II areas would have to be designed to mitigate for scenic values. Any changes to the landscape would need to repeat the basic elements of form, line, color, and texture found in the natural features of the landscape.

Under Alternative A, VRM class designations were generally assigned to maintain the existing visual quality throughout the CRVFO and protect unique and fragile resource values such as found in ACECs, except for the Red Hill SRMA, which was assigned VRM Class II specifically to help retain the physical RSCs of the SRMA. The physical RSCs of the other SRMAs have been retained, and would continue to be retained, by the Class I and Class II designations, or have been somewhat impacted by Class III and Class IV designations. Under the Proposed RMP and Alternatives C and D, VRM Class II designations were specifically assigned to all SRMAs unless otherwise managed as VRM Class I to maintain physical RSCs.

Impacts from Wildland Fire Management. The CRVFO fire management is the same in all alternatives. Scenic values and recreation values are identified for protection. Short-term closures of recreation areas and facilities could occur during wildland fire suppression and during prescribed fires for visitor safety.

Impacts from Cave and Karst Resource Management. Under all alternatives, cave and karst resources would be managed under specific cave management objectives and setting prescriptions that allow for appropriate access, while addressing issues and concerns relating to preservation of the caves' pristine and fragile resources, wildlife values, scientific and research values, and visitor safety and rescue issues. The cave management objectives and setting prescriptions would retain the current physical, social, and operational qualities of caves. If caves are found to be significant, they would be managed in accordance with the Federal Cave Resources Protection Act. An NSO stipulation for the protection of the Deep Creek Cave Area would prohibit surface occupancy and surface-disturbing activities there. The NSO extends to 5,000 feet below the surface. The NSO area encompasses the cave openings and portions of the subsurface features and watersheds immediately above the caves. Proposed management under Alternatives A and D would directly benefit physical and biological resources of caves in the Deep Creek area, as well as the recreational, scientific, and educational opportunities provided by the caves.

Impacts from Forestry Management. Under all alternatives, wood cutting and intensive commercial timber management would impact recreation opportunities in or outside RMAs by altering the physical, social, and operational RSCs. Over the long term, the physical RSC of naturalness would be degraded if landscape design features were not incorporated to offset impacts on the landscape. Road construction from timber harvesting would result in additional vehicle routes and change the remoteness of the area. Access to and through the area may be improved if forestry roads were open to the public; however, the improved roads may provide no additional opportunities for OHV driving and riding and even displace visitors participating in trail-based motorized (e.g., ATV riding and motorcycling) and nonmotorized activities.

Since wood cutting areas are few and small in the CRVFO, the greatest concern are areas proposed to be intensively manage for commercial forest and woodland products. These areas include King Mountain, portions of Castle Peak, and the southern part of the Hardscrabble area. These areas are now popular destinations for local and regional visitors. In King Mountain and Castle Peak (outside the WSAs), certain harvest treatments may improve wildlife habitat and result in better hunting, a popular activity. Under Alternative A, no SRMAs are specifically closed to wood cutting and commercial timber management for the benefit of R&VS, as opposed to the Proposed RMP and Alternatives C and D.

Impacts from Livestock Grazing Management. Livestock grazing affects human visitors to public lands on an individual basis. For some recreationists, just the signs of livestock grazing, such as the presence of cattle or sheep, fences, driveways, stock tanks and ponds, cropped forage, trampled vegetation, and manure, affect the natural aesthetics and their visit. Rare conflicts occur between visitors and sheep dogs used to control and protect sheep.

The most common criticism comes from visitors and managers engaged in wildlife-related recreation. They raise the question of forage competition between livestock and big game and the indirect impact on wildlife-related recreation. The existing RMP generally allocated forage on a basis where 50 percent could be removed (available forage) and 50 percent was retained to maintain sufficient residual vegetation cover. Of the available forage, the RMP proportionately allocated 50 percent to livestock and 50 percent to big game. Completed land health assessments seem to support this allocation of forage as adequate to meet the needs of livestock as well as big game. The LHAs have indicated that livestock grazing management and the current AUM levels are creating only site-specific distribution issues and that sufficient forage is available within the areas assessed for a diversity of wildlife. In addition, elk populations from the late 1970s to present have been increasing, while livestock AUMs and periods of use have decreased. Big game population trends and CPW big game objectives in relationship to the livestock grazing management alternatives (maintaining similar levels of livestock AUMs, along with the applied land health standards) indicate that the cumulative annual use of forage by big game and livestock would remain compatible with CPW's big game objectives while still achieving land health standards.

The impacts of livestock grazing decisions are similar under the Proposed RMP and Alternatives A and D. Unlike Alternative C, where livestock grazing management would meet the forage demands of livestock and grazing preference would be given to wildlife if conflicts arise that cannot be mitigated by vegetation or habitat treatments.

Impacts from Comprehensive Trails and Travel Management. Trails and travel management directly affect RSCs, recreation opportunities, and recreation outcomes. Travel designations, including the level of development and maintenance, influence recreation use and desired recreation settings. The amount of public access and the types and modes of travel permitted are considered a determinative RSC in the CRVFO and in this analysis.

The comprehensive trails and travel management section discusses area designations, limitations on public travel and access, and miles of routes open to different types and modes of travel by alternative. Adverse impacts on specific recreation activities are generally considered to increase as the acres or the miles of routes decrease. However, a quality recreation opportunity has many more variables (i.e., naturalness, level of contact with other visitors, group size, level of management control, and level of maintenance) to consider. Designated routes for each SRMA can be found in Section 4.3.4 Comprehensive Trails and Travel Management. Pedestrian and equestrian travel is not constrained by limited travel area designations for motorized and mechanized types of travel and the subsequent route designations in any alternative. Only the Storm King Trail, which begins on private property, is closed to horse travel.

Under the Proposed RMP and Alternatives C and D, over-snow travel would be limited to designated routes on King Mountain, Blue Hill ACEC, Sheep Uplands ACEC, Lyons Gulch ACEC, and Glenwood Springs Debris Flow ACEC. Over-snow travel would be prohibited in the Deep Creek ACEC, Thompson Creek ACEC, WSAs, Hack Lake area, the Haff Pasture portion of Fisher Creek, Siloam Springs area, and wildlife

closure areas. In WSAs, the over-snow travel closures support primitive and unconfined recreation opportunities. In ACECs and the other areas listed above, the closures support nonmotorized RSCs, protect resource values, and reduce conflicts with recreation use.

Under all alternatives, the BLM would seasonally limit motorized use on portions of Castle Peak area accessed by the Stagecoach Trail (#8535) and Domantle Road (#8513). Under Alternatives A and D, the routes would be gated from October 1 to November 30. This seasonal limitation is designed to help keep big game on BLM lands and to reduce big game movement to adjacent private lands during the big game hunting season. These seasonal closures were first implemented in 1998 and are viewed as beneficial to visitors harvesting big game on BLM lands.

Continuing with the current area travel designations and not identifying specific designated routes would allow for increased cross-country motorized travel, route proliferation, and conflict (in terms of resource use and recreation). The long-term impacts on all visitors, including motorized activity participants, from these travel decisions would be negative because the naturalness and visual aesthetics of BLM lands would be negatively impacted by permissible but inappropriate motorized use.

Impacts from Lands and Realty Management. ROWs (including renewable energy sites such as solar, wind, hydro, and biomass development) can change the physical RSCs of naturalness and remoteness, or impact developed recreation sites and trails, depending on the location of the corridor or development. In turn, the social and operational RSCs could also change. To avoid ROWs that could negatively impact the naturalness or remoteness of an area, the BLM can designate ROW avoidance areas or ROW exclusion areas. A ROW may not be totally unavailable in an avoidance area but should not be permitted if possible. ROWs are to be completely prohibited from exclusion areas. As opposed to the Proposed RMP and Alternatives C and D (with only developed recreation sites in Alternative D), there are no specific ROW avoidance areas proposed for R&VS under Alternative A. Alternatives A and D would allow for the most change in RSCs from ROWs.

Alternative A identified 494,400 acres that are not suitable for disposal through public sale as Category II lands. These lands are considered for disposal on a case-by-case basis through exchange, boundary adjustment, state selection, Recreation and Public Purpose Act purchase, or other appropriate statutory authority, provided disposal is consistent with management efficiency and effectiveness under multiple use principles for specific areas.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the 147,500 acres of BLM mineral estate in this high potential area for the occurrence of gas resources, 129,900 has been leased and is currently being developed.

The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling is likely to occur in areas of medium and low potential, and no drilling is predicted in the areas identified as no-known potential.

In areas with a high potential for the occurrence of gas resources, impacts on visitors have included physical and visual surface-disturbing activities, noise, dust, odors, and additional traffic and people. RSCs, such as naturalness, remoteness, and evidence of use, have changed over the life of the current RMP, and would continue to change with expanding fluid mineral development and associated ROWs, pipelines, roads, and facilities. Access to and through the area may be improved if roads were open to the public. However, the improved roads may provide no additional opportunities for OHV driving and riding, and may even displace visitors participating in trail-based motorized (e.g., ATV riding and motorcycling) and nonmotorized activities.

Currently, all WSAs and the Thompson Creek ACEC are closed to fluid mineral leasing and geophysical development. Over the life of the current RMP, the closing of these areas to fluid mineral leasing has helped retain the RSCs and maintain primitive and unconfined recreation opportunities in the WSAs.

No SRMAs, except for a small portion of the Thompson Creek SRMA in Alternatives A and D, would be proposed in any alternative in locations identified as having a high potential for the occurrence of gas resources, because existing RSCs could not be retained as a result of development of gas resources. Opportunities would remain to pursue a variety of outdoor recreation activities and to enjoy dispersed recreation opportunities. However, the extent and quality of those dispersed recreation opportunities would likely change or diminish proportionate to the amount of area affected by active fluid mineral development and production.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Recreation opportunities and RSCs could be impacted during all phases of minerals development. Minerals-related exploration and development would create visual and physical disturbances, noise, and localized increases in people. These impacts would be greatest if mineral development occurred in the more natural appearing landscapes.

Locatable mineral exploration and development on BLM land would be regulated under 43 CFR 3800 under all alternatives. Under Alternative A, developed recreation sites, the Bull Gulch SRMA, the Deep Creek SRMA, the Thompson Creek SRMA, and all WSAs would be petitioned for withdrawal to the Secretary of the Interior for closure to the mining laws for locatable minerals. Avoiding surface disturbances resulting from the withdrawal of lands from locatable mineral entry would benefit existing recreational opportunities, help retain the existing RSCs, and protect developed recreation sites.

Acres of locatable minerals, mineral materials sales, and non-energy leasable minerals open to development would vary by alternative, with Alternatives A and D opening the most acres. If new mining development would occur, direct change of RSCs would be unavoidable because of surface-disturbing activities and associated use. However, the amount of land that is open to mineral use does not necessarily indicate of the number of acres that would be directly disturbed, since the amount of expected mineral development is low. Recognizing that mineral development technologies changes through time and because there are no specific actions being evaluated at this time, the indicator of effects between alternatives is the level and type of protection provided to R&VS. Adverse impacts of minerals decisions on recreation opportunities would be reduced by the application of protective management action and allowable use decisions in addition to petitions for withdrawals.

Under all alternatives, minerals would be subject to the concurrent stipulations for each alternative. The risk of impacting R&VS would vary according to the type of stipulation (NSO or CSU) for R&VS and other resources applied, and the locations where the stipulations would be applied in each alternative.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, 27,700 acres would be designated as ACECs to protect relevant and important values, including cultural and paleontological resources, scenic quality, riparian habitat, fish and wildlife, and sensitive and endangered species. Management action and allowable use decisions (e.g., VRM Class I or II designations, application of NSO/CSU stipulations, closing areas to fluid mineral leasing, and designation of ACECs as avoidance or exclusion areas) for ACECs have indirectly helped retain the existing RSCs of these areas. As a result of the protection of relevant and important values, the ACECs have route limitations that restrict motorized and mechanized activities and NSO stipulations that constrain the construction of recreation trails and facilities.

ACEC designations under Alternative A would overlap 18,171 acres of SRMAs (Table 4.3.3-3). For example, overlapping designations have created management conflicts where the Thompson Creek ACEC overlaps with the Thompson Creek SRMA. Climbing activities have been limited due to incongruous management direction aimed at protecting the relevant and important geologic values of the ACEC. Overlaps with ERMAs are less complex because recreation is commensurate and considered in context with the management of other resources and resource uses.

Table 4.3.3-3
Overlap of SRMAs with ACECs under Alternative A

SRMA	Acres of Overlap	ACEC
Bull Gulch	8,240	Bull Gulch
Deep Creek	2,400	Deep Creek
Thompson Creek	4,270	Thompson Creek
Upper Colorado River	3,250	Blue Hill and Bull Gulch
Total	**18,160**	

Acronyms and Abbreviations:

ACEC area of critical environmental concern
SRMA special recreation management area

Impacts from Wilderness Study Area Management. WSAs are areas that generally appear to have been affected primarily by the forces of nature, that provide outstanding opportunities for solitude or primitive and unconfined types of recreation, and that often are characterized by such special qualities as ecological, geological, educational, historical, scientific, and scenic values. Recreational activities that would impair wilderness suitability are prohibited in WSAs. Examples of activities that are allowed in WSAs are hunting, fishing, and trapping under state and federal laws and rockhounding, camping, hiking, and horseback riding.

The BLM has no discretion to change management of WSAs through this planning process, with the exception of decisions relating to VRM designation and motorized vehicle use. Under all alternatives, the CRVFO would continue to manage four WSAs (Bull Gulch, Castle Peak, Eagle Mountain, and Hack Lake) consistent with Integrated Management Plan (IMP) guidelines for recreation.

Under Alternative A, WSAs and SRMAs overlap in Bull Gulch and the Hack Lake area. Recreation and management are subject to limitations aimed at protecting wilderness characteristics. The SRMAs are being

managed for hunting, hiking, camping, horseback riding, wildlife viewing, floatboating, fishing, and photography, which are consistent with providing opportunities for primitive and unconfined types of recreation in WSAs. Existing RMP decisions, as well as IMPs, would continue to indirectly retain the existing RSCs and recreation opportunities in the overlapping SRMAs and ERMAs. The constraint on permanent facility development is not a management issue because management of both the SRMAs and the WSAs is striving to maintain the naturalness of the area.

Impacts from Wild and Scenic Rivers Management. To be eligible for wild and scenic river designation, a river or stream segment must possess one or more ORVs, have sufficient water quality to support those values, and be free-flowing. ORVs could be scenic, recreational, geological, fish-related, wildlife-related, historical, cultural, botanical, hydrological, paleontological, or scientific. All stream segments would be identified as eligible for inclusion in the NWSRS under Alternative A.

Rivers in the NWSRS are often referred to as "wild and scenic rivers" without regard to actual classification. This terminology is acceptable when speaking of the national system in general, but the specific legal classification is an important distinction, as it has a direct effect on how the river is administered and whether certain activities on federally owned land within the boundaries are permissible (NPS 1998). BLM's policy is to protect any ORVs identified in the eligibility study until a decision on suitability can be made. The BLM would protect the free-flowing condition, water quality, tentative classification of the segment (based on the level of stream corridor development), and identified ORVs of eligible segments. Future recreation-related actions would conform to interim management that protects the ORVs until a decision on suitability is made by BLM.

The impacts on RSCs, recreation opportunities, and recreation management along the eligible Colorado River segments would be minor because the segments would continue to be managed as part of the Upper Colorado River SRMA and covered by stipulations that help to retain the physical RSC and to protect recreation opportunities, which are also the identified ORVs for the stream segments. Along the other stream segments, the impact on RSCs and recreation opportunities would be minimal because these stream segments were determined to be eligible under current recreation management and use. Changes in the types of recreational use or new recreation development may not be appropriate in eligible stream segments classified as scenic or wild. Any proposed recreation implementation actions would be evaluated on a case-by-case basis until a suitability determination is made by the CRVFO.

Impacts from Transportation Facilities Management. Maintenance and upkeep of BLM roads is critical for recreational access. As costs have risen, fewer miles of BLM roads have been maintained each year. The actual miles of roads maintained each year would be based on annual budgets. Under all alternatives, the CRVFO would emphasize maintaining the majority of BLM system roads at maintenance intensities that may not provide year-round access but that are intended to keep the route in use for most of the year. This intensity of maintenance is sufficient to meet the recreation objectives across all alternatives.

Impacts from Health and Safety Management. Under all alternatives, the CRVFO would continue to monitor and address public health and safety as problems arise. LNs attached to fluid mineral leases would require operators (lessees) drilling on federal mineral estate to consider the impact of operations on nearby communities and residences, to reasonably adjust operating procedures to accommodate local residential concerns, and to provide emergency communications plans in case of an accident. Under all alternatives, camping limits and camping closures would help maintain sanitary conditions. Firearm use restrictions would

protect visitors and adjacent homeowners from unsafe target shooting, especially in high-use areas, such as developed recreation sites and in urban interface areas.

Alternative B (Proposed RMP)

Impacts to R&VS from management of resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP, five SRMAs (Hardscrabble/East Eagle, King Mountain, Red Hill, The Crown, and the Upper Colorado River) totaling 62,800 acres would be proposed for designation. Under the Proposed RMP, six ERMAs (Bocco Mountain, Eagle River, Gypsum Hills, New Castle, Silt Mesa and Thompson Creek) totaling 40,900 acres would be proposed for designation (Table 4.3.3-1). The remaining BLM lands would not be designated for R&VS management. Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs. Although recreation is not emphasized, recreation activities may occur. The R&VS areas are managed to allow recreation uses that are not in conflict with the primary uses of these lands

The Proposed RMP, as well as Alternative D, would designate the most areas where recreation opportunities, recreation setting characteristics, recreation use, and demand for R&VS program investments are recognized as a predominant land management focus, or considered commensurate with management of other resources and resource uses.

Under the Proposed RMP and Alternatives C and D, a CSU stipulation would be applied on developed recreation sites and trails (e.g., Boy Scout, Fisher Creek, Arbaney-Kittle, Storm King, and Rifle Arch), when not covered by NSO stipulations, which would help protect existing and future recreation developments from surface-disturbing activities.

Under all alternatives, camping restrictions would protect resources, reduce conflicts, improve unsanitary conditions at dispersed campsites, and reduce long-term camping (squatting) on BLM lands. The restrictions would help achieve R&VS objectives in the context of managing for a multiple of land uses and resources. Camping restriction language is clarified in the Proposed RMP and Alternatives C and D. Alternative C proposes the most closures, followed by the Proposed RMP and Alternatives D and A, respectively.

The types of impacts would be similar to those described under Alternative A and Alternative D. However, under the Proposed RMP and Alternative C, additional high use and urban interface area would have firearm use restrictions on target shooting. The Proposed RMP and Alternative C would restrict firearm use for target shooting on approximately 1,100 acres and 3,500 acres respectively. The Proposed RMP only proposes restricting firearm use for target shooting on 900 acres in the urban interface zone (south portion) of Silt Mesa, whereas Alternative C proposes to restrict firearm use for target shooting on all BLM lands on Silt Mesa (3,300 acres). The 900-acre restriction would cause very minor, localized impacts to target shooting activities in the CRVFO. The 900-acre restriction would address the existing public safety concerns by minimizing a direct threat to public safety from accidental shooting and use in an urban interface zone. Other local BLM lands and state lands would probably absorb the displaced target shooting use. For example, people who want to target shoot could go to the nearby West Rifle Creek State Wildlife Area, which has a recently improved and expanded shooting range. The improved shooting range provides Garfield County (including the towns of Rifle, Silt and New Castle) hunters and firearm enthusiasts with a safe, high-end

public shooting area. Improvements include improved access, expanded parking, and the construction of additional rifle and pistol lanes (CPW 2013).

Under the Proposed RMP the number of big game hunting SRPs (14) and mountain lion hunting SRPs (12) would be managed to maintain the current number of permittees as a maximum within the same or similar permit area boundaries. SRPs for guiding special tag holders (e.g., Governor's tag) would be issued on a case-by-case basis. In the Red Hill SRMA no competitive events, group use or new commercial special recreation permits would be issued. In other RMAs SRP issuance would be guided by specific RMA guidance (see Appendix K). Downhill biking shuttle services and downhill mountain biking events would not be authorized. At the implementation level, the CRVFO would prohibit vending permits (except shuttle services) outside special events on BLM lands. Outside of the Red Hill SRMA the CRVFO would evaluate the need for new SRPs or new uses on existing permits every 5 years. SRPs would be issued as a discretionary action for activities that (1) are consistent with resource/program objectives, (2) are within budgetary/ workload constraints, and (3) would satisfy a public demand that the applicant can factually demonstrate is not being met. As a whole these decisions would help achieve R&VS objectives, support existing permit holders, accommodate anticipated recreation demand, and reduce potential use conflicts.

Recreation Setting Characteristics. The Proposed RMP would emphasize the conservation of natural and cultural resources. The accompanying management action and allowable use decisions (e.g., special designations, stipulations, and travel designations) included under these alternatives would create recreation settings that are (1) more remote from four-wheel-drive vehicle, ATV, and motorcycle routes, and (2) more natural appearing across the CRVFO (Table 4.3.3-2).

Impacts from Water Resource Management. Impacts would be similar to those under Alternative A, except that the stipulations for water resources would impact the placement and development of recreation facilities and routes for trail-based activities like mountain biking and motorcycling. The stipulations would be applied on a case-by-case basis, so the actual impact would be determined at the implementation level.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to those under Alternative A, except that under the Proposed RMP and Alternatives C and D, the CRVFO would close BLM lands to human activity and dogs during severe winter weather conditions. The decision would be based on a combination of factors, such as snow depth, snow crusting, daily mean temperatures (long periods of cold temperatures), and concentrations of animals. The closure would locally restrict winter recreation use.

To reduce big game movement to private lands during the big game hunting season and to increase game hunter success, the CRVFO has worked with CPW on seasonally limiting motorized use on specific routes during the big game hunting seasons. The Stagecoach Trail and Domantle Road (8 miles total) in the Castle Peak area have been traditionally gated from October 1 through November 30. The Proposed RMP and Alternative C proposed moving the beginning date to August 20 to be ahead of the big game archery and muzzleloader hunting seasons to help reduce big game movement to private lands during those hunting seasons too. The Proposed RMP and Alternative C also propose seasonal route limitations in the Dry Rifle Creek area and the West Rifle Creek area from October 1 to November 30. These routes add 10 miles to the existing seasonal route limitations. BLM has worked in concert with the CPW to perform vegetation treatments for big game and sagebrush-dependent species in the Dry Rifle Creek and West Rifle Creek areas. The combination of seasonal route limitations from October 1 through November 30 and the habitat treatments would probably keep more animals on BLM land and accessible to hunters.

An NSO for core wildlife areas would be applied under the Proposed RMP and Alternative C. The NSO stipulation would apply to all surface-disturbing activities (and occupancy) associated with land use authorizations, permits, and leases. The NSO stipulation for core wildlife areas would limit recreation developments that would impact wildlife on winter ranges and sagebrush shrublands. A potential implementation-level conflict exists where the NSO stipulation for core wildlife areas overlaps with The Crown SRMA. The NSO could limit new recreation developments on the northern side of The Crown SRMA, which emphasizes recreation opportunities for mountain biking.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. The Proposed RMP would apply an NSO for fish-bearing streams and a TL stipulation for coldwater sport and native fish, in addition to an NSO for fish hatcheries. The TL stipulation prohibits in-channel work during certain spawning periods. The TL stipulations would be a seasonal constraint on recreation-related surface-disturbing and construction activities, unless the exception criteria were met. The overall impact would be localized and possibly mitigated through site-specific engineering or relocation of the recreation development.

Impacts from Visual Resource Management. Under the Proposed RMP and Alternatives C and D, a VRM Class II designation would be assigned to all proposed SRMAs. Under each action alternative, the acres of VRM Class II vary by the number and acres of SRMAs proposed. The specific objective of VRM Class II is to retain the existing character of the landscape, and the level of change to the characteristic landscape should be low. The VRM Class II designation was assigned to minimize the visual impacts of non-recreational surface-disturbing activities and to retain the current degree of naturalness, which was an important contribution to the quality of recreation opportunities desired by visitors and emphasized in the proposed SRMAs. As opposed to Alternative A, the VRM Class II designations would better retain the physical RSCs for SRMAs.

Outside of SRMAs, the designation of VRM classes varied by alternative. The Proposed RMP has the highest amount of VRM Class I and II acres and likely would be the best alternative for retaining the existing character of the landscape across the CRVFO.

Impacts from Lands with Wilderness Characteristics Management. Under the Proposed RMP, 34,400 acres would be managed to protect wilderness characteristics. Recreation management would be subject to Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics in these areas. (See Appendix F.) No permanent recreation structures would be permitted. The construction of new travel routes would be constrained. No new SRPs would be authorized unless they were necessary for helping people realize the primitive and unconfined recreational values (e.g., upland outfitting service). When commercial SRPs are renewed, their terms and conditions would be modified as necessary to comply with the Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics. No competitive events would be authorized in these areas.

Within the Thompson Creek ERMA, for example, recreation activities would be subject to protecting wilderness characteristics. As a result, opportunities for sport climbing and mountain biking in Thompson Creek would be adversely affected because those activities would be inconsistent with providing opportunities for primitive and unconfined recreation.

Recreationists seeking primitive and unconfined recreation activities in an area characterized by essentially unmodified natural landscapes would benefit from managing lands for wilderness characteristics and the

supporting management prescriptions applied to these lands. Table 4.3.3-4 displays the change in the RSC of remoteness between Alternative A (existing condition) and the Proposed RMP and Alternative C created by changes in travel designations. All units except the Flat Tops Addition would have a physically more remote recreation setting character.

Table 4.3.3-4
RSC of Remoteness – A Comparison between Alternative A (Existing) and Alternative B (Proposed RMP) and Alternative C within Lands Managed for Wilderness Characteristics

Lands Managed for Wilderness Characteristics		Recreation Setting Character Classification (acres)					
		Primitive	Backcountry	Middle Country	Front Country	Rural	Urban
Castle Peak Addition	Alt. A	2,060	0	1,380	580	0	0
	Alt. B and C	2,550	0	889	580	0	0
Deep Creek	Alt. A	730	0	1,616	2,070	0	0
	Alt. B and C	1,800	0	550	2,070	0	0
Flat Tops Addition	Alt. A	1,060	0	870	1,600	1,060	0
	Alt. B and C	1,060	0	870	1,600	1,060	0
Grand Hogback	Alt. A	3,470	0	3,120	2,680	2,280	0
	Alt. C	6,160	0	430	2,680	2,280	0
Pisgah Mountain	Alt. A	3,240	1,748	4,870	1,990	3,850	0
	Alt. B and C	4,880	1,935	3,040	1,990	3,850	0
Thompson Creek	Alt. A	1,520	251	3,280	2,830	370	0
	Alt. B and C	5,020	0	5	2,830	370	0

Acronyms and Abbreviations:

RSC recreation setting characteristic

More than 3,450 acres of the Pisgah Mountain unit would overlap with the Upper Colorado SRMA. The proposed physical RSCs (keeping the level of change to the natural landscape low) for the SRMA is consistent with maintenance of naturalness in lands managed for wilderness characteristics. The SRMA's targeted activities (fishing and floatboating) are consistent with offering opportunities for primitive and unconfined recreation. However, the SRMA is not being managed for solitude. The SRMA is being managed to offer experiences for the following: enjoying closeness to family and friends; enjoying the area's wildlife, scenery, views, and aesthetics; experiencing the natural surroundings; developing skills and abilities; and escaping everyday responsibilities for a while. The administration of the SRMA may be somewhat constrained by prescriptions for lands managed for wilderness characteristics along the north side of Pisgah Mountain.

Impacts from Cave and Karst Resource Management. The NSO stipulation for the cave and karst occurrence areas applied in the Proposed RMP and Alternatives C and D would prohibit surface occupancy and surface-disturbing activities around known cave and karst resources to a depth of 5,000 feet below the surface. The NSO area encompasses cave openings and portions of the subsurface features and watersheds immediately above the caves. The NSO stipulation would be applied to 10 known caves in the Deep Creek cave area, a cave at Hack Lake on the Flattops, and small, dry caves in Glenwood Canyon. The Proposed RMP and Alternative D would protect known caves but would not protect caves yet undiscovered. The Proposed RMP and Alternative D also offer less protection to subsurface portions of the cave that extend

beyond the 40-acre NSO area at each cave. The potential indirect impacts to recreational, scientific and education opportunities in the cave would parallel the change in coverage of the NSO stipulations.

Impacts from Forestry Management. Impacts would be similar to those under Alternative A, except only that approximately one-third as much area (28,000 acres under the Proposed RMP, 28,400 acres under Alternative C, and 32,200 acres under Alternative D) would be managed intensively to provide wood products. Under the Proposed RMP and Alternatives C and D, various SRMAs and ERMAs are specifically closed to wood cutting and commercial timber management for the benefit of retaining RSCs, such as naturalness and remoteness. Under the Proposed RMP, the Hardscrabble/East Eagle and King Mountain SRMAs are both open to timber harvest and firewood cutting provided the implementation does not affect the desired recreation setting.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those under Alternative A, except the travel management system included under the Proposed RMP outside SRMAs would be structured to balance a variety of uses while protecting resources. No acres would be open to cross-country OHV travel. Impacts on RSCs, recreation opportunities, and recreation management from OHV area designations (open, closed, and limited) and route limitations would be variable, and would depend on the recreation activity and the user's desired outcome (see Assumptions on first page of this section).

Over-snow travel would be limited to designated routes on King Mountain under all alternatives, in the Glenwood Springs Debris Flow Hazard Zone ACEC, and Sheep Creek Uplands ACEC under the Proposed RMP and Alternatives C and D.

Over-snow travel is prohibited in the following: All-winter wildlife closures, Deep Creek ACEC, Thompson Creek ACEC, Hardscrabble/East Eagle ACEC, East Castle Peak, Wolcott, Castle Peak isolated parcels, Red Hill SRMA, Hardscrabble/East Eagle SRMA, The Crown SRMA, lands managed for wilderness characteristics, WSAs, and the Siloam Springs area. Alternatives C, the Proposed RMP, and Alternative D, in order, close the most acres to over-snow travel. Alternative A has a 15-day longer limitation (December 1 to April 30) than under the Proposed RMP and Alternatives C and D (December 1 to April 15), but the closure under the Proposed RMP and Alternatives C and D applies to both motorized and mechanized recreation activities. Motorized cross-country travel for big game retrieval is prohibited in all action alternatives to protect resources from inappropriate recreation use.

To reduce big game movement to private lands during the big game hunting season and to increase game hunter success, the CRVFO has worked with CPW on seasonally limiting motorized use on specific routes during the big game hunting seasons. The Stagecoach Trail and Domantle Road (8 miles total) in the Castle Peak area have been traditionally gated from October 1 through November 30. The Proposed RMP and Alternative C proposed moving the beginning date to August 20 to be ahead of the big game archery and muzzleloader hunting seasons to help reduce big game movement to private lands during those hunting seasons too. The Proposed RMP and Alternative C also propose seasonal route limitations in the Dry Rifle Creek area and the West Rifle Creek area from October 1 to November 30. These routes add 10 additional miles to the existing seasonal route limitations. BLM has worked in concert with the CPW to perform vegetation treatments for big game and sagebrush-dependent species in the Dry Rifle Creek and West Rifle Creek areas. The combination of seasonal route limitations from October 1 through November 30 and the habitat treatments would probably keep more animals on BLM land and accessible to hunters.

Currently, many tracts of BLM lands are inaccessible (legally or physically) to the public for motorized and mechanized activities. Adjacent landowners may have exclusive use of these lands for motorized and mechanized recreation activities. Under the Proposed RMP and Alternative C, routes in these inaccessible parcels are proposed to be designated administrative routes and are open only to pedestrian and equestrian travel, unless otherwise authorized by BLM. This approach would create a more equitable system of public travel and access, without impeding authorized users.

Under the Proposed RMP and Alternatives C and D, designating a public travel management system throughout the planning area would help retain the existing RSCs and would reduce unethical travel, recreation conflicts, resource conflicts, and recreational trespass on adjacent private lands. This designation would reduce conflicts between recreationists and private landowners.

Impacts from Lands and Realty Management. Impacts would be similar to those described under Alternative A, except that the Proposed RMP and Alternatives C and D propose identifying retention areas specifically for the protection of ERMAs, SRMAs and developed recreation sites. In all action alternatives, SRMAs and ERMAs would be retained in federal ownership for long-term management unless specific exception criteria are met. This ownership would guarantee recreation opportunities would be available through the life of the plan. In all alternatives, recreation opportunities outside of RMAs would indirectly benefit from retention areas identified for other programs.

Under the Proposed RMP and Alternative C, all SRMAs and all developed recreation sites would be designated as ROW avoidance areas to help maintain the desired recreation settings. Also under all action alternatives, existing recreation opportunities and RSCs outside of SRMAs indirectly, are retained from designation of ROW avoidance areas and ROW exclusion areas identified for other resources (heritage areas, wetlands, WSAs, ACECs, and special-status species habitat).

Pursuing additional access to BLM lands through exchanges, boundary adjustments, donations, or purchase of lands according to criteria outlined in Chapter 2 for the lands and realty program would benefit retaining key RSCs and offering a diversity of recreation opportunities. Land tenure adjustments would facilitate greater access to recreation areas and reduce conflicts between private landowners and recreation user groups (e.g., trespass issues).

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). In all action alternatives, the entire Silt Mesa ERMA and the Garfield Creek portion of the New Castle SRMA are proposed on BLM lands as having a high potential for the occurrence of gas resources or on BLM lands that are leased for fluid minerals. The Garfield Creek portion of the New Castle ERMA is indirectly protected from surface-disturbing activities by the NSO stipulation for major river corridors. However, the Silt Mesa ERMA is partially leased and the likelihood of development is high. The ERMA objective may not be achieved if the existing RSCs become more industrialized by the development of gas resources. Opportunities to pursue a variety of outdoor recreation activities and to enjoy dispersed recreation opportunities afforded would remain. However, the extent and quality of those dispersed recreation opportunities would likely change or diminish proportionate to the amount of area affected by active fluid mineral development and production.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The impacts would be similar to those under Alternative A, except that the Proposed RMP

and Alternative C propose closing SRMAs and developed recreation sites to mineral materials (salable) disposal for the protection of RSCs in SRMAs from surface-disturbing activities and the protection of existing and future recreation developments. Closing WSAs, ACECs, suitable WSR segments, and municipal watersheds would indirectly help retain existing RSCs and would maintain primitive and unconfined recreation opportunities in the WSAs.

In addition, BLM would recommend to the Secretary of the Interior to withdraw developed recreation sites for closure to the mining laws for locatable mineral exploration or development to help retain the physical RSCs under all action alternatives.

Impacts from Areas of Critical Environmental Concern Management. Impacts from ACECs on R&VS would be similar to those described under Alternative A. Under the Proposed RMP, a total of 46,400 acres would be designated as ACECs. Approximately 3,250 acres of the Blue Hill and the Bull Gulch ACEC overlap with the Upper Colorado River SRMA. This overlap was removed from the Upper Colorado River SRMA because many portions of the current SRMA extend well beyond the river corridor. This boundary revision reflects a decision to reduce potential future management and administrative conflicts between protecting ACEC values and managing for specific recreation objectives on a sustained or enhanced long-term basis.

Impacts from Wilderness Study Area Management. The impacts on RSCs, recreation opportunities, and recreation management within the WSAs under all action alternatives would be similar to those under Alternative A because the IMP would be applicable. If the WSAs were released by Congress, the CRVFO would manage the areas as separate distinct ERMAs for nonmotorized recreation, along with the identified management action and allowable use decisions in this plan.

Managing WSAs as VRM Class I would help maintain the naturalness of WSAs. Closing the Eagle Mountain WSA (320 acres) to motorized and mechanized use would not impact motorized or mechanized activities since the area is small and rugged and has no known motorized or mechanized routes. Both management actions would enhance primitive and unconfined recreation opportunities.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, BLM would determine the Deep Creek Segments 2 and 3 (as well as USFS Deep Creek segments) as suitable for inclusion into the NWSRS. This determination is compatible with current and anticipated future recreation use in Deep Creek Canyon.

The BLM would defer a suitability determination on Colorado River segments and would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing nature, ORVs, classification, and water quality of Colorado River segments. The Upper Colorado River Stakeholder Group Management Plan would protect the ORVs through a cooperative water delivery mechanism. The Upper Colorado River Stakeholder Group Management Plan would attempt to operate water facilities in a manner that meets water supply objectives and protects the ORVs. With no Upper Colorado River Stakeholder Group Management Plan, water flows would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use over the life of the plan. If monitoring indicated a decline in the condition of the ORVs, BLM would start the formal suitability process to designate the Colorado River segments for inclusion into the NWSRS.

The Proposed RMP, with the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, would support a wide range of recreational uses along the Colorado River because the water stakeholders would attempt to operate their facilities in a manner that meets water supply objectives and recreation ORVs within the Upper Colorado River SRMA. With no Upper Colorado River Stakeholder Group Management Plan, water flows in the Colorado River would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use over the life of the plan.

BLM has not identified or brought forward and is not analyzing instream flows in this planning process, nor is it required to do so until after designation. At the time of designation, BLM would write a WSR management plan that would then address the needed instream flows.

All other segments would be determined not suitable and would be released from further protection under the Wild and Scenic River Act. Thus impacts to recreation would result only from other WSR decisions in the Proposed RMP. In many cases--such as the Eagle River (recreational), Hack Creek (scenic), Abrams Creek (recreational), or Thompson Creek (wild)--SRMA/ERMA designations or managing lands for the protection of wilderness characteristics would maintain current recreation opportunities and existing recreation settings.

Impacts from Health and Safety Management. Impacts would be similar to those under Alternative A, except the CRVFO would also proactively close specific routes to motorized vehicles that access persistent and repetitive trash dumping areas to reduce the amount of trash and hazardous waste dumped on BLM lands.

Alternative C

Impacts to R&VS from soils management, vegetation–general management, special status species—plants and terrestrial wildlife management, cultural resource management, wildland fire management, cave and karst resource management, fluid minerals management (oil and gas, oil shale, and geothermal resources) management, and transportation facilities management would be similar to those under Alternative A. Impacts to R&VS from management of all other resources and would be the same or similar to those under the Proposed RMP, except as described below.

Impacts from Recreation and Visitor Services Management. Under Alternative C, two SRMAs (Red Hill and Upper Colorado River) totaling 23,800 acres would be proposed for designation. Under Alternative C, nine ERMAs (The Crown, Eagle River, Fisher Creek, Hack Lake, Hardscrabble/East Eagle, King Mountain, New Castle, Silt Mesa, and Thompson Creek) totaling 64,300 acres are proposed for designation (Table 4.3.3-1). The remaining BLM lands would not be designated for R&VS management. Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.

Alternative C would designate the fewest SRMAs where R&VS management is recognized as the predominant land management focus. However, Alternative C would designate the most ERMAs where recreation opportunities are considered commensurate with the management of other resources and resource uses. The resultant corresponding management in ERMAs (e.g., Thompson Creek and Hack Lake) and on undesignated lands (e.g., Pisgah Mountain and Castle Peak) would emphasize opportunities for more primitive, non-mechanized recreation activities (e.g., foot and horseback riding).

Proposed management action and allowable use decisions (e.g., camping restrictions, firearm use restrictions, and stipulations) under Alternative C for R&VS as well as other programs would help achieve R&VS objectives in the context of managing for a multiple of land uses and resources. Alternative C proposes the highest level of restrictions on land uses in order to protect natural and cultural values.

Under Alternative C, to help achieve R&VS objectives the CRVFO would not issue new SRPs for big game and mountain lion hunting. SRPs for guiding Governor's tag holders would be issued on a case-by-case basis. Vending permits outside special events on BLM lands would not be permitted. Downhill biking shuttle services and downhill mountain biking events would not be authorized in certain recreation management areas. Within lands managed for the protection of wilderness characteristics, SRPs would only be issued if the proposed activity or event is beneficial to the realization of values associated with wilderness characteristics. At the implementation level, SRPs would be issued as a discretionary action for a variety of uses that are consistent within resource/program objectives and within budgetary/workload constraints. The CRVFO would prohibit vending permits outside special events on BLM lands.

Recreation Setting Characteristics. Alternative C emphasizes the conservation of natural and cultural resources and protection of the ecological integrity of plant, fish, and wildlife habitat. The accompanying decisions (e.g., special designations, stipulations, and travel designations) included under Alternative C in turn would create recreation settings that (1) are more remote from four-wheel-drive vehicle, ATV, and motorcycle routes, (2) are more natural appearing, and (3) contain fewer recreation facilities (Table 4.3.3-2).

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be similar to those under the Proposed RMP, except Alternative C applies a TL stipulation for coldwater sport and native fish, in addition to an NSO stipulation for fish hatcheries.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to those under Alternative A and the Proposed RMP, except Alternative C is slightly more constraining on group use events and recreation-related surface-disturbing activities because of the amount and extent of NSO stipulations included to protect wildlife and wildlife habitat. On the other hand, Alternative C would indirectly offer more acres of protection for retaining the physical RSCs of naturalness and remoteness. Generally, this alternative would be the most beneficial for enhancing wildlife-related activities.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts would be similar to those under the Proposed RMP except an ACEC is proposed to protect Colorado River cutthroat trout in Abrams Creek southwest of the town of Eagle. Because of the size of the ACEC, it would have only a minor local impact on recreation opportunities.

Impacts from Lands with Wilderness Characteristics Management. Impacts would be the same as the Proposed RMP, except under Alternative C, 45,900 acres would be managed to protect wilderness characteristics because the Grand Hogback area would be included.

Impacts from Cave and Karst Resource Management. Alternative C proposes to apply both the NSO stipulation for the Deep Creek Cave Area and the cave and karst occurrence NSO stipulation. Alternative C would protect known caves and karsts yet undiscovered in the Deep Creek area. Alternative C would offer protections to the subsurface portions of caves in the Deep Creek area that extend beyond the 40-acre area

around the cave entrance. Alternative C would offer the greatest extent of protection for caves and the recreational, scientific, and education opportunities they provide.

Impacts from Livestock Grazing Management. The impacts of Alternative C are similar to the other alternatives, except that combining, closing, and creating reserve allotments would reduce or eliminate competition between wildlife and livestock and would improve livestock management. These actions would help ensure that future conflicts are reduced and that would indirectly benefit wildlife-related recreation activities. These actions would also benefit individuals who dislike recreating where livestock is grazed.

Impacts from Comprehensive Trails and Travel Management. Impacts would be similar to those under the Proposed RMP, except the travel management system included under Alternative C, outside SRMAs, would be structured to emphasize resource protection, sustaining the ecological integrity of habitats for priority plant and animal species and sustaining a relatively unmodified physical landscape. No acres would be open to cross-country OHV travel.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, a total of 79,800 acres would be designated as ACECs, 4,190 acres of which overlap the Upper Colorado River SRMA. In comparison to Alternative A, this amount is an almost 70 percent increase in ACEC acres. It also represents an increase of 40 percent over the Proposed RMP . Impacts on recreation management and administration from overlapping SRMAs and ACECs would be similar to those described under Alternative A and the Proposed RMP . Impacts from ACECs on recreation opportunities in ERMAs would be similar to those described under Alternative A and the Proposed RMP .

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The interim protections would apply to lands within 0.25 mile of either side of the stream segment.

The notable difference is in the Colorado River segments. The suitability determination would not include a cooperative agreement with the Upper Colorado River stakeholder group. With no *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, water flows in the Colorado River would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use within the Upper Colorado River SRMA over the life of the RMP.

Alternative D

Impacts to R&VS from visual resource management, forestry management, wilderness and wilderness study areas (administrative designations) management, and health and safety management would be similar to those under the Proposed RMP . Impacts from management of all other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Recreation and Visitor Services Management. Under Alternative D, seven SRMAs (Bocco Mountain, Fisher Creek, Hardscrabble/East Eagle, Red Hill, The Crown, Thompson Creek, and the Upper Colorado River) totaling 63,600 acres would be proposed for designation. Under Alternative D, five ERMAs (Eagle River, Hack Lake, King Mountain, New Castle, and Silt Mesa) totaling 33,000 acres would be proposed

for designation (Table 4.3.3-1). The remaining BLM lands would not be designated for R&VS management. Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs. Alternative D, as well as the Proposed RMP, would designate the most areas where recreation opportunities, RSCs, recreation use, and demand for R&VS program investments are recognized as a predominant land management focus or considered commensurate with management of other resources and resource uses.

Proposed management action and allowable use decisions (e.g., camping restrictions, firearm use restrictions, and stipulations) under Alternative D for R&VS as well as other programs would help achieve R&VS objectives in the context of managing for a multiple of land uses and resources.

Under Alternative D to help achieve recreation objectives, the CRVFO would maximize opportunities for commercial recreation through the issuance of SRPs, including vending permits outside special events. The BLM would apply cost-recovery procedures for issuing SRPs where appropriate. Downhill biking shuttle services and downhill mountain biking events would not be authorized in certain recreation management areas. At the implementation level, SRPs would be issues as a discretionary action. Vending permits outside of special events would be prohibited.

SRPs would be issued as a discretionary action for a variety of uses that are consistent with resource and program objectives and within budgetary and workload constraints. Alternative D would offer the most opportunities for SRPs in such locations as the Colorado and Eagle Rivers.

Recreation Setting Characteristics. Alternative D, as well as Alternative A, places more of an emphasis on producing recreation opportunities in combination with other land uses. The accompanying management actions (e.g., special designations, stipulations, and travel designations) included under these alternatives in turn create recreation settings within the CRVFO that (1) are less remote from four-wheel-drive vehicle, ATV, and motorcycle routes (i.e., more routes open to motorized and mechanized activities), (2) are less natural appearing, and (3) contain more recreation facilities (Table 4.3.3-2). Alternative D would provide the most acres where mountain biking occurs in isolation from motorized vehicles. The recreation emphasis on maintaining local tourism revenue and accommodating more destination visitors would likely result in higher use levels in already highly visited areas such as the Roaring Fork Valley and the Vail Valley.

Impacts from Terrestrial Wildlife Management. Impacts would be similar to those under Alternative A, except that Alternative D applies a CSU stipulation that is a less protective, moderate constraint on surface-disturbing activities on Garfield Creek, Basalt, and West Rifle Creek State Wildlife Areas. Alternative D also closes the Dry Rifle Creek area, the New Castle area, and the Thompson Creek/Holgate Mesa area to protect wintering big game from motorized and mechanized activities from December 1 to April 15.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts would be similar to those under the Proposed RMP, except an NSO stipulation is applied to streams containing conservation and core conservation populations of Colorado River cutthroat trout in light of the lack of other NSOs for fisheries and aquatic wildlife under the Proposed RMP and Alternative C. This NSO stipulation covers fewer miles of streams, providing fewer safeguards for fisheries and anglers, but more opportunities for new recreation development, pending other overlapping stipulations for soils, water, and riparian vegetation.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as or similar to those under Alternative A, except that the travel management system included under Alternative D, outside SRMAs, would support a variety of mixed uses, while protecting natural and cultural resources. Impacts on RSCs, recreation opportunities and recreation management from OHV area designations (open, closed, and limited) and route limitations would be similar to those under the Proposed RMP and Alternative C, which also have no acres open to cross-country travel and similar acres with limited and closed area designations.

Impacts from Lands and Realty Management. Under Alternative D, only developed recreation sites would be designated as ROW avoidance areas. This alternative would allow ROWs to be authorized that could cause unplanned and possibly unacceptable impacts to the physical, social, and operational RSCs in SRMAs and ERMAs. Alternative D does not identify any retention criteria for R&VS that would retain for long-term management SRMAs or ERMAs or developed recreation sites.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The impacts would be the same as or similar to those under Alternative A, except that Alternatives A and D do not close any BLM surface estate to mineral materials disposal.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative D, a total of 20,200 acres would be designated as ACECs, 3,253 acres of which overlap with the upper Colorado River SRMA. In comparison to Alternative A, this alternative would result in a 25 percent decrease of total acres designated as ACECs and managed as SRMAs. Impacts from ACECs on recreation opportunities in ERMAs would be the same as or similar to those under Alternative A.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. Thus impacts to R&VS would result only from other decisions in Alternative D.

Specific Analysis by Recreation Area

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Bocco Mountain (northeast of Eagle)	SRMA	ERMA	Undesignated*	SRMA

*Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
Acronyms and Abbreviations:

ERMA extensive recreation management area
R&VS recreation and visitor service
SRMA special recreation management area

The Proposed RMP would designate Bocco Mountain as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to support and sustain the existing recreation activities and the associated qualities and conditions of the ERMA. Management of ERMA areas would be commensurate with the management of other resources and resource uses (i.e., core wildlife area, livestock grazing, cultural resources). The Proposed RMP, through route designations, would offer opportunities for advanced motorcycle riders. Route designations would maintain the current single-track motorcycle trail system. Some motorized routes may need be closed and rerouted based on resource issues.

The SRMA is a destination for advanced motorcycle riders in the spring and for big game hunters in the fall. Under Alternative A, BLM would continue to manage the Bocco Mountain SRMA specifically for motorcycle riding, in accordance with the 1997 Castle Peak Travel Management Plan Amendment. The Glenwood Springs visitor study (Virden et al. 2008) respondents highlighted the need for more motorcycle trails. However, protecting cultural values and highly erosive soils, while allowing motorcycle use, has created conflicts that have resulted in the closure of many motorcycle trails, the closure of the motocross track, and the need to reroute many trails. A big game winter closure to motorized use from December 1 to April 30 further limits spring shoulder season riding. Under Alternative A, no explicit protective measures to maintain the RSCs of the SRMA exist, and only the limited area travel designation protects the physical RSCs.

Under Alternative D, the Bocco Mountain area would be managed as an SRMA. Emphasizing motorcycling would allow visitors the opportunity to experience frequent access to outdoor physical activity, adventure, excitement, and challenge. These activities and experiences would offer personal benefits to participants, such as a more outdoor-oriented lifestyle, improved balance of work and play, freedom from stress, tension, and anxiety, and improved outdoor recreation skills (Appendix N). However, because of limitations created by existing cultural and natural resources, it would be likely that neither new trails nor a broader diversity of easy to moderate difficulty motorcycle trails could be created. The latter would be for different levels of motorcycle riders to better realize their desired outcomes of challenge and excitement. Under these circumstances, it is unrealistic to assume that R&VS management would be recognized as the predominant management focus with specific recreation opportunities and desired RSCs maintained on a long-term basis.

The visitor study (Virden et al. 2008) indicated that respondents across all activities showed a preference to retain the existing physical RSCs. Under the action alternatives, the physical, social, and operational RSCs would be maintained through proposed allowable use and management actions (e.g., CSU stipulation, closure to mineral material sales, ROW avoidance areas, special recreation permit limitations, closure to wood cutting and commercial timber management, closure to non-energy solid mineral leasing, and travel designations).

Under Alternative C, the area would be undesignated because management of natural and cultural resources would be the primary resource management focus. Public lands that are not designated as RMAs are managed to meet basic R&VS and resource stewardship needs. Although recreation would not be emphasized, recreation activities not in conflict with the primary uses of these lands would continue to occur.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would sustain recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts. The Proposed RMP and Alternatives A and D would require a continued R&VS management commitment (e.g., staff time, volunteer hours, and funding) to offer the proposed recreation opportunities, to reduce conflicts with natural and cultural resources, and to maintain the desired RSC.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Bull Gulch (north of Dotsero)	SRMA/RMA	Undesignated*	Undesignated*	Undesignated*

*Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
Acronyms and Abbreviations:

RMA recreation management area
R&VS recreation and visitor service
SRMA special recreation management area

Under Alternative A, BLM would continue to manage the Bull Gulch SRMA, as identified in the 1988 CRVFO RMP. SRMA management would continue to emphasize nonmotorized activities, specifically hiking and hunting. No RMP was ever completed for the Bull Gulch SRMA because the remote and rugged area requires a low level of recreation management. Under Alternative A, the SRMA identification is overlapped by ACEC and WSA designations. A duplicative NSO stipulation for RMAs covers the portion of the WSA not within the SRMA. Recreation use and implementation-level management would continue to be subject to management direction provided by the BLM Manual 6330--*Management of BLM Wilderness Study Areas* (BLM 2012c), and ACEC prescriptions.

Under the Proposed RMP and Alternatives C and D, the Bull Gulch area would not be designated as an RMA. Recreation use and implementation-level management would be subject to management direction provided by the BLM Manual 6330--*Management of BLM Wilderness Study Areas* (BLM 2012c), and ACEC prescriptions. An NSO stipulation would be applied, as well as a closure to mineral materials sales. The WSA and ACEC designations, along with their guidance and prescriptions, would maintain the natural-appearing landscape, the current degree of remoteness, and the emphasis on primitive and unconfined recreation. From a visitor's perspective, the resulting RSCs and recreation opportunities would be the same under all alternatives.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support maintaining wilderness characteristics and ACEC values while achieving CRVFO-wide R&VS objectives. Correspondingly, recreation management costs and personnel requirements would be low under all alternatives.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Castle Peak (northwest of Wolcott)	Glenwood Springs ERMA/RMA	Undesignated*	Undesignated*	Undesignated*

*Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
Acronyms and Abbreviations:

ERMA extensive recreation management area
RMA recreation management area
R&VS recreation and visitor service

Under Alternative A, the Castle Peak area (approximately 19,650 acres) would continue to be identified as part of the CRVFO ERMA and managed under the current management direction. Recreation management would focus on providing visitor information, sanitation facilities, and access, and on resolving management issues. The 12,200-acre Castle Peak WSA lies within the Castle Peak area, and recreation management is guided by the IMP. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied an NSO stipulation to protect nonmotorized opportunities and recreation settings in the Castle Peak area. The travel management decisions for non-WSA lands were made in the 1997 Castle Peak Travel Management Plan and would continue.

The CRVFO visitor study indicated respondents were moderately to very satisfied with their visit to the Castle Peak area. Respondents said that all physical, social, and operational RSCs should be left as is but that more information should be available for visitors. People felt only slightly crowded (Virden et al. 2008).

Under the Proposed RMP and Alternatives C and D, the area would be undesignated for R&VS because protecting wilderness values would remain the predominant land management focus. Management would continue to emphasize primitive and unconfined recreation opportunities within the Castle Peak WSA portion and dispersed recreation opportunities outside the WSA. The majority of the area would be subject to IMP. R&VS management would continue to meet basic R&VS and resource stewardship needs. Under the Proposed RMP and Alternatives C and D, little change is expected in the determinative RSCs of naturalness, remoteness, and access.

Under Alternative C, an additional 4,000 acres outside the WSA would be managed for wilderness characteristics. In addition, the Greater Sage-Grouse Habitat ACEC would create a large, contiguous, intact landscape where existing physical RSCs and recreational opportunities would continue to be indirectly maintained. These designations would enhance opportunities for solitude and opportunities for primitive and unconfined recreation in the Castle Peak area.

The implementation of decisions for comprehensive trails and travel management and SRPs included in each alternative would help sustain recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts. Recreation management costs and personnel requirements would be low under all alternatives.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
The Crown (east of Carbondale)	Glenwood Springs ERMA	SRMA	ERMA	SRMA

Acronyms and Abbreviations:

ERMA extensive recreation management area
SRMA special recreation management area

In all alternatives, The Crown area offers Roaring Fork Valley residents frequent access to outdoor physical activities near their home. However, the emphasized recreation activities vary by alternative.

Under Alternative A, The Crown area would continue to be part of the Glenwood Springs ERMA, where recreation is not the management focus but an issue of some significance. Recreation management would focus on providing visitor information, sanitation facilities, and access, and on resolving management issues. No specific RSCs or recreation opportunities would be emphasized. Visitors would continue to participate in a variety of dispersed activities (e.g., OHVs, ATVs, motorcycling, mountain biking, hiking, and hunting). Mountain biking and hunting would remain seasonally dominant activities.

Under the Proposed RMP and Alternative D, The Crown area would be designated as an SRMA for its unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. R&VS management would be recognized as the predominant LUP focus and managed in two RMZs (RMZ 1 and RMZ 2) to further delineate specific recreation opportunities. The Proposed RMP would focus on mountain biking while maintaining OHV riding and driving on designated motorized routes. Management would focus on accommodating Roaring Fork Valley residents as the primary visitors. Alternative D proposes

to emphasize mountain biking in the entire area. Management under Alternative D would focus on accommodating destination mountain bike riders to the Roaring Fork Valley as well as local mountain bike riders.

The overall management direction under Alternative D is to recognize and expand existing uses and accommodate new uses to the greatest extent possible. To that end The Crown SRMA would be part of a valley-wide emphasis on mountain biking, which would include the Red Hill SRMA, Fisher Creek SRMA, and a portion of Thompson Creek SRMA, along with opportunities on adjacent National Forest land. According to proponents, SRMA designation, recreation enhancements for mountain biking, the exclusion of motorized use, and subsequent marketing would draw the attention of destination visitors and create a regionally popular mountain biking destination, like Fruita, Colorado. This destination would benefit businesses catering to the needs of mountain bikers but may hurt businesses supporting the current mix of recreation activities. Increases in destination visitors, combined with local population growth, would result in increases in social RSCs (e.g., level of contact, group sizes, and evidence of recreation use) through the life of the plan.

The activity emphasis within the proposed SRMA would change (the Proposed RMP) or eliminate (Alternative D) traditional motorized recreation activities. For example, the popular activity of hunting would take place in the SRMAs. However, the level of public motorized access would decrease under the Proposed RMP, and motorized access would be completely eliminated under Alternative D as a result of the emphasis on creating a nonmotorized recreation setting for mountain biking.

Under the Proposed RMP (RMZ 2) and Alternative D, travel designations allowing only foot, horse, and mechanized travel would create the greatest change in public use and traditional public access. The existing road system would remain in place for authorized users. This road system would result in recreation use on existing two-track roads, and not single-track trails specifically designed for foot, horseback riding, or mountain biking.

Under the Proposed RMP, SRMA-specific NSO stipulations would limit changes to the naturalness of the landscape by prohibiting surface-disturbing activities and intensive or large-scale human use or occupation (e.g., group use events). Recreation-specific CSU stipulations under Alternatives D and C would minimize conflicts with recreation opportunities by requiring surface-disturbing activities that negatively impact recreation opportunities to be moved more than 200 meters away from recreation trails and facilities.

Alternative C proposes to designate The Crown area as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to support and sustain the existing recreation activities and the associated qualities and conditions of the ERMA. Management of ERMAs would be commensurate with the management of other resources and resource uses (core wildlife area, livestock grazing, and ACEC). Alternative C, through route designations, would offer opportunities for a variety of recreation activities without emphasizing any specific recreation activity in a particular zone. Route designations would maintain the current single-track mountain bike trail system. Some motorized routes would be closed because of resource and private land issues.

Wildlife conflicts, squatters, trash, unsanitary conditions, and evidence of recreation use are current management issues. The Proposed RMP and Alternative D propose prohibiting camping and overnight use within 0.25 mile of Prince Creek Road (Pitkin County Road 7) to reduce squatters, trash, unsanitary

conditions, and evidence of use. Alternative C would prohibit camping and overnight use on BLM lands outside designated campsites and developed campgrounds within The Crown ERMA.

Motorized activities would be prohibited from December 1 to April 30 under Alternative A because of a big game winter closure. Motorized and mechanized activities would be prohibited from December 1 to April 15 under the Proposed RMP and Alternative C. Under Alternative D, motorized activities would be prohibited year-round, and mechanized use would be prohibited from December 1 to April 15. The seasonal limitation does not create recreation conflicts because visitation dramatically drops during the winter. The shorter seasonal limitation under the Proposed RMP and Alternatives C and D would allow earlier spring recreation use.

It is likely that visitation levels would increase under all alternatives, which would require more intensive administration, management, and monitoring (e.g., more visitor facilities, more signs, increased managerial and enforcement presence, and increased user controls), especially in the proposed SRMAs. Resolving the existing recreation-related trespass issues would be time and labor intensive under all alternatives. The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts. The effectiveness of managing recreation resources and the anticipated increases in use would depend on (1) gateway communities (e.g. businesses, chambers, tourism organizations, and local governments) marketing the SRMA responsibly and accurately; (2) local partners providing on-the-ground support; and (3) sufficient funding to support recreation developments and staffing. Recreation management costs, volunteer contribution requirements, and personnel requirements would be substantial under the Proposed RMP and Alternative D.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Deep Creek (northwest of Gypsum)	SRMA	Undesignated*	Undesignated*	Undesignated*

*Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
Acronyms and Abbreviations:

RMA recreation management area
SRMA special recreation management area

Alternative A maintains the 1988 CRVFO RMP identification of Deep Creek as an SRMA. The SRMA administratively overlies the Deep Creek ACEC with duplicative management action and allowable use decisions applied to protect the physical and biological qualities of the area. Recreation activities and management would be subject to finding Deep Creek as eligible for inclusion in the NWSRS.

Recognizing the multiple land use designations aimed at protecting natural processes, ecological values, and primitive and unconfined recreation opportunities, the area would not be designated an RMA under the Proposed RMP and Alternatives C and D. Dropping the overlapping SRMA identification would create only an administrative change from Alternative A and no on-the-ground change for visitors. The Deep Creek area would continue to offer opportunities to participate in activities, such as hiking, fishing, or hunting. The interdisciplinary mix of allowable use and management action decisions and limited area travel designations would retain the current RSCs.

Under the Proposed RMP and Alternatives A and C, recreation use would be subject to ACEC designation, along with corresponding prescriptions, proposed protective measures, and nonmotorized travel designations. Under Alternative C, recreation use and management would be subject to finding the two segments of Deep Creek suitable for inclusion in the NWSRS. Under Alternative C, recreation use and management would be subject to Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics.

Under Alternative D, the Deep Creek area would not have any special designations. Management action and allowable use decisions for individual resources and travel management would guide and constrain R&VS management. Some motorized use, south of Deep Creek, would be provided to the private landowner, but all public access would remain nonmotorized. The Deep Creek area would probably continue to offer opportunities to participate in activities, such as hiking, fishing, or hunting. The most constraining use on surface-disturbing activities would be the VRM Class I designation. It is likely the VRM Class I designation alone would retain the existing physical RSCs; however, Alternative D provides the least protections of all alternatives.

Minimal recreation management is currently performed outside the Coffee Pot Road corridor, where developed campsites exist. In a region that is already renowned and marketed for its outdoor recreation amenities, a subsequent congressional WSR designation under the Proposed RMP and Alternative C would highlight Deep Creek to a recreation-tourism market, and consequently more intensive management and administration would be needed. The implementation decisions included in each alternative would support the recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Eagle River	Glenwood Springs ERMA	ERMA	ERMA	ERMA

Acronyms and Abbreviations:

ERMA extensive recreation management area

Under Alternative A, the Eagle River corridor would continue to be identified as part of the Glenwood Springs ERMA, where recreation is not the management focus but an issue of some significance. Recreation management would be focused on providing visitor information, sanitation facilities, and access, and focused on resolving management issues. This direction has resulted in the creation of many developed recreation sites. Visitors currently participate in a variety of river-related activities, camping, and picnicking. A moratorium on commercial river-related SRPs would continue. Recreation activities and recreation management would be subject to finding the Eagle River as eligible for inclusion into the NWSRS.

The Proposed RMP and Alternatives C and D propose designating the Eagle River corridor as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The fragmented parcels of BLM lands provide valuable river access but are not sufficient to be designated and managed as an SRMA. The ERMA designation would appropriately support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Recreation use, demand, or R&VS program investments would be addressed. All alternatives would offer day-use recreation opportunities near local communities and allow participants frequent access to outdoor physical activity.

An NSO stipulation for major rivers (0.5 mile on both sides of the river) applied to the Eagle River corridor and ROW avoidance identification on developed recreation sites would protect the physical RSC on BLM lands from unnecessary surface-disturbing activities. However, factors outside BLM's control, such as access to Interstate 70, population growth, and development of adjacent private lands, would continue to change the social and operational RSCs of the Eagle River corridor through the life of the RMP.

Changing recreation use, camping and partying, campground staffing, sanitation, overfishing, low water levels, and launch site crowding are noted area-specific recreation and tourism issues. The Proposed RMP would restrict camping within the Eagle River ERMA to designated campsites and developed campgrounds. Alternatives C and D would prohibit camping and overnight use on BLM lands, and manage the ERMA for day-use activities by converting the Wolcott and Gypsum campgrounds to day-use recreation sites. Alternatives C and D would better address sanitation, management, staffing, and the changing recreation use patterns, but would impact visitors who enjoy camping. Under Alternative C, recreation activities and management would be subject to finding the Eagle River suitable for inclusion into the National Wild and Scenic River system.

Under the proposed RMP, the CRVFO would evaluate the need for new SRPs or new uses on existing permits every 5 years. SRPs would be issued as a discretionary action for activities that (1) are consistent with resource/program objectives, (2) are within budgetary/ workload constraints, and (3) would satisfy a public demand that the applicant can factually demonstrate is not being met. Alternative C proposes to not authorize new river-related SRPs, whereas Alternative D proposes to maximize opportunities for commercial recreation through the issuance of SRPs, including vending permits outside special events. Since many commercial river outfitters access the river through private and municipal lands, the impacts on commercial use may be minimal.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts. Alternative C includes a group size limit of 25 people per group to reduce crowding at recreation sites because the current infrastructure is limiting. Moderate increases in funding and staffing would be required under all alternatives because of wildland-urban interface issues and anticipated increases in visitors.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Fisher Creek (north of Carbondale)	Glenwood Springs ERMA/RMA	Undesignated*	ERMA	SRMA

Acronyms and Abbreviations:

ERMA extensive recreation management area
RMA recreation management area
SRMA special recreation management area

A 1995 land exchange added Haff Pasture (1,040 acres) to neighboring BLM lands along Cattle Creek. The area is now known as Fisher Creek and is included in the Glenwood Springs ERMA, where recreation is not the management focus but an issue of some significance. Recreation management has focused on providing visitor information, sanitation facilities, and access, and on resolving management issues. The Haff Pasture portion of the area has restrictions on motorized use, mechanized use, cross-country skiing, dogs, and camping. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied an NSO stipulation to protect

nonmotorized opportunities and recreation settings in the Haff Pasture portion of the Fisher Creek area. Alternative A would continue this management direction.

The Proposed RMP would not designate Fisher Creek as an RMA. Mountain biking within the Roaring Fork Valley is accommodated at other SRMAs (Red Hill SRMA and The Crown SRMA). Under the Proposed RMP, the management emphasis for the Fisher Creek area was identified as priority wildlife habitat. The Fisher Creek area would still maintain existing recreation opportunities on designated OHV, mechanized and foot and horse travel routes.

Alternative C proposes designating the Fisher Creek area (Haff Pasture and Cattle Creek) as an ERMA in recognition of existing and anticipated recreation use and demand. The ERMA would be managed to support and sustain the principal nonmotorized recreation activities and the existing qualities and conditions of the ERMA. Management of the ERMA would be commensurate with management of maintaining and improving terrestrial wildlife habitat, as the area is also identified as a core wildlife area. Under Alternative C, an NSO stipulation would be applied to the area to protect core wildlife habitat. On-the-ground management and recreation opportunities would be similar to Alternative A.

Alternative D proposes to designate the area as an SRMA, which recognizes the close-to-town recreational opportunities for local mountain bikers and RSCs for their unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. R&VS management would be recognized as the predominant LUP focus. Emphasizing mountain biking would allow visitors the opportunity to experience frequent access to outdoor physical activity, challenge, reduced mental tension, and improved skills and abilities. These activities and experiences would offer participants personal benefits, such as improved physical fitness, mountain biking skills, and balance of work and play in their lives, and encourage development of a more outdoor-oriented lifestyle.

The determinative RSC attributes of naturalness, remoteness, and access would be maintained, and management issues would be addressed by applying supporting management action and allowable use decisions (e.g., VRM Class II class designation, ROW avoidance area identification, closure to mineral materials sales, closure to wood cutting and commercial timber management, closure to non-energy solid mineral leasing, and travel designations). Recreation-specific CSU stipulations under Alternative D would minimize conflicts with recreation opportunities by requiring surface-disturbing activities that negatively affect recreation opportunities to be moved more than 200 meters away from trails and developed recreation sites.

The overall management direction under Alternative D is to recognize and expand existing uses and accommodate new uses to the greatest extent possible. To that end, the Fisher Creek SRMA would be part of a valley-wide emphasis on mountain biking, which would include the Red Hill SRMA, The Crown SRMA, and a portion of Thompson Creek SRMA, along with opportunities on adjacent National Forest land. According to proponents, SRMA designation, recreation enhancements for mountain biking, the exclusion of motorized use, and subsequent marketing would draw the attention of destination visitors and create a regionally popular mountain biking destination, like Fruita, Colorado. This destination setting would benefit businesses catering to the needs of mountain bikers but may hurt businesses supporting the current mix of recreation activities. Increases in destination visitors, combined with local population growth, would result in increases in social RSCs (e.g., level of contact, group sizes, and evidence of recreation use) through the life of the plan.

Sustaining big game habitat, protecting wintering wildlife, maintaining open space values, and increasing recreation use are local recreation and tourism issues. Alternatives C and D propose management action and allowable use decisions to address these issues. The decisions include December 1 to April 15 seasonal limitations on motorized and mechanized use, limitations on over-snow travel, recreational target shooting restrictions at developed recreation sites, and prohibition of camping within 0.25 mile of the Fisher Creek Cemetery Road.

All alternatives include a seasonal limitation to protect wintering big game. Alternative A has a 15-day longer limitation (December 1 to April 30) than under the Proposed RMP and Alternatives C and D (December 1 to April 15), but the closure under the Proposed RMP and Alternatives C and D would apply to both motorized and mechanized recreation activities.

The effectiveness of managing recreation resources and the anticipated increases in use would depend on: (1) gateway communities (e.g., businesses, chambers, tourism organizations, and local governments) marketing the SRMA responsibly and accurately; (2) local partners providing on-the-ground support; and (3) sufficient funding to support recreation developments and staffing. Under Alternative D, the Red Hill Council (managing partner for the Red Hill SRMA) has been identified as a potential managing partner for the SRMA.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Gypsum Hills Area (northwest of Gypsum)	SRMA	ERMA	Undesignated*	Undesignated*

*Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
Acronyms and Abbreviations:
ERMA extensive recreation management area
SRMA special recreation management area

Alternative A maintains the 1997 Castle Peak Travel Management Plan Amendment designation of Gypsum Hills as an SRMA specifically for OHV riding/driving. No RAMP (implementation plan) has been completed because of a lack of interest. Without such a plan, the CRVFO staff has focused on managing travel management issues, such as designating travel routes, installing signs, and reducing cross-country travel and bandit trails.

The Proposed RMP would designate the Gypsum Hills area as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to support and sustain the existing recreation activities and the associated qualities and conditions of the ERMA. Management of ERMA areas would be commensurate with the management of other resources and resource uses (priority wildlife area, livestock grazing). The Proposed RMP, through route designations, would offer opportunities for a variety of recreation activities (e.g., motorsports, rock crawling, mountain biking, hiking, hunting and scenic driving).

Alternatives C and D would not designate the area as an RMA. Public lands that are not designated as RMAs are managed to meet basic R&VS and resource stewardship needs. Motor sport activities would take place, but the amount of motorized routes would vary by the emphasis of each alternative. The most route reductions would occur under Alternative C, and the least amount of route reductions would occur under Alternative D.

Recreation management costs and personnel requirements would not increase from present levels under any alternative, but travel management implementation costs would be high, depending on the miles of routes closed.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Hack Lake (northwest of Gypsum)	SRMA	Undesignated*	ERMA	ERMA

Acronyms and Abbreviations:

ERMA extensive recreation management area
SRMA special recreation management area

Alternative A maintains the 1988 CRVFO RMP identification of the Hack Lake area as an SRMA. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied an NSO stipulation to protect nonmotorized recreation opportunities and RSCs within the SRMA. Existing recreation management and supporting travel designations emphasize nonmotorized activities. No RAMP was completed to guide R&VS implementation. The 4-acre WSA would continue to be managed under IMP under all alternatives. Recreation activities and management would be subject to finding Hack Creek as eligible for inclusion into the NWSRS.

The Proposed RMP would not designate Hack Lake as an RMA. Under the Proposed RMP, the management emphasis for the Hack Lake area was identified as lands with wilderness character. The Hack Lake area would still maintain existing non-mechanized and nonmotorized recreation opportunities on designated foot and horse travel routes.

Under Alternatives C and D, the Hack Lake area would be designated as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to sustain the principal non-mechanized recreation activities (e.g.. hiking, hunting, horseback riding, and camping) and the associated qualities and conditions of the ERMA.

Under Alternative C, recreation use and management would be commensurate with and subject to finding Hack Creek as suitable for inclusion into the NWSRS and managed for wilderness characteristics. This designation and management would create a large, contiguous, intact landscape where physical RSCs would be protected. The designation and management would enhance opportunities for primitive and unconfined recreation in the area. The accompanying NSO stipulation would preserve the natural-appearing landscape. From a visitor's perspective, Alternatives A and C offer analogous recreation opportunities because of the similarity of activities permitted and resultant RSCs created over the life of the plan. Under Alternative D, the recreation-specific CSU stipulation would minimize conflicts between land uses and recreation use. The Proposed RMP and Alternative D, in that order, have the greatest potential for RSC change through the life of the plan.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the recreation opportunities and would address visitor health and safety, resource protection, and use and user conflicts. Minimal on-the-ground actions would be performed under all alternatives; thus, recreation management costs and personnel requirements would probably be low under all alternatives.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Hardscrabble/East Eagle (Eagle/Gypsum area; south of Interstate-70)	Glenwood Springs ERMA	SRMA	ERMA	SRMA

Acronyms and Abbreviations:

ERMA extensive recreation management area
SRMA special recreation management area

In all alternatives, the Hardscrabble/East Eagle area would offer Eagle-Vail Valley residents frequent access to outdoor activities near their home.

Under Alternative A, the Hardscrabble/East Eagle area would continue to be identified as part of the Glenwood Springs ERMA, where recreation is not the management focus but an issue of some significance. Recreation management would be focused on providing visitor information, sanitation facilities, and access, and on resolving management issues. Visitors would continue to participate in a variety of dispersed activities (e.g., OHVs, ATVs, motorcycling, mountain biking, hiking, and hunting). No explicit RSCs or specific recreation opportunities would be emphasized except in the East Eagle area, where the single-track trail system emphasizes mountain biking and hiking. Recreation activities and recreation management would be subject to finding Abrams Creek as eligible for inclusion into the NWSRS.

Alternative C proposes to designate the area as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to support and sustain current variety of recreation activities and the existing qualities and conditions of the ERMA. Management of the ERMA would be commensurate with management of other resources and resource uses (core wildlife areas, ACECs, and livestock management). Alternative C would offer opportunities for a variety of recreation activities through route designations without emphasizing any specific recreation activity in a particular zone. Route designations would maintain the current single-track mountain bike trail system. However, some motorized routes would be closed based on resource issues and private lands. Recreation activities and management would be subject to management prescriptions for the Hardscrabble-Mayer Gulch ACEC under the Proposed RMP and the larger Hardscrabble-Mayer Gulch/East Eagle Ridge ACEC under Alternative C. Recreation activities and management would also be subject to finding Abrams Creek as suitable for inclusion in the NWSRS in Alternative C.

Under the Proposed RMP and Alternative D, the Hardscrabble/East Eagle area would be designated as an SRMA where the existing recreation opportunities and RSCs are recognized for their unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. R&VS management would be recognized as the predominant LUP focus and managed in two RMZs to further delineate specific recreation opportunities. The Proposed RMP and Alternative D would focus on producing a specific set of recreation opportunities for the day-use activities of mountain biking in RMZ 1, and OHV riding and driving in RMZ 2. Under the Proposed RMP and Alternative D, the Hardscrabble/East Eagle SRMA (RMZ 1) would be part of a local emphasis on mountain biking and creation of a biking destination, like Fruita, Colorado. The activity emphasis by RMZ would reduce the area open to motor sports.

The RSCs within the SRMA would be retained through proposed management action and allowable use decisions (e.g.. CSU stipulations, VRM class designations, ROW avoidance area identification, and closures to mineral materials sales, wood cutting and commercial timber management, non-energy solid mineral leasing,

and travel designations). The CSU stipulation for the ERMA is a moderate constraint on surface-disturbing activities, whereas physical RSCs are best maintained by the application of an NSO stipulation.

All alternatives include specific protective measures and management actions to protect resources and provide for visitor safety. Protective measures and management actions include firearm use restrictions, parking restrictions, and camping and overnight use restrictions.

It is likely that visitation levels would increase through the life of the plan because (1) the Vail region is renowned and marketed for its outdoor recreation amenities, and (2) information about the local mountain biking and hiking opportunities can be found on websites and brochures produced by the town of Eagle, Eagle County, and local businesses. Maintaining the existing social RSCs (i.e., level of contact with others, group size, and evidence of use) will be difficult over the life of the plan. More intensive administration, management, and monitoring (e.g., more visitor facilities, more signs, increased managerial and enforcement presence, and increased user controls), especially in the proposed SRMAs, would be necessary.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would help sustain recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts. The effectiveness of managing recreation resources and the anticipated increases in use would depend on: (1) gateway communities (e.g.. businesses, chambers, tourism organizations, and local governments) marketing the SRMA responsibly and accurately; (2) local partners providing on-the-ground support; and (3) sufficient funding to support recreation developments and staffing. To fulfill the local desire for a motor-cross track; the Proposed RMP and Alternatives C and D would propose locating a motocross track and staging area (pending an environmental assessment) in the Spring Creek area. The track would be managed under a Recreation and Public Purposes lease by the town of Gypsum.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
King Mountain (near Toponas)	Glenwood Springs ERMA/RMA	SRMA	ERMA	ERMA

Acronyms and Abbreviations:

ERMA extensive recreation management area
SRMA special recreation management area

Under Alternative A, the King Mountain area would continue to be included as part of the Glenwood Springs ERMA identified in the 1984 GSRA RMP. The public gained access in 1993 by a conservation partnership between the BLM, the CPW, and the Rocky Mountain Elk Foundation that acquired private land along the north slope of King Mountain. Recreation management would focus on providing visitor information, sanitation facilities, and access, and on resolving management issues. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied an NSO stipulation to protect nonmotorized opportunities and RSCS.

The Proposed RMP would manage the area as an SRMA, recognizing the existing recreation opportunities and RSCs for their unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. The focus would be on producing a specific set of outcomes desired for hunting, horseback riding, wildlife viewing, and camping. Emphasizing these activities would offer visitors the opportunity to escape everyday responsibilities for a while, to experience solitude and reduce tension, to exercise, and to

enjoy the area's wildlife scenery and aesthetics. These activities and experiences would offer personal benefits to participants, such as improved mental well-being, improved physical fitness, stronger ties with friends and family, and greater environmental awareness and sensitivity.

In the Proposed RMP, the determinative RSCs of naturalness, remoteness, and access would be maintained and management issues would be addressed by applying an NSO stipulation along with other supporting management action and allowable use decisions. These decisions would include VRM Class II class designation, ROW avoidance area identification, and closure to mineral materials sales, wood cutting and commercial timber management, and non-energy solid mineral leasing and travel designations.

Under Alternatives C and D, King Mountain would be managed as an ERMA to address recreation use, demand, and existing R&VS program investments. The ERMA designation would support and sustain the principal recreation activities (e.g.. hunting, horseback riding, wildlife viewing, and camping) and the associated qualities and conditions of the ERMA. The management of the ERMA areas would be commensurate with the management of other resources and resource uses.

Under Alternative C, a CSU stipulation would be applied to the entire area to constrain surface use, occupancy, and surface-disturbing activities. Under Alternative D, a less extensive CSU is applied only to developed recreation sites, allowing the potential for more physical change in the landscape. Alternatives C and D have more potential than either Alternative A or the Proposed RMP for adverse physical RSC change through the life of the plan.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the targeted recreation opportunities and would address visitor health and safety, resource protection, and use and user conflicts. Staff presence would probably remain low, except during the fall big game hunting season. Recreation management costs and personnel requirements would probably stay close to present levels in all alternatives.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
New Castle (near New Castle)	Glenwood Springs ERMA	ERMA	ERMA	ERMA

Acronyms and Abbreviations:

ERMA extensive recreation management area

The New Castle area is part of the Glenwood Springs ERMA, where recreation is not the management focus but is an issue of some significance. Recreation management is focused on providing visitor information, sanitation facilities, and access, and on resolving management issues. On-the-ground implementation actions would continue to focus on maintaining the undeveloped Garfield Creek Colorado River access recreation site, working with the town of New Castle as a managing partner for the Colorow Trail, reducing recreation and wintering wildlife conflicts, and handling travel management.

The Proposed RMP and Alternatives C and D would designate the New Castle area as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to support and sustain the existing recreation activities and the associated qualities and conditions of the ERMA. Management of ERMA areas would be commensurate with the management of other resources and resource uses (i.e., core wildlife area and livestock grazing).

The physical, social, and operational RSCs are maintained through proposed management action and allowable use decisions (e.g., CSU stipulations, VRM class designations, ROW avoidance applied to developed recreation sites, and closure to mineral materials sales, to wood cutting and commercial timber management, to non-energy solid mineral leasing, and travel designations). Under the Proposed RMP and Alternative C, a CSU stipulation would be applied to the entire area; under Alternative D, a less extensive CSU would be applied only to developed recreation sites, allowing the potential for more physical change in the landscape. Management action and allowable use decisions for other resources (e.g., NSO stipulations for wildlife core areas, soils, steep slopes) would indirectly help retain the existing physical RSCs. To reduce seasonal wildlife conflicts, over-snow travel and the winter big game closures are proposed for the entire area under Alternative C; it excludes the Tibbetts area under the Proposed RMP and Alternative D.

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would help sustain recreation opportunities and address visitor health and safety, resource protection, and use and user conflicts. In this community growth area, community partners would be necessary to hold down BLM recreation and travel management costs and staffing needs. With community support, the BLM recreation management costs and personnel requirements would slightly increase above present levels under the Proposed RMP and Alternatives C and D.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Pisgah Mountain (between Burns and McCoy)	Glenwood Springs ERMA/RMA	Undesignated*	Undesignated*	Undesignated*

- Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.

Acronyms and Abbreviations:

R&VS recreation and visitor services
RMA recreation management area
SRMA special recreation management area

The Pisgah Mountain area was included as part of the Glenwood Springs ERMA identified in the 1984 GSRA RMP. Recreation management focused on providing visitor information, sanitation facilities, and access, and focused on resolving management issues. Recreation opportunities, nonmotorized activities, RSCs, and management were amended by area-specific decisions made in the 1997 Castle Peak Travel Management Plan. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied GS-NSO-17 to protect nonmotorized activity opportunities and RSCs in the Pisgah Mountain area. Recreation activities and management would be subject to finding the Colorado River as eligible for inclusion in the NWSRS.

Under the Proposed RMP and Alternatives C and D, the Pisgah area would not be designated as a RMA. BLM lands that are not designated as RMAs are managed to meet basic R&VS and resource stewardship needs. Under the Proposed RMP, recreation use would be subject to and consistent with managing priority and general greater sage-grouse habitat and the Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics, which emphasize primitive and unconfined recreation. Under Alternative C, recreation use would be subject to and consistent with prescriptions for the Greater Sage Grouse Habitat ACEC and the *Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics*, which emphasize primitive and unconfined recreation. Under Alternative C, recreation activities and management would be subject to finding the Colorado River as suitable for inclusion in the NWSRS.

Under the Proposed RMP and Alternatives C and D, nonmotorized activities would be emphasized and managed through nonmotorized travel designations. Travel designations, along with decisions for visual,

natural, and cultural resources (e.g., NSO stipulations for major rivers and Upper Colorado River SRMA prescriptions) would indirectly retain the current RSCs on portions of the area through the life of the plan.

The minimum recreation management actions would be required to achieve CRVFO-wide recreation objectives. Recreation management costs and personnel requirements would slightly increase from present levels under all alternatives.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Red Hill (near Carbondale)	SRMA	SRMA	SRMA	SRMA

Acronyms and Abbreviations:

SRMA special recreation management area

Unlike other SRMAs in the CRVFO, the 2000 Red Hill RMP Amendment identified Red Hill as an SRMA. The Red Hill SRMA emphasizes opportunities to participate in day-use mountain biking, hiking, and walking. The majority of visitors come from the Roaring Fork Valley. Under all alternatives, the Red Hill area would be managed as an SRMA, with a commitment to emphasize recreation by managing for specific recreation opportunities and RSCs on a long-term basis. The Proposed RMP and Alternatives C and D propose to revise the SRMA's outcome objective based on the visitor study (Virden et al. 2008) and scoping comments.

Rationale for maintaining the SRMA under the Proposed RMP and Alternatives C and D is based on public comment and the CRVFO visitor study data (Virden et al. 2008) suggests the existing recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. The data suggested that visitors are extremely satisfied with the existing RSCs and the recreation opportunities. All alternatives would continue to offer close-to-town hiking, walking, and mountain biking opportunities, and would allow participants frequent access to outdoor physical activity. Emphasizing these activities would allow visitors the opportunity to experience frequent access to outdoor physical activity, the area's wildlife, scenery, views, and aesthetics, challenge, reduced mental tension, and improved skills and abilities. These activities and experiences would offer participants personal benefits such as improved physical fitness, improved outdoor skills, and improved balance of work and play in their lives, and would encourage development of a more outdoor-oriented lifestyle. Social, economic, and environmental benefits would include lifestyle improvement or maintenance, greater value-added local services, increased desirability as a place to live or retire, and the desire to preserve the special landscape character of Red Hill.

The determinative RSCs of naturalness, remoteness, and access would be maintained, and management issues would be addressed by applying supporting management action and allowable use decisions. These actions include NSO stipulation, nonmotorized travel designations, closure to timber harvest, ROW avoidance of recreation sites, closure to non-energy solid mineral leasing, camping closure, seasonal winter wildlife closures, over-snow limitations, restriction of firearms in developed recreation sites, nonmotorized travel designations, closure to timber harvest, ROW avoidance of recreation sites, and VRM Class II designation. A ROW avoidance area identification and a closure to mineral materials sales under the Proposed RMP and Alternative C would complement the existing NSO stipulation, and would ensure that the existing physical RSCs are retained. These actions are not included under Alternatives A and D.

Under the Proposed RMP and Alternative C, no competitive events, group use or new commercial SRP would be issues. In contrast Alternative D would allow small (< 75 person) competitive and group use events. Realizing the lack of recreation infrastructure; parking and access issues; intermixed land ownership; terrain and current use trends; prohibiting competitive events, group use, or new commercial SRP would reduce conflicts and help maintain recreation objectives and desired RSCs.

The RMP management direction under Alternative D is to recognize and expand existing uses and accommodate new uses to the greatest extent possible. To that end, the Red Hill SRMA would be part of a valley-wide emphasis on mountain biking, which would include The Crown SRMA, Fisher Creek SRMA, and a portion of Thompson Creek SRMA, along with opportunities on adjacent National Forest land. According to proponents, SRMA designation, recreation enhancements for mountain biking, the exclusion of motorized use, and subsequent marketing would draw the attention of destination visitors and would create a regionally popular mountain biking destination, like Fruita, Colorado. This destination setting would benefit businesses catering to the needs of mountain bikers. Increases in destination visitors, combined with local population growth, would result in increases in social RSCs (e.g.. level of contact, group sizes, and evidence of recreation use) through the life of the plan.

Overall, respondents and comments have suggested that all RSCs should be left as is, but that fewer visitor services should be provided in the Mushroom Rock area, a few more trails could be constructed on the north side, and a few more signs should be installed, especially at trail junctions. Alternatives A and C would maintain the existing trail system and new trails would be constructed only to connect to new access points. The construction of new mountain bike trails could be authorized under the Proposed RMP to make additional loop trail connections and connect new access points. Under Alternative D, more miles of trail would likely be needed to support increases in recreation tourism.

The SRMA is currently and would continue to be administered under an MOU with the Red Hill Council. The effectiveness of managing recreation resources and the anticipated increases in use would depend on: (1) gateway communities (e.g.. businesses, chambers, tourism organizations, and local governments) marketing the SRMA responsibly and accurately; (2) local partners providing on-the-ground support; and (3) sufficient funding to support recreation developments and staffing.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Siloam Springs (near Dotsero)	Glenwood Springs ERMA/RMA	Undesignated*	Undesignated*	Undesignated*
Sunlight Peak	Glenwood Springs ERMA/RMA	Undesignated*	Undesignated*	Undesignated*

- Public lands that are not designated as RMAs would be managed to meet basic R&VS and resource stewardship needs.
Acronyms and Abbreviations:

ERMA extensive recreation management area
R&VS recreation and visitor services
RMA recreation management area

The Siloam Springs and Sunlight Peak areas were included as part of the Glenwood Springs ERMA identified in the 1984 GSRA RMP. Recreation management focused on providing visitor information, sanitation facilities, and access, and focused on resolving management issues. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied an NSO stipulation to protect nonmotorized activity opportunities

and RSCs in both areas. Implementation-level management, administration, and monitoring have focused solely on travel management issues.

Because existing recreation opportunities and RSC are not unique or distinctive, especially as compared with other areas used for recreation, the Proposed RMP and Alternatives C and D would not designate the areas as an ERMA or SRMA. Public lands that are not designated as RMAs are managed to meet basic R&VS and resource stewardship needs. Under the Proposed RMP and Alternatives C and D, nonmotorized recreation activities would be emphasized and managed through nonmotorized travel designations. Travel designations, along with management action and allowable use decisions for visual, natural, and cultural resources, would indirectly but cumulatively retain the current RSCs through the life of the plan.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Silt Mesa (north of Silt)	Glenwood Springs ERMA	ERMA	ERMA	ERMA

Acronyms and Abbreviations:
ERMA extensive recreation management area

Under Alternative A, the Silt Mesa area would continue to be identified as part of the Glenwood Springs ERMA, where recreation is not the management focus but an issue of some significance. Recreation management would focus on providing visitor information, sanitation facilities, and access, and on resolving management issues.

Under the Proposed RMP and Alternatives C and D, the Silt area would be managed as an ERMA to better address recreation use and demand. The ERMA would be managed to support and sustain the principal nonmotorized recreation activities and the associated qualities and conditions of the ERMA. Management of the ERMA would be commensurate with management of other resources. An SRMA designation was considered but not proposed because portions of the area are mapped as high potential for gas resources and are leased for natural gas development, so surface-disturbing activities are anticipated during the life of the plan. The inability of recreation managers to plan for and maintain RSCs or to produce specific recreation opportunities on a long-term basis means the SRMA designation is inappropriate.

Alternative C emphasizes opportunities to participate in dispersed, day-use, nonmotorized recreation. The Proposed RMP and Alternative D emphasize a greater range of recreation activities, including both motorized and nonmotorized recreation. All alternatives offer a mix of recreation opportunities near the town and allow participants in emphasized activities frequent, close-to-town, access to outdoor physical activities.

The Proposed RMP and Alternative C would apply a CSU stipulation to constrain surface use, occupancy, and surface-disturbing activities on unleased lands within the ERMA. Alternative D would apply a CSU stipulation on developed recreation sites and trails. The CSU stipulation in the Proposed RMP and Alternative C would cover more acres of the ERMA, offering better protections for the physical RSCs.

Current management issues involve indiscriminate and unsafe target shooting (including exploding targets); trash; inappropriate OHV use; and trespassing on private lands. Local homeowners and users sent a petition to the CRVFO stating that target shooting had escalated to the point that the area is no longer used by many residents. To address these issues, the Proposed RMP and Alternative C would limit travel to designated routes and prohibit camping. In addition, the Proposed RMP and Alternative C would also restrict firearm

use for target shooting. The Proposed RMP only proposes restricting firearm use for target shooting on 900 acres in the urban interface zone (south portion), whereas Alternative C proposes to restrict firearm use for target shooting on all BLM lands on Silt Mesa (3,300 acres). The 900-acre restriction would cause very minor, localized impacts to target shooting activities in the CRVFO. The 900-acre restriction would address the existing public safety concerns by minimizing a direct threat to public safety from accidental shooting and use in an urban interface zone. Other local BLM lands and state lands would probably absorb the displaced target shooting use. For example, people who want to target shoot could go to the nearby West Rifle Creek State Wildlife Area, which has a recently improved and expanded shooting range. The improved shooting range provides Garfield County (including the towns of Rifle, Silt, and New Castle) hunters and firearm enthusiasts with a safe, high-end public shooting area. Improvements include improved access, expanded parking and the construction of additional rifle and pistol lanes (CPW 2013).

The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the recreation opportunities and would address visitor health and safety, resource protection needs, and use and user conflicts. In this community growth area, community partners would be necessary to hold down BLM recreation and travel management costs and staffing needs.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Thompson Creek (southwest of Carbondale)	SRMA	ERMA	ERMA	SRMA

Acronyms and Abbreviations:

ERMA extensive recreation management area
SRMA special recreation management area

Under all alternatives, the Thompson Creek area would offer Roaring Fork Valley residents frequent access to outdoor physical activities near their home. However, the emphasized activities vary by alternative.

Alternative A maintains the 1988 RMP identification of the southern portion of the Thompson Creek area as an SRMA managed primarily to provide scarce recreation opportunities not available elsewhere and, secondarily, to reduce resource damage, solve visitor health and safety problems, and mitigate conflicts. Overlapping ACEC prescriptions for the protection of geologic and scenic values has created unresolved management conflicts with rock climbing on the geologically unique rock fins. The 1999 Oil and Gas RMP Amendment/Supplemental EIS applied an NSO stipulation to protect nonmotorized activities and recreation settings within the SRMA. No RAMP was completed to guide implementation. Recreation activities and management would be subject to finding Thompson Creek as eligible for inclusion in the NWSRS.

Under the Proposed RMP and Alternative C, the area would be designated as an ERMA in recognition of existing and anticipated recreation use, demand, and R&VS program investments. The ERMA would be managed to sustain the principal recreation activities (e.g.. hiking, climbing, hunting, horseback riding, mountain biking, and camping) and the associated qualities and conditions of the ERMA.

Under the Proposed RMP, recreation use would be subject to and managed consistent with Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics, which emphasize primitive and unconfined recreation opportunities, while still maintaining existing mechanized travel on the Lorax trail and existing motorized use on route #8275. Leaving the Lorax trail open would allow mountain biking to

continue on the popular route. Continued motorized use on route #8275 would accommodate motorized access to the area during hunting season and allow for scenic driving opportunities.

Under Alternative C, recreation use would be subject to and managed consistent with finding Thompson Creek as suitable for WSR designation (wild classification) and with interim protective management guidelines. Also under Alternative C, recreation use would be subject to and managed consistent with Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics, which emphasize primitive and unconfined recreation opportunities.

Under Alternative D, the Thompson Creek area would be identified as an SRMA where the existing recreation opportunities and RSCs are recognized for their unique value, importance, or distinctiveness, especially as compared with other areas used for recreation. R&VS management would be recognized as the predominant LUP focus and managed in three RMZs to further delineate specific recreation opportunities. Alternative D would focus on producing a specific set of outcomes for the day-use activities of hiking in RMZ 1 (700 acres), climbing in RMZ 2 (4,000 acres), and mountain biking in RMZ 3 (4,850 acres).

The overall management direction under Alternative D is to recognize and expand existing uses and accommodate new uses to the greatest extent possible. To that end, RMZ 3 would be part of a valley-wide emphasis on mountain biking, which would include the Red Hill SRMA, Fisher Creek SRMA, and The Crown SRMA, along with opportunities on adjacent National Forest land. According to proponents, SRMA designation, recreation enhancements for mountain biking, the exclusion of motorized use, and subsequent marketing would draw the attention of destination visitors and create a regionally popular mountain biking destination, like Fruita, Colorado. This destination setting would benefit businesses catering to the needs of mountain bikers but may hurt businesses supporting the current mix of recreation activities. Increases in destination visitors, combined with local population growth, would result in increases in social RSCs (e.g.. level of contact, group sizes, and evidence of recreation use) through the life of the plan.

Under Alternative A, climbing would continue as outlined in an agreement with the Roaring Fork Climber's Coalition. The Proposed RMP and Alternative C propose some climbing limitations to protect geologic values in the ACEC and wilderness characteristics in the Thompson Creek Unit, which would allow for the continued use of established sport climbing routes. Some climbers argue that the nature of the rocks in Thompson Creek requires that permanent fixed anchor bolts are needed for sport climbing and safety. Alternative D does not propose an ACEC designation so management focuses on emphasizing sport climbing in RMZ 2 and allows for establishing new routes and installing bolts with power drills. The corresponding implementation decisions for climbing by alternative include those described below. Under all alternatives, climbing without the use of fixed anchors (bolts, hangers, pitons) would continue to be allowed throughout the area.

Alternative A:

- Climbing is permitted on designated bolted routes at the current climbing area (rock crag) only.
- No additional development of bolted routes within the area would be permitted.
- Mechanical devices (e.g., power drills) may not be used at the current climbing area (rock fin) only.

Alternative B (Proposed RMP) only:

- Reestablishment of old routes and permanent fixed anchors (bolts and pitons) would be permitted at the current climbing area (rock crag) only.
- No additional development of bolted routes within the area would be permitted.
- Mechanical devices (e.g., power drills) may be used at the current climbing area (rock fin) only.

Alternative C only:

- The establishment of new routes and reestablishment of old routes using fixed anchors would not be permitted. All climbing must be done without fixed anchors or other human installations.
- All existing fixed anchors (bolts, hangers, and pitons) would be removed.
- Mechanical devices (e.g., power drills) would not be permitted.

Alternative D only:

- The establishment of new routes and reestablishment of old routes using fixed anchors would be permitted.
- Mechanical devices (e.g., power drills) would be permitted.

The RSCs within the SRMA are retained through proposed management action and allowable use decisions (e.g., CSU stipulations, VRM class designations, ROW avoidance area identification, and closure to mineral materials sales, to wood cutting and commercial timber management, to non-energy solid mineral leasing, and travel designations). Management action and allowable use decisions for other resources (e.g., NSO stipulations for soils and riparian areas) would indirectly help retain the existing physical RSCs under all alternatives. Alternative D has the greatest potential for RSC change through the life of the plan because the SRMA has a CSU stipulation (moderate constraint on surface-disturbing activities) instead of an NSO stipulation (major constraint) to protect RSCs. The implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the targeted recreation opportunities and would address visitor health and safety, resource protection, and use and user conflicts. With community support, R&VS program costs and personnel requirements would increase only under Alternative D.

Area	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Upper Colorado River (State Bridge to Glenwood Canyon)	SRMA	SRMA	SRMA	SRMA

Acronyms and Abbreviations:
SRMA special recreation management area

Alternative A maintains the 1988 RMP identification of the Colorado River corridor as an SRMA, offering opportunities for floatboating and related activities (e.g., fishing and camping) in roaded, semideveloped, but natural-appearing landscape. BLM's river management would continue to focus on providing facilities and permitting—but not regulating—commercial and private river use. Market demand and conditions would determine the long-term use levels. Recreation activities and management would be subject to finding the Colorado River as eligible for inclusion in the NWSRS.

Under all action alternatives, the Upper Colorado River area would also be identified as an SRMA where the river-related recreation opportunities and RSCs are recognized for their unique value, importance, or

distinctiveness, especially as compared with other areas used for recreation. R&VS management would be recognized as the predominant LUP focus and recreation opportunities would be managed in two RMZs to further delineate specific recreation opportunities. From State Bridge to Burns, opportunities to participate in trout fishing and floatboating would be emphasized; from Burns to Glenwood Canyon, opportunities to participate in floatboating and tubing would be emphasized.

In all action alternatives the determinative RSC of naturalness would be retained and management issues would be addressed by applying the supporting management action and allowable use decisions. These decisions include NSO or CSU stipulations, nonmotorized travel designations, closure to timber harvest, ROW avoidance of recreation sites, closure to non-energy solid mineral leasing, camping restrictions, seasonal winter wildlife closures, over-snow limitations, restriction of firearms in developed recreation sites, nonmotorized travel designations, closure to timber harvest, ROW avoidance of recreation sites, and VRM Class II designation. In addition, BLM would recommend to the Secretary of the Interior to withdraw developed recreation sites and to close the Upper Colorado River SRMA to the mining laws for locatable mineral exploration or development to help retain the physical RSCs. The lack of an identified ROW avoidance area and closure to mineral materials sales under Alternatives A and D would allow some surface-disturbing activities that could negatively change RSCs. These activities are prohibited under the Proposed RMP and Alternative C.

Under the Proposed RMP, the BLM would defer a suitability determination on Colorado River segments and would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing nature, ORVs, classification, and water quality of Colorado River segments. The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* would protect the ORVs through a cooperative water delivery mechanism. The Upper Colorado River Stakeholder Group Management Plan would attempt to operate water facilities in a manner that meets water supply objectives and protects the ORVs. Under Alternative C, recreation activities and management would be subject to finding the Colorado River as suitable for WSR designation and with interim protective management guidelines. However with no *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* in place, water flows would be subject to the water rights system. Without some sort of specific effort to protect and manage flows, there may be a gradual reduction in flows necessary to support recreation use and river values over the life of the RMP.

Generally, river use has remained flat on the Upper Colorado River. Between 2007 and 2009, use declined by 4.9 percent, from 31,997 user days to 28,000 user days (CROA 2009). From State Bridge to Burns, 96 percent of visitors were very to extremely satisfied with their trip (Virden et al. 2008b). The visitor studies and public comments indicate the most important contributions to satisfaction were participation in desired river-related activities, companionship, opportunity to think and reflect, and the naturalness of the place. The mean number of groups encountered by visitors was 5.5 per trip, with an estimated average group size of 4.7 people. The small average group size is a result of the popularity and dominance of commercial and private fishing groups, which are typically small. Eighty-eight percent of visitor study respondents felt the current group size and number of contacts should stay "as is" (Virden et al. 2008b). The long-term management question becomes how much change, if any, to the physical, social, and operational RSCs is acceptable to visitors.

Although current use levels are somewhat flat, the recreation management challenge would be maintaining the social RSCs "as is" over the life of the RMP. Maintaining the social RSCs could be especially difficult under

Alternative C, where the Colorado River is found as suitable for inclusion in the NWSRS. In a region that is already renowned and marketed for its outdoor recreation amenities, a subsequent congressional designation would probably highlight the Colorado River to destination visitors. Visitation would probably increase, and consequently the need for more intensive recreation management and administration to protect resources and maintain the desired social RSCs.

The alternatives present several management scenarios to maintain the current visitor satisfaction levels over the life of the RMP. Groups are limited to a maximum of 25 people per group (including guides) in both RMZs in the Proposed RMP. The Proposed RMP could result in difficulties in maintaining the season average desired social RSCs in RMZ 1, but it does allow for groups of 16-25 people to float from above State Bridge through RMZ 1. Alternative C proposes to manage for a season average of up to 15 people per group in RMZ 1 and 25 people per group in RMZ 2 by limiting floatboating group sizes to 15 people (including guides) in RMZ 1 and to 25 people per group (including guides) in RMZ 2.

Under the Proposed RMP, the CRVFO would evaluate the need for new SRPs or new uses on existing permits every 5 years. SRPs would be issued as a discretionary action for activities that (1) are consistent with resource/program objectives, (2) are within budgetary/ workload constraints, and (3) would satisfy a public demand that the applicant can factually demonstrate is not being met. Vending permits (except shuttle services) outside special events on BLM lands would be prohibited. Alternative C proposes to not authorize any new river-related commercial SRPs. Limiting commercial SRPs to current levels adversely affects people wanting to acquire a new SRP. No vending permits, group use, or competitive events would be authorized in RMZ 1. All these limitations would help to ensure that commercial and private use does not grow above desired social RSCs throughout the life of the RMP.

No river permit system is proposed under any alternative. A permit system could be adaptively implemented at a later date if monitoring indicates the level of contact with other groups were impacting the quality of the visitor's recreation experience based on the standards found in the SRMA objective and the desired RSCs.

Alternative D proposes to initially manage both RMZs for a season average group size of 25 people to better maintain tourism revenue and maximize resource use. Alternative D proposes to use monitoring data to determine when visitor use limitations would be imposed, based on the RMZ objective and proposed RSCs. Alternative D would allow for slightly more physical and social RSC change through the life of the plan. Based on data showing a visitor preference for current physical, social, and operational RSCs, it is unclear whether a larger group size limit (15 or 25 people) and an increase amount of contact with other groups would facilitate the visitors' realization of the targeted recreation experiences and benefits in RMZ 1.

Alternative B proposes the implementation-level decision to require a human waste carry-out system for all river trips. A human waste carry-out system would protect visitor health and help maintain a natural setting at dispersed river camp sites. Permitted outfitters are already required by the River Outfitter Regulations to pack out human waste (CPW 2011). While the requirement to pack out human waste will be new to the public, CRVFO included this regulation to be consistent with decisions made for upstream sections of the Colorado River managed by KFO and for other rivers throughout the region. In addition, the Proposed RMP proposes that all river trips must use a fire pan for campfires outside of designated camping sites with metal fire rings. Fire pans must have a 1.5 inch rim. This requirement will be new for commercial outfitters and the public in the SRMA. It will help to maintain the existing level of evidence of use. The CRVFO will also have more

consistent regulations with upstream sections of the Colorado River managed by KFO and with other rivers throughout the region.

The other implementation decisions for comprehensive trails and travel management and SRPs included in each alternative would support the recreation opportunities and would address visitor health and safety, resource protection needs, and use and user conflicts. BLM recreation management funding and staffing needs would moderately increase under all action alternatives.

Other BLM Lands not Identified as an RMA

Under Alternative A, recreation management would be managed under current RMP guidance that focuses on providing visitor information, sanitation facilities, and access, and on resolving management issues. Under all action alternatives, BLM lands not included in an RMA would be managed to meet basic R&VS and resource stewardship needs and achieve CRVFO-wide recreation objectives. The BLM and its partners would monitor recreation use and resources and would adaptively perform additional implementation actions, as necessary, to address basic R&VS and resource stewardship needs.

Cumulative Impacts

Past and present actions that have had, and are having, direct and indirect impacts on recreation are discussed in Chapters 3 and 4. Cumulative effects include other future actions that are reasonably certain to occur in the region. The CRVFO has experienced many changes in recreation use and management since the 1984 RMP in the types of recreation activities desired, the intensity of recreation, and the location of recreation use. The most complete description of recreation-tourism demand and trends in northwest Colorado can be found in the *2008 Colorado Statewide Comprehensive Outdoor Recreation Plan* (CSP 2008). The plan noted the following key points:

- Outdoor recreation opportunities significantly contribute to the high quality of life enjoyed by Colorado residents. Growth in the region will significantly impact the demand for outdoor recreation in the future. Overall, the Northwest Region anticipates an 80 percent increase in residents by 2030, partially attributed to two major factors: anticipated growth in the oil and gas industry, and retiring baby boomers seeking the milder climate of the Western Slope. Garfield County is projected to grow more dramatically than other counties in the region, increasing 138 percent between 2007 and 2030.
- Overall, tourism is a major driver of Colorado's economy and is the second-largest industry statewide, with more than 28 million people visiting the state in 2008. The tourism industry is a critical component of the Northwest Region's economy, contributing nearly $3.9 billion in 2006 through direct travel spending, tourism-related employment wages, and state and local taxes.
- Colorado's tourism industry is tied to the unique landscapes, natural resources, and renowned recreation opportunities that international, domestic, and in-state travelers enjoy throughout the year. The Northwest Region is also home to some of Colorado's most popular resort towns, including Aspen, Snowmass, Vail, Beaver Creek, Winter Park, Breckenridge, Frisco, and Steamboat Springs.
- Recreational opportunities in the Northwest Region are closely tied to the 9.9 million acres of public lands, the majority of which are managed by federal agencies, such as the BLM, USFS, and National Park Service. Nearly 600,000 acres are managed by state agencies, such as the CPW, Colorado State Parks, and Colorado State Land Board.

- Developing a community trail system is the top need for not just Northwest Region local governments but also for respondents across Colorado. Second was the need to develop trails connecting to public lands. Interestingly, mountain biking trails are not reported as a priority for recreation managers in other regions, but they are important for agencies in the northwest.
- The majority of recreation occurs near the home, particularly during the week, but outdoor enthusiasts are willing to travel much farther on weekends. Nearly half of Coloradans seem to prefer recreation sites with basic services, which consist of toilets, shelter, water, and picnicking areas.

"A Survey of Colorado Recreation Trends, Issues, and Needs," prepared by Gary Horvath, Colin Hickey, and Cindy DiPersio for the Leeds School of Business at the University of Colorado at Boulder (Horvath et al. 2007), reported the following:

- Coloradans apparently enjoy the full spectrum of recreation destinations from "large parks with a wide range of camping, trails, boating, and fishing" to "wilderness areas with little to no development" to "forests and/or lakes with limited trails, camping, boating, and fishing opportunities."
- More than 32 percent engaged in outdoor recreation two to four times per week, and approximately 20 percent participated more than four times per week.
- Respondents used trails, parks, and open spaces approximately 1.5 times per week.
- Cleanliness and crowding were the top concerns about outdoor recreation in the state.

In 1997, the WRNF recorded more than 8.8 million recreation visitor-days. The WRNF Forest Plan ROD projected recreation demand to increase for trails and scenic resources that provide opportunities for hiking, backpacking, horseback riding, mountain biking, all-terrain vehicle and snowmobile use, sightseeing, and pleasure driving (WRNF 2002). That plan increased summer motorized and winter nonmotorized recreation activities, limited the number of new developed recreation sites, and allowed developed sites to be expanded to provide concentrated recreational use (WRNF 2002). The *North-Central Colorado Community Assessment Report* (BLM 2007d) for the BLM indicated that recreation, scenic beauty, and quality of life were some of the top reasons people live in local communities. As expected, the most commonly identified outcomes that communities want to receive from BLM lands related to benefits from participation in recreation activities and maintenance of open spaces and scenic vistas. The most commonly cited economic benefit derived from BLM lands was contributions to the local economy made by recreation-related tourism, especially hunting and wildlife-related tourism.

Activities. People seeking outdoor recreation historically have used BLM lands, the adjacent WRNF, and state lands for a wide variety of activities. Since approximately 80 percent of BLM lands are within 1 mile of private land, BLM lands would continue to be the frequent destination for outdoor recreation activities, for community residents, as well as visitors to destination resort towns. All alternatives offer dispersed and structured recreation opportunities designed for a specific activity, such as camping, fishing, hunting, wildlife viewing, boating, hiking, rock climbing, mountain biking, OHV riding and driving, snowmobiling, and skiing. Each alternative includes a different strategic mix of recreation opportunities to meet the diverse range of recreation opportunities demanded by visitors and communities in the region. All alternatives, no matter the area designation of SRMAs or ERMAs, offer opportunities for "close to home" and frequent access to outdoor physical activities. The BLM would consider additions to community trail systems when necessary to

address recreation activity demand created by growing communities and recreation tourism. Alternative D proposes to manage the most areas specifically for mountain biking. Alternative C, with the fewest SRMAs, offers less structured recreation opportunities and more opportunities for nonmotorized recreation activities. Winter limitations on motorized and mechanized activities to protect wildlife are included in all alternatives but are the most widespread under the Proposed RMP and Alternative C.

Recreation Setting Characteristics. The effects of proposed BLM management actions and allowable use decisions, combined with future actions that are reasonably certain to occur in the region on adjacent lands, could affect recreation by changing the RSCs that are considered desirable for much recreation.

Physical Recreation Setting Characteristics. The Proposed RMP and Alternatives A and C offer the most management action and allowable use decisions aimed at retaining natural landscapes and scenic vistas in high-valued recreation areas. Constraints on surface development and protections afforded to natural resources would be the highest under Alternative C and the lowest under Alternative D. The area west of the Grand Hogback would probably see some degradation of naturalness over the life of the plan because of energy development on already leased lands.

The Proposed RMP and Alternative C use travel management designations to increase the amount of remoteness on BLM lands. Alternatives A and D would maintain a similar degree of remoteness as is found now on BLM lands. In SRMAs, recreation facility development would be aimed at achieving the SRMAs' desired RSCs. Alternative C would better meet the needs of visitors who desire little to no development in the recreation setting. Alternative D would result in the most developed recreation facilities (including trails), as a result of the emphasis on accommodating increases in recreation use and tourism. New recreation developments would be considered under all alternatives to effectively address recreation activity demand near communities.

Social Recreation Setting Characteristics. BLM lands would probably stay within acceptable social carrying capacities, at least seasonally, in most locations away from communities. However, other actions outside BLM control, such as improvements to Interstate 70, increased marketing by tourism organizations of local recreational opportunities, and increases in recreation information on the Internet, could more rapidly increase recreation use. If these actions increase visitation, and if regional populations grow as predicted, proposed SRMAs, especially those near communities, would not likely be able to maintain the desired social RSCs through the life of the RMP. More crowded conditions would be likely during peak use times (i.e., summer on the Colorado River, weekday evenings and weekends near communities, and the big game hunting seasons). The Proposed RMP and Alternative D have more SRMAs with initial social allocations aimed at maintaining social recreation setting qualities. The Proposed RMP generally proposes lower levels of contact, lower group sizes, and less evidence of use, while Alternative D proposes slightly higher levels of social interactions.

Operational Recreation Setting Characteristics. Proposed SRMA designations, special designations for other resources , lands managed for wilderness characteristics, and travel designations under the Proposed RMP and Alternative C would change public access and create more mechanized and pedestrian- and equestrian-only recreation settings. Alternative D proposes higher levels of visitor services in SRMAs. The Proposed RMP and Alternative C would include more interdisciplinary limitations and restrictions on recreation use, while Alternatives A and D would pose the fewest. In all alternatives, BLM R&VS funding (sometimes substantial when circumstances require it) and staff would be directed toward effectively

addressing visitor health and safety, use and user conflict, and resource protection issues created by recreation activities.

Outcomes. ERMAs would offer recreation opportunities that facilitate the visitors' freedom to pursue a variety of outdoor recreation activities and attain a variety of outcomes. SRMAs would be managed explicitly for specific activities, sometimes through zoning, to sustain or enhance specific recreation outcomes over the life of the plan. Participants in the emphasized or permitted activities, regardless of the alternative, would have opportunities to realize recreation outcomes, such as "living a more outdoor-oriented lifestyle," or "escaping everyday responsibilities for a while," or "enjoying frequent access to outdoor physical activity," or improved physical fitness. Alternative D proposes a mix of SRMAs to increase the economic contributions made to local economies from recreation-related tourism on BLM lands.

4.3.4 Comprehensive Trails and Travel Management

Methods and Assumptions

This section is an analysis of potential impacts on public access and travel from implementing management actions and allowable uses to meet resource and resource use objectives for the various programs. Travel designations support resource programs and are designed to help achieve their objectives. The land use emphasis for each area guides travel designations. Consequently, the travel designations would adhere to the management prescriptions included under each alternative, while following the theme of each alternative. Impacts resulting from the travel system on other resources and resource uses are discussed in those specific resource sections of this chapter. The existing conditions for trails and travel management are described in Section 3.3.4.

As required by EO and regulation, this RMP would classify all BLM lands as open, limited, or closed to motorized travel activities, as discussed in Chapter 2. Additionally, for areas classified as limited, the RMP would designate the types or modes of travel, such as pedestrian, equestrian, bicycle, or motorized; limitations on time or season of use; limitations to certain types of vehicles (i.e., OHVs, motorcycles, all-terrain vehicles, or mechanized [mountain bike]); limitations on licensed or permitted vehicles or users; limitations on BLM administrative use only; or other types of limitations.

The following discussion of the impacts on travel and access focuses on management actions and allowable uses that restrict or facilitate travel opportunities. The analysis describes the changes to miles of routes open for public use, the adjustments in the number of acres open to off-road travel, and the specific travel restrictions (such as vehicle size and seasonal restrictions) that would affect access.

Impact analyses and conclusions were based on interdisciplinary team knowledge of the travel system and information provided by other agencies and the public. Spatial analyses were conducted using ESRI's ArcGIS desktop computer software, and effects were quantified where possible. In the absence of quantitative data, best professional judgment was used. Impacts were sometimes described using ranges of potential impacts or in qualitative terms, when appropriate.

The travel system is managed to achieve the goals and objectives of each alternative and to provide for appropriate public access. This program is considered a support function for all BLM resource programs. As such, the determination of significance for travel management is based on BLM's ability to administer the comprehensive public travel along with administrative access for resource management activities.

The analysis is based on the following assumptions:

- All types and modes of travel, designations, and limitations associated with public access were analyzed.
- A mechanized vehicle is further defined as a mountain bike only.
- The travel designations would not affect ROW holders, permitted uses, county or state roads, or other valid existing rights. Travel closures and limitations apply only to public access.
- The demand to increase travel routes on BLM lands would continue to increase over the life of the plan, especially near communities.

- The BLM has no authority over federal highways, state roads, or county roads on BLM lands, so those routes are not included in the analysis tables.
- The incidence of resource damage and conflicts among mechanized, motorized, and nonmotorized activities would increase with increasing use of BLM lands.
- If necessary, the BLM would evaluate RS-2477 assertions under process and criteria separate from this planning process. Travel management planning is not intended to address the validity of any R.S. 2477 assertions. A travel management plan is not intended to provide evidence bearing on or addressing the validity of any R.S. 2477 assertions. R.S. 2477 rights are determined through a process that is entirely independent of the BLM's planning process. Consequently, travel management planning should not take into consideration R.S. 2477 assertions or evidence. Travel management planning should be founded on an independently determined purpose and need that is based on resource uses and associated access to public lands and waters. At such time as a decision is made on R.S. 2477 assertions, the BLM will adjust its travel routes accordingly.
- Impacts on travel management occur from both limitations (i.e., wildlife stipulations, special designations, and cultural resources) and permitted uses (i.e., gas development, livestock grazing, and mining).
- Because of significant increases in use and the development of new vehicle technologies, designation of large areas as open to cross-country travel is no longer a viable management strategy. There is no motorized or mechanized cross-country travel in areas designated as limited or closed (excluding game retrieval carts). Exceptions for motorized cross-country travel can be included within the terms and conditions of a lease or permit, or by separate written authorization (BLM 2007k).
- Game retrieval carts are not allowed in WSAs.
- In areas with limited travel designations, motorized and mechanized travel is allowed up to 300 feet from designated motorized and mechanized routes for direct, not cross-country, access to dispersed campsites, provided that no resource damage occurs, no new routes are created, and access is not otherwise prohibited by the BLM Field Manager.
- Pedestrian and equestrian access would not be restricted by travel designations that limit or prohibit motorized and mechanized travel, and pedestrian and equestrian access would be allowed on all routes open to motorized and mechanized uses, unless otherwise specified.
- Administrative use authorizations are granted on a case-by-case basis with approval from BLM.
- New routes, reroutes, or closures to the travel network in the limited areas would be changed adaptively through activity level planning with site-specific NEPA analyses.

Existing OHV area designations in the CRVFO, as approved under the current RMP and subsequently modified by *Federal Register* notices issued after approval of the RMP, are provided in Table 4.3.4-1, OHV Area Designations in the CRVFO by Alternative (also, see figures for OHV Area Designations for Alternatives A, B, C, and D in Appendix A).

Table 4.3.4-1
OHV Area Designations in the CRVFO by Alternative

Trails and Travel Management	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Acres open to cross-country travel	295,900	0	0	0
Acres limited to existing routes	38,000	0	0	0
Acres limited to existing routes May 1 to November 30	4,300	0	0	0
Acres limited to designated routes	123,000	464,000	461,300	464,800
Acres closed to OHV use	44,000	41,200	43,900	40,400
Total CRVFO acres	505,200	505,200	505,200	505,200

Acronyms and Abbreviations:

CRVFO Colorado River Valley Field Office
OHV off-highway vehicle

Table 4.3.4-2 shows areas closed to OHV travel in the CRVFO by alternative. Limited area OHV designations would reduce cross-country OHV travel in an area, but would not eliminate it from designated routes. A closed area OHV designation would completely prohibit motorized travel in the entire area.

Table 4.3.4-2
Closed OHV Areas by Alternative

Location	Acres Closed* Alt. A	Acres Closed* Alt. B (Proposed RMP)	Acres Closed* Alt. C	Acres Closed* Alt. D
Red Hill SRMA	2,600	2,600	2,600	2,600
Bull Gulch WSA	15,200	15,200	15,200	15,200
Bull Gulch ACEC	0	10,400	10,400	10,400
Deep Creek ACEC	2,400	0	2,400	2,400
Fisher Creek Area	1,000	0	1000	1000
Thompson Creek ACEC	4,300	3,600	3,600	0
Castle Peak WSA	12,200	12,200	12,200	12,200
Hack Lake WSA	4	4	4	4
Hack Lake Area/SRMA	3,300	0	0	0
Hack Lake ERMA	0	0	3,700	3,700
Sloane Peak Area	2,500	2500	0	0
Dotsero Crater ACEC	0	0	97	0
Eagle Mountain WSA	320	320	320	320
Abrams Creek ACEC	0	0	186	0

*Some OHV closed area boundaries overlap, so the sum of individual closed areas is greater than the total acres closed.

Acronyms and Abbreviations:

ACEC area of critical environmental concern
ERMA extensive recreation management area
OHV off-highway vehicle
SRMA special recreation management area
WSA wilderness study area

Table 4.3.4-3 shows total miles of routes designated by modes of travel and alternative in the CRVFO. See figures for OHV Area Designations for Alternatives A, B, C, and D in Appendix A for individual travel route designations arranged by alternative and zone.

Table 4.3.4-3
Approximate Miles of Designated Routes in the CRVFO under the Four Alternatives

Route Open To	Alternative A (miles)	Alternative B (Proposed RMP) (miles)	Alternative C (miles)	Alternative D (miles)
Routes Without Public Access Designated as Administrative Routes for Motorized/Mechanized Vehicles				
Administrative Routes[1, 2]	320	320	320	320
Total No Public Access	***320***	***320***	***320***	***320***
Routes Open to the Public				
Full-sized vehicles	770	510	430	525
All-terrain Vehicles	90	75	55	70
Motorcycles	90	90	30	90
Subtotal Motorized	**950**	**675**	**515**	**685**
Mechanized	185	180	150	290
Pedestrian and equestrian	170	405	470	305
Foot	2	2	2	2
Subtotal Nonmotorized	**357**	**587**	**622**	**597**
Routes to be Decommissioned	*0*	*50*	*205*	*30*
TOTAL DESIGNATED ROUTES	***1,632***	***1,632***	***1,632***	***1,632***

[1] Administrative use is authorized on a case-by-case basis. Although nonmotorized and non-mechanized routes are open to public use by pedestrians and equestrians, the associated mileage is included with numbers for no public access.
[2] Routes with no public access are open to full-sized vehicles under Alternatives A and D for public with legal access.

Acronyms and Abbreviations:

CRVFO Colorado River Valley Field Office

Table 4.3.4-4 shows designations for over-snow vehicle travel. See figures for OHV Area Designations for Alternatives A, B, C, and D in Appendix A for area designations arranged by alternative.

Environmental Consequences

Impacts on comprehensive trails and travel management would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on comprehensive trails and travel management under any of the four alternatives.

Alternative A

Impacts from Comprehensive Trails and Travel Management. Tables 4.3.4-1, 4.3.4-2, 4.3.4-3, and 4.3.4-4 summarize the area and route designations by alternative.

Under Alternative A, the 320 miles of motorized and mechanized routes with no legal public access allow for exclusive access to the landowners adjacent to BLM lands. Alternative A designates 295,900 acres as open to OHVs. Over-snow travel is limited to designated routes on King Mountain under all alternatives. Under all alternatives, over-snow travel is prohibited in the following areas: all winter wildlife closures, Deep Creek ACEC, Thompson Creek ACEC, WSAs, the Hack Lake area, the Haff Portion of Fisher Creek, and the Siloam Springs area. The over-snow travel closures in WSAs support primitive and unconfined recreation

Table 4.3.4-4
Area Designations for Over-Snow Travel

Designation	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Closed	• All winter wildlife closures • Deep Creek ACEC • Thompson Creek ACEC • Hack Lake area • Fisher Creek (Haff Pasture) • Siloam Springs • WSAs **Total acres closed to over-snow travel = 118,600**	Same as Alternative D With the addition of: • East Castle Peak • Wolcott • Castle Peak isolate parcels • Hardscrabble/East Eagle SRMA • The Crown SRMA • Red Hill SRMA **Total acres closed to over-snow travel = 174,600**	Same as Alternative D With the addition of: • Hardscrabble • Red Hill Gypsum • Basalt Mountain • East Eagle • East Castle Peak • Castle Peak isolate parcels **Total acres closed to over-snow travel = 206,400**	• All winter wildlife closures • WSAs • Deep Creek ACEC • Thompson Creek ACEC • Hack Lake area • Fisher Creek area • Siloam Springs area **Total acres closed to over-snow travel = 134,100**
Limited	• King Mountain **Total area limited to designated routes for over-snow travel = 13,000 acres**	• King Mountain SRMA • Portions of the Upper Colorado River SRMA • Blue Hill ACEC • Sheep Creek Uplands ACEC • Lyons Gulch ACEC • Glenwood Springs Debris Flow ACEC • Mount Logan ACEC **Total area limited to designated routes for over-snow travel = 45,800 acres**	• King Mountain SRMA • Portions of the Upper Colorado River SRMA • Blue Hill ACEC • Sheep Creek Uplands ACEC • Lyons Gulch ACEC • Glenwood Springs Debris Flow ACEC **Total area limited to designated routes for over-snow travel = 27,800 acres**	Same as Alternative C
Open	All areas not designated as limited or closed **Total area open to over-snow travel = 373,600 acres**	All areas not designated as limited or closed **Total area open to over-snow travel = 284,800 acres**	All areas not designated as limited or closed **Total area open to over-snow travel = 271,000 acres**	All areas not designated as limited or closed **Total area open to over-snow travel = 343,300 acres**

Acronyms and Abbreviations:

ACEC area of critical environmental concern
SRMA special recreation management area
WSA wilderness study area

opportunities in WSAs. Within ACECs and the other areas they support, nonmotorized RSCs protect resource values and reduce conflicts with recreation use.

Impacts from Air Quality Management. Under all alternatives, the impacts on travel would be minor and short term along unpaved travel routes (Class-D roads, single-track routes, and mechanized trails) that require road surfacing-related dust abatement measures because travelers could experience some delays or rerouting around the affected road sections during dust abatement and maintenance. In addition, impact analysis for air management is until air quality modeling has been completed.

Impacts from Soils Management. GS-NSO-14 would be placed on the debris flow hazard zone around Glenwood Springs. GS-NSO-15 would prohibit surface occupancy and surface-disturbing activities on slopes greater than 50 percent. Stipulation GS-CSU-4 would require special design measures to new construction on erosive soils and slopes greater than 30 percent. The intentions of the stipulations were to apply the similar measures to other public land activities to reduce erosion and maintain soil site stability. Across all alternatives, new route construction would be mitigated by design features to reduce the impact of surface-disturbing activities on soil management and would create the same or similar impacts that would result in restrictions to transportation and access.

Impacts from Water Resource Management. GS-NSO-3 for major river corridors would reduce the impact of surface-disturbing activities on watershed areas along the Colorado, Roaring Fork, Crystal, Frying Pan, Eagle, and Piney Rivers. GS-NSO-13 for municipal watershed areas would reduce the impact of surface-disturbing activities on watershed areas south of Rifle and north of New Castle. Across all alternatives, new route construction would be mitigated by design features to reduce the impact of surface-disturbing activities on water management and would create the same or similar impacts that would result in restrictions to transportation and access.

Impacts from Vegetation—General Management. Stipulations and implementation actions to reduce the impact of surface-disturbing activities on vegetation would limit the placement or development of new route construction within 500 feet of riparian areas. Across all alternatives, new route construction would be mitigated by design features to reduce the impact of surface-disturbing activities on vegetation management and would create the same or similar impacts that would result in restrictions to transportation and access.

Impacts from Wildlife Management. This alternative contains no specific management action or allowable use decisions for aquatic species, except GS-NSO-5, based on a 2-mile radius of the Rifle Falls and Glenwood Springs fish hatcheries to protect the quality and quantity of surface water and underground aquifers, which would limit placement or development of new route construction. The winter wildlife closures would seasonally limit access for motorized and mechanized travel. Access and travel would be managed so that deer and elk can effectively use the area during winter and other critical periods. Alternative A closes the fewest areas and acres to motorized recreation activities to protect wintering big game, thus closes the fewest overall acres to motorized activities. Alternative A also has a 15-day longer limitation (December 1 to April 30) than the other alternatives (December 1 to April 15), although under the other alternatives the closure applies to both mechanized and motorized recreation activities.

To reduce big game movement to private lands during the big game hunting season and to increase game hunter success, the Stagecoach Trail and the Domantle Road (8 miles total) have been traditionally gated from October 1 through November 30.

Under all alternatives, TLs and NSOs would limit placement or development of new route construction to protect wildlife species, areas, or habitat. These include NSO, CSU, or TL stipulations for big game birthing areas, for nesting raptors, for waterfowl and shorebird habitat and rookeries, and for waterfowl and shorebird nesting and production areas. The TLs would be a seasonal constraint on OHV use, unless the exception criteria are met.

The winter wildlife closures have a minor impact on winter motorized recreation, since these areas have traditionally not been popular winter destinations because of the lower amounts of snow, the shorter season of snow cover, the vegetation types, and the proximity of better winter recreation opportunities on the adjacent WRNF. Mechanized activities are not affected by the closures under Alternative A, but mechanized activities are included in the seasonal closure under the other alternatives. The 15-day shorter closure is intended to reduce impacts on mountain biking, since low elevations areas are often free of snow and dry by April 15.

Across all alternatives, new route construction would be mitigated by design features to reduce the impact of surface-disturbing activities on wildlife management and would create the same or similar impacts that would result in restrictions to transportation and access.

Impacts from Special Status Species Management. The management of special status species is guided by law, agency direction, policy conservation plans, and the decisions in this plan. The placement or development of new route construction could be impacted if biological surveys found any special status species in the area of proposed recreation-related developments. Unlike the other alternatives, Alternative A does not contain TLs for special status fish and other aquatic wildlife.

Impacts from Cultural Resource Management. Cultural sites could be closed to visitation if it were determined that travel-related activity threatens cultural site integrity. If sites were closed, then travel opportunities could be adversely affected in the short term or long term, depending on CRVFO decisions to protect a threatened site. Compared with Alternative A, the action alternatives could have more long-term adverse impacts on travel opportunities because access would be reduced to protect cultural resources.

Impacts from Visual Resource Management. Management to protect visual resources would restrict new routes or trail plans in areas identified for such development (SRMAs, for example). VRM classifications would affect the location of new transportation systems. Projects would be designed to meet the objectives of the established VRM class for the project area. Most transportation systems would be compatible with VRM Classes III and IV. Transportation actions would be limited in VRM Class I and Class II areas.

Impacts from Recreation and Visitor Services Management. Under Alternative A, the CRVFO would continue to manage eight SRMAs under existing plans and direction. The RMAs would be generally managed for nonmotorized recreation activities, as provided for in the 1999 Oil and Gas Leasing and Development ROD and RMPA. The remaining BLM lands would continue to be managed as the CRVFO ERMA, under the direction of the current RMP, and travel management decisions would be made on an interdisciplinary basis.

Recreation-related demands on public lands could increase the need for access. Overall, there would be minimal impacts on transportation and access from recreation management.

A site-specific travel network of roads and trails available for public use, and any limitations on that use would be included in the land use plan to the extent practical. In some areas, the final travel management network of trails would be determined at the implementation level because of the complexity of the area and incomplete data.

Table 4.3.4-5 shows the area and route designation for each SRMA by alternative.

Table 4.3.4-5
Area and Route Designations for SRMAs by Alternative

SRMA	Alternative A—Area Designation and Route Designations	Alternative B (Proposed RMP)—Area Designation and Route Designations	Alternative C—Area Designation and Route Designations	Alternative D—Area Designation and Route Designations
Bocco Mountain	**Area Designation** Limited to existing routes on 1400 acres **Route Designations** Moto 13 miles FSV 2.5 miles	N/A	N/A	**Same as Alternative A**
Bull Gulch	**Area Designation** Closed to OHVs 8,300 acres **Route Designations** FHO 2 miles	N/A	N/A	N/A
Deep Creek	**Area Designation** Closed to OHVs 2,400 acres **Route Designations** FSV 1 mile FHO 2 miles	N/A	N/A	N/A
Fisher	N/A	N/A	N/A	**Area Designation** Limited to existing routes on 3,300 acres **Route Designations** Mech 10 miles FSV 0.5 miles
Gypsum Hills	**Area Designation** Limited to existing routes on 16,900 acres **Route Designations** FHO 0.5 miles Moto 1 mile ATV 1.5 miles FSV 91 miles	N/A	N/A	N/A

Table 4.3.4-5
Area and Route Designations for SRMAs by Alternative- continued

SRMA	Alternative A—Area Designation and Route Designations	Alternative B (Proposed RMP)—Area Designation and Route Designations	Alternative C—Area Designation and Route Designations	Alternative D—Area Designation and Route Designations
Hack Lake	**Area Designation** Closed to OHVs 3,300 acres **Route Designations** FHO 9 miles FSV 1 mile	N/A	N/A	N/A
Hardscrabble/ East Eagle	N/A	**Area Designation** Limited to existing routes on 11,600 acres in RMZ 1 and 11,400 acres in RMZ 2 **Route Designations** **RMZ 1** FHO 1 mile Mech 35 miles ATV 2 miles FSV 11 miles Admin 2 miles **RMZ 2** Mech 8 miles Moto 29 miles ATV 19 miles FSV 30 miles	N/A	**Area Designation** Limited to existing routes on 11,700 acres in RMZ 1 and 5,300 acres in RMZ 2 **Route Designations** **RMZ 1** FHO 2 mile Mech 57 miles Moto 1 miles ATV 1 miles FSV 7 miles **RMZ 2** FHO 1 mile Mech 5 miles Moto 21 miles ATV 4 miles FSV 15 miles
King Mountain	N/A	**Area Designation** Limited to existing routes on 13,000 acres **Route Designations** FHO 56 miles FSV 1 mile Admin 0.5 miles	N/A	N/A
Red Hill	**Area Designation** Closed to OHVs 3,100 acres **Route Designations** FHO 2.5 miles Mech 17 miles	**Same as Alternative A**	**Same as Alternative A**	**Same as Alternative A**

Table 4.3.4-5
Area and Route Designations for SRMAs by Alternative- continued

SRMA	Alternative A—Area Designation and Route Designations	Alternative B (Proposed RMP)—Area Designation and Route Designations	Alternative C—Area Designation and Route Designations	Alternative D—Area Designation and Route Designations
The Crown	N/A	**Area Designation** Limited to existing routes on 9,100 acres **Route Designations** FHO 8 mile Mech 31 miles Moto 7 miles FSV 16 miles	N/A	**Area Designation** Limited to existing routes on 9,100 acres **Route Designations** FHO 11 miles Mech 55 miles
Thompson Creek	**Area Designation** Closed to OHVs 4,300 acres **Route Designations** FSV 2 miles FHO 1 mile	N/A	N/A	**Area Designation** Limited to existing routes on 700 acres in RMZ 1, 4,000 acres in RMZ 2 and 4,800 acres in RMZ 3 **Route Designations** **RMZ 1** FHO 4 miles Mech 12 miles FSV .5 miles **RMZ 2** FHO 3 miles **RMZ 3** FHO 1 miles Mech 1 miles
Upper Colorado River	**Area Designation** Limited to existing routes on 20,700 acres **Route Designations** FHO 3 miles Mech 7 miles Moto 2 miles ATV 3 miles FSV 19 miles	**Area Designation** Limited to existing routes on 20,700 acres **Route Designations** FHO 6 miles Mech 4 miles Moto 5 miles ATV 4 miles FSV 7 miles Admin 7 miles	**Same as Alternative B (Proposed RMP)**	**Area Designation** Limited to existing routes on 20,700 acres **Route Designations** FHO 6 miles Mech 5 miles Moto 5 miles ATV 3 miles FSV 16 miles

Acronyms and Abbreviations:

ACEC	area of critical environmental concern	Moto	motorcycle
Admin	administrative	N/A	not applicable
ATV	all-terrain vehicles	RMA	recreation management area
FHO	foot and horse (pedestrian and equestrian) only	SRMA	special recreation management area
FSV	full-sized vehicle	WSA	wilderness study area
Mech	mechanized		

Impacts from Lands and Realty Management. The travel designations would not affect ROW holders, permitted uses, county or state roads, or other valid existing rights. Travel closures and limitations apply only to public access. To avoid ROWs that could negatively impact the naturalness or remoteness of an area — including renewable energy sites, such as solar, wind, hydro, and biomass development —BLM could identify the area as a ROW avoidance area or ROW exclusion area. The ROW may not be totally unavailable in an avoidance area but should not be permitted, if possible; ROWs are to be completely prohibited from exclusion areas. Unlike the other alternatives, there are no specific ROW avoidance areas for recreation and visitor services under Alternative A. It is, therefore, likely that ROWs would, over the long term, impact the naturalness or remoteness of many landscapes.

Alternative A identified 494,000 acres as not suitable for disposal through public sale as Category II lands. These lands are considered for disposal on a case-by-case basis through exchange, boundary adjustment, state selection, Recreation and Public Purpose Act purchase, or other appropriate statutory authority, provided disposal is consistent with management efficiency and effectiveness under multiple use principles for specific areas. When public lands are disposed of, the BLM no longer controls the access or routes. Because it is unknown which lands (if any) might be sold, it is likewise unknown whether those lands would be of high value because of travel management. When BLM acquires lands, it also acquires new access, route systems, or lands that may accommodate construction of new route systems.

Land tenure adjustments could benefit the overall management of the transportation and access program. These actions would help to facilitate the location of transportation systems by providing for a more contiguous public land base and encouraging these developments near communities.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where the high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling will occur in the areas identified as high potential for the occurrence of oil and gas resources. Infill and step-out drilling will be the major portion of future activity. Of the 147,500 acres of BLM mineral estate in this high-potential area that is not within the Roan Plateau planning area, 88 percent has been leased and is being developed.

New roads constructed for energy development would normally be gated and would not offer new public access. Energy development often leads to improvement of existing roads.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Locatable mineral exploration and development on BLM land would be regulated under 43 CFR 3800 under all alternatives. Minerals-related access roads would be constructed under all of the alternatives. New roads constructed for energy development would normally be gated and would not offer new public access.

Impacts from Areas of Critical Environmental Concern Management. Across all alternatives, the travel designations for ACECs would influence area OHV designations. Under Alternative A, the Bull Gulch, Deep Creek, and Thompson Creek ACECs are closed to OHV travel (see Chapter 2 Special Designations—Areas of Critical Environmental Concern (Administrative Destinations); OHV travel in the Blue Hill and Glenwood Springs Debris Flow Hazard Zone ACECs is limited to existing and designated routes. A route closure would

reduce public access in an area but may not eliminate it completely. An area closure would completely prohibit travel in the entire area.

Impacts from Wilderness Study Area Management. There are 27,700 acres of WSAs, which are closed to motorized and mechanized travel but open to pedestrian and equestrian travel. The WSAs are closed to motorized and mechanized travel to preserve wilderness characteristics, in accordance with nonimpairment standards, as defined by the BLM Manual 6330--*Management of Wilderness Study Areas* (BLM 2012c). The long-term adverse impact would be that these areas would remain closed to any future proposal for motorized and mechanized routes. However, pedestrian and equestrian travel would not be affected.

Impacts from Transportation Facilities Management. Maintenance and upkeep of BLM roads are critical for travel management. As costs have risen, fewer miles of BLM roads have been maintained each year. The actual miles of roads maintained each year would be based on annual budgets. All alternatives would emphasize maintaining the majority of BLM system roads at maintenance intensities that may not provide year-round access but are intended to keep the route in use for most of the year. This level of maintenance is sufficient to meet the recreation objectives across all alternatives.

Impacts from Health and Safety Management. Under all alternatives, the BLM Field Manager could enact temporary closure or restriction orders to resolve management conflicts and protect persons, property, and public lands and resources (including wintering wildlife) using 43 CFR Subpart 8364 (Closures and Restrictions).

Alternative B (Proposed RMP)

Impacts from Comprehensive Trails and Travel Management. Tables 4.3.4-1, 4.3.4-2, 4.3.4-3, and 4.3.4-4 summarize the area and route designations by alternative.

The travel designation of administrative route was assigned for motorized and mechanized routes with no physical or legal public access. An administrative route is open to pedestrian and equestrian travel. This action would limit public access for routes that do not have designated or legal public access, but where the property owner does not prevent trespassing. This action would prevent any private landowner from having exclusive motorized or mechanized access to BLM lands.

Over-snow travel would be limited to designated routes on King Mountain under all alternatives, in the Glenwood Springs Debris Flow Hazard Zone ACEC under the Proposed RMP and Alternatives C and D, and in the Sheep Creek Uplands ACEC under the Proposed RMP and Alternative C.

Over-snow travel is prohibited in the following areas: all winter wildlife closures, Deep Creek ACEC, Thompson Creek ACEC, WSAs, the Hack Lake area, Fisher Creek (Haff Pasture), and the Siloam Springs area. Alternative C, the Proposed RMP, and Alternative D, in order, would close the most acres to over-snow travel.

Compared with Alternative A, the Proposed RMP would close 2,800 fewer acres to OHVs and limit 341,000 more acres to designated routes. The impacts from not having any open travel designations would be negligible because direct access for campsites up to 300 feet from designated routes is still allowed under all action alternatives, and game retrieval carts are a permitted for direct access to game, provided that no resource damage occurs, no new routes are created, and access is not otherwise prohibited by the BLM.

Public scoping did not identify a need for unlimited cross-country travel. Designated routes were viewed as a benefit since they still allowed for access to BLM lands, while protecting naturalness, scenic, and other important resource values.

Impacts to comprehensive trails and travel management from management of other resources and uses under the Proposed RMP would be the same or similar to those under Alternative A, except as described below.

Impacts from Water Resource Management. Impacts would be the same as or similar to those under Alternative A, except that stipulations CRVFO-NSO-5, and CRVFO-CSU-3 would probably affect the placement and development of travel routes. The stipulations would be applied on a case-by-case basis, so the actual impact would be determined at the implementation level.

Impacts from Wildlife Management. To reduce big game movement to private lands during the big game hunting season and to increase game hunter success the CRVFO has worked with CPW on seasonally limiting motorized use on specific routes during the big game hunting seasons. The Stagecoach Trail and Domantle Road (8 miles total) in the Castle Peak area have been traditionally gated from October 1 through November 30. The Proposed RMP and Alternative C propose moving the beginning date to August 20 to be ahead of the big game archery and muzzleloader hunting seasons to help reduce big game movement to private lands during those hunting seasons too.

The Proposed RMP and Alternative C also propose seasonal route limitations in the Dry Rifle Creek area and the West Rifle Creek area from October 1 to November 30 to reduce big game movement to adjacent private lands. These routes add 10 miles to the existing seasonal limitations and create a negligible overall decrease in available motorized routes in the CRVFO administrative area.

In turn specific routes in the Cottonwood Creek winter wildlife closure would be cooperatively managed on a year-to-year basis with CPW to allow motorized vehicle access for late season big game hunting.

Impacts from Special Status Species Management. The Proposed RMP would apply NSOs and CSUs to protect sensitive species. The overall impact would be localized and possibly mitigated through site-specific engineering of any included routes. Compared with Alternative A, the action alternatives could have more long-term adverse impacts on travel opportunities because access could be reduced to protect special status species.

Impacts from Visual Resource Management. Impacts would be the same as under Alternative A, except the Proposed RMP would be more restrictive for travel management.

Impacts from Managing to Protect Wilderness Characteristics. The travel designations would be particularly influenced by limitations to protect wilderness characteristics. Mitigation measures (NSO, CSU, and TL stipulations) to protect resources or to manage special areas typically include limitations or closures on the types and modes of travel. A route closure would reduce public access in an area but may not eliminate it completely. An area closure would completely prohibit the type or mode of travel in the entire area. Development of routes for mechanized travel would not be permitted on the approximately 34,400 acres of lands managed for the protection of wilderness characteristics outside existing WSAs.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP, the CRVFO would continue to manage five SRMAs. Table 4.3.4-5 shows the area and route designation for each SRMA by alternative.

Compared with Alternative A, the Proposed RMP would designate less area as closed to OHVs and would designate more routes for pedestrians and equestrians and for mechanized, motorcycle, ATV, and full-sized vehicles, based on SRMAs.

Impacts from Areas of Critical Environmental Concern Management. Areas closed to OHV travel would be the same as under Alternative A, but the Proposed RMP would close 700 fewer acres since the Thompson Creek ACEC is smaller.

Areas limited to OHV travel would be the same as under Alternative A, with the addition of the, Grand Hogback, Hardscrabble-East Eagle, Lyons Gulch, McCoy Fan Delta, Sheep Creek Uplands, and Mount Logan Foothills ACECs.

In addition to the limited designation, there is no net increase in miles beyond the baseline of designated routes of motorized and mechanized routes in the ACEC. The impact of this management action would require closure of an equivalent length of route to construct a new route. This alternative has more acres affected by the management action prohibiting a net increase in routes than Alternatives A and D, but fewer than Alternative C.

Alternative C

Impacts to comprehensive trails and travel management from comprehensive trails and travel management and soils management would be the same as or similar to those under the Proposed RMP. Impacts from management of all other resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Wildlife Management. Impacts would be the same as or similar to those under the Proposed RMP, except Alternative C would apply a slightly more constraining NSO stipulation (CRV-NSO-16) for all perennial waters instead of just fish-bearing streams. It would also apply a TL (CRV-TL-7) for coldwater sport and native fish, in addition to CRV-NSO-17 for fish hatcheries. In addition, Alternative C is slightly more constraining on route construction surface-disturbing activities as a result of the amount and extent of NSO stipulations included to protect wildlife and wildlife habitat.

Impacts from Visual Resource Management. Compared with Alternative A, Alternative C would be more restrictive for travel management and the most restrictive of all the action alternatives.

Impacts from Managing to Protect Wilderness Characteristics. The travel designations would be particularly influenced by limitations to protect wilderness characteristics. Mitigation measures (NSO, CSU, and TL stipulations) to protect resources or to manage special areas typically include limitations or closures on the types and modes of travel. A route closure would reduce public access in an area but may not eliminate it completely. An area closure would completely prohibit the type or mode of travel in the entire area. Development of routes for mechanized travel would not be permitted on the approximately 45,800 acres of lands managed for wilderness characteristics outside existing WSAs.

Impacts from Recreation and Visitor Services Management. Under Alternative C, the CRVFO would manage two SRMAs. Table 4.3.4-5 shows the area and route designation for each SRMA by alternative.

Compared with Alternative A, Alternative C would designate less area as closed to OHVs, and would designate the least amount of routes for pedestrians and equestrians and for mechanized, motorcycle, ATV, and full-sized vehicle, based on SRMAs.

Impacts from Areas of Critical Environmental Concern Management. Areas closed to OHV travel would be the same as under the Proposed RMP, with the addition of the Abrams Creek ACEC.

Areas limited to OHV travel would be the same as under the Proposed RMP, with the addition of the Colorado River Seeps, Dotsero Crater, Grand, Greater Sage-Grouse Habitat, and The Crown Ridge ACECs.

In addition to the limited designation, there is no net increase in miles of motorized and mechanized routes stipulated in the ACEC prescriptions. The impact of this management action would require closure of an equivalent length of route to construct a new route. This alternative would affect most acres by the management action prohibiting a net increase in routes.

Alternative D

Impacts to comprehensive trails and travel management from management of resources and uses would be the same as or similar to those under Alternative A, except as described below.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as those under the Proposed RMP, except for motorized and mechanized routes with no physical or legal public access. The travel designation from Alternative A was assigned unless a resource concern was identified, in which case the corresponding route designation was assigned. This action would provide exclusive access to BLM lands on many routes with no public access. Compared with Alternative A, the exclusive use would be further intensified since no area would have an open travel designation, allowing for one private landowner to control right of entry to any routes without legal public access.

Compared with Alternative A, Alternative D would close 3,600 fewer acres to OHVs and limits 341,800 more acres to designated routes. The impacts from not having any open travel designations would be negligible because direct access for campsites up to 300 feet from designated routes is still allowed under all action alternatives, and game retrieval carts are permitted for direct access to game, provided that no resource damage occurs, no new routes are created, and access is not otherwise prohibited by the BLM Field Manager. Public scoping did not identify a need for unlimited cross-country travel. Designated routes were viewed as a benefit since they still allowed for access to BLM lands, while protecting naturalness, scenic, and other important resource values.

Impacts from Visual Resource Management. Impacts would be the same as Alternative A, except Alternative D would be more restrictive for travel management.

Impacts from Recreation and Visitor Services Management. Under Alternative D, the CRVFO would manage seven SRMAs. Table 4.3.4-5 shows the area and route designation for each SRMA by alternative. Compared with Alternative A, Alternative D would designate less area as closed to OHVs, would designate

more routes for pedestrians, equestrians, motorcycles, ATVs, and full-sized vehicles, and would designate the most routes for mechanized vehicles, based on SRMAs.

Impacts from Areas of Critical Environmental Concern Management. The area that would be closed to OHV travel as a result of ACECs is the Bull Gulch ACEC. Areas that would have a limited OHV travel designation include the Blue Hill and Glenwood Springs Debris Hazard Zone ACECs.

In addition to the limited designation, there is no net increase in miles of motorized and mechanized routes stipulated in the ACEC prescriptions. The impact of this management action would require closure of an equivalent length of route to construct a new route. This alternative would affect the fewest acres by the management action, prohibiting a net increase in routes.

Cumulative Impacts

The cumulative impact analysis boundary includes the CRVFO boundary. Cumulative impacts on trails and travel management would occur primarily from actions that facilitate, restrict, or preclude motorized access. Management actions that restrict OHV use would limit the degree of travel opportunities and the ability to access certain portions of the planning area for the public. The continued maintenance of federal and state highways would provide arterial connections to BLM system roads. County-maintained routes that connect federal and state highways to BLM system routes would maintain and improve access to the decision area's resources. Past, present, and reasonably foreseeable future nonfederal actions have affected, and will continue to affect, travel management within the planning area. These actions, which include urban development patterns, the continuing growth of vehicle-based recreation, planned road and highway projects, and population growth, are expected to increase demand and construction of transportation routes near the CRVFO. Actions that would limit or restrict transportation project design (e.g., VRM designations, land use closures, and NSO stipulations) would result in impacts on transportation and access.

The actions and activities considered in this analysis, including land use restrictions for the preservation of sensitive resources, would not result in the inability of BLM to provide public access. The degree of impact would be lowest under Alternative A because of fewer land use restrictions for the protection of sensitive resources. Conversely, implementation of increased restrictions to protect sensitive resources under Alternative C would result in the greatest level of impact on transportation and access. The Proposed RMP would have slightly less restriction, and therefore slightly greater impact, than Alternative C. Alternative D would have the fewest restrictions.

4.3.5 Lands and Realty

Lands and realty management includes land tenure adjustments (sales, exchanges, donations, and acquisitions) and realty actions. Existing conditions concerning lands and realty are described in Section 3.3.5. The discussion of the impacts on lands and realty in each alternative is limited to the impacts on permitted or authorized uses, including restrictions, costs, timeframes to complete lands and realty actions, and issuance or denial of proposals.

Terms. The term "realty authorizations" includes all types of authorizations to use public land that are included in the lands and realty program. These authorizations include ROWs, land leases, land use permits, memorandums of understanding, cooperative agreements, reservations to other federal agencies, and license agreements. The term "realty actions" includes all lands and realty activities, such as realty authorizations, land tenure actions, and withdrawals. All alternatives would similarly meet the needs of government agencies and the public for resource protection through public withdrawals, acquisition of conservation easements, and resolution of unauthorized use.

Withdrawals. Withdrawals are formal lands actions that set aside, withhold, or reserve federal land by statute or administrative order for public purposes. A withdrawal creates a title encumbrance on the land. Withdrawals are established for a wide variety of purposes, e.g., power site reserves, military reservations, administrative sites, recreation sites, national parks, reclamation projects, wilderness areas, etc. Withdrawals are most often used to preserve sensitive environmental values and major federal investments in facilities or other improvements, to support national security, and to provide for public health and safety. Existing withdrawals that close areas to operation of the public land laws would restrict the location or possibly preclude the placement of lands and realty actions. The review of withdrawals would determine whether the withdrawals are serving or are needed for their intended purpose. Withdrawals that are revoked or modified would then open public land to the operations of the public land laws and locatable mineral entry, which would open more public land for different types of actions and create more flexibility for placement of projects.

ROWs. A ROW grant or temporary use permit is not required for use of federal surface lands related to access, production, and conveyance of fluid minerals and associated produced water in the lease underlying that surface, or a combination of leases joined together into a communitization agreement.

A pipeline on BLM administered lands (or on lands administered by two or more federal agencies), located downstream of the "custody transfer point" either on or off a lease, also requires a ROW from the BLM. (Refer to 43 CFR 2880 ; The Gold Book 2007).

A substantial portion of lands and realty actions are related to the intensive oil and gas development in recent years. Under 43 CFR 2881.2 concerning the Minerals Leasing Act of 1920, as amended (30 USC 185), it is BLM's objective to grant ROWs under the regulations in this part to any qualified individual, business, or government entity and to direct and control the use of ROWs on public lands in a manner that does the following:

- Protects the natural resources associated with federal lands and adjacent lands, whether private or administered by a government entity.
- Prevents unnecessary or undue degradation to public lands.

- Promotes the use of ROWs in common considering engineering and technological compatibility, national security, and land use plans.
- Coordinates, to the fullest extent possible, all BLM actions under the regulations in this part with state and local governments, interested individuals, and appropriate quasi-public entities.

A ROW grant pursuant to either the Mineral Leasing Act (in relation to oil and gas) or FLPMA (in relation to produced water, access roads, power lines, telephone lines and other facilities) is required whenever an oil and gas operator uses federal lands to access or convey private fluid minerals or federal fluid minerals associated with a different federal parcel than the one being crossed. Granting ROWs or temporary use permits for construction and use of access roads, well pads, pipelines, and other facilities related to fluid minerals development includes attachment of stipulations associated with the federal mineral estate being accessed, stipulations associated with the federal mineral estate underlying the federal land being crossed, or discretionary actions authorized under the current RMP. An example of a discretionary action is issuance by BLM of ROW grants on lands under its jurisdiction, except when:

- A statute, regulation, or public land order specifically excludes ROWs.
- The lands are specifically segregated or withdrawn from ROW uses.
- BLM identifies areas in its land use plans or in the analysis of an application as inappropriate for ROW uses.

Examples of typical major category ROWs projects include a large-kV power line (115 kV or greater), large-diameter pipeline (generally 24 inches or greater), significant surface disturbance, long distance (e.g., interstate), linear feature (e.g., pipeline, transmission line, or fiber optic line), and other projects that involve multiple federal jurisdictions, require a land use plan amendment, have a high level of public controversy or concern, impact critical or sensitive resources, cross international borders, or require preparation of an EIS.

Land Tenure. Land ownership transfer through purchase, exchange, donation, or sale is an important component of land-tenure adjustments consolidate and reduce fragmented ownership of BLM lands, thereby improving land management administration. The Bureau completes ownership transactions involving land and interests in land when these transactions are in the public interest and consistent with publicly approved land use plans. BLM's land tenure program is designed to accomplish the following:

- Improve management of natural resources through consolidation of federal, state, and private lands.
- Increase recreational opportunities and preserve open space.
- Secure key property necessary to protect endangered species and promote biological diversity.
- Preserve archaeological and historical resources.
- Implement specific acquisitions authorized by acts of Congress.
- Allow for expansion of communities and consolidation of nonfederal land ownership.

Disposing of scattered and isolated parcels reduces management costs and eliminates inefficiencies in the lands and realty program. The impacts on overall management logistics and budgets would be beneficial and would likely occur as long as the ownership does not change further. Land sales may benefit ongoing

development of private lands by making additional lands available. The term "private" in this context refers to all non-public lands, which includes allowing towns and cities to locate or expand infrastructure on public lands.

Legislative Proposals. Legislative proposals, as actions and decisions made by Congress, are not decisions within BLM's management of land sale and acquisition, and that is why they are not addressed. Special legislation is sometimes enacted to provide supplemental exchange authority that may prescribe certain aspects of the exchange process, allow for transactions not authorized under FLPMA (e.g., interstate exchange), or simply direct that an exchange transaction be completed. Typically, there are no codified regulations covering transactions that are legislated in this manner.

Legislated exchanges vary widely as to the degree that Congress has specified what will be exchanged, whether NEPA analysis will be conducted, and whether appraisals will be undertaken, and must therefore be approached individually. In many instances, land exchange legislation contains direction to complete transactions within a relatively short timeframe. To avoid conflict with these Congressional directives for completing transactions, the BLM Washington Office does not normally issue specific policy and guidance outlining the steps to be taken to process individual legislative land exchanges. However, State Directors may request specific guidance, as needed. It is also advisable to consult with each Regional Solicitor regarding whether or not "standard" processing actions (such as NEPA) do or do not apply in exchanges authorized by legislation.

Methods and Assumptions

- The Property Clause of the US Constitution, Art. IV, Sec. 3 cl.2 gives Congress plenary authority over federally owned lands, and federal agencies must manage such lands as directed by Congress in statutes such as FLPMA.
- Land use authorizations support the public need for pipelines, utilities, transportation, and telecommunications through various means such as right-of-ways, leases, or permits. Benefits are critical to communities throughout the region. Designated right-of-way corridors and communication sites allow for the installation of additional facilities to provide services to communities as they grow. Utilities are imperative for the safety and security of dependent communities within the region, as well as for improving reliability, relieving congestion, and enhancing the capability of the grid to deliver energy to those communities.
- Federally owned property is exempt from the enforcement of local zoning ordinances under principles of federal sovereign immunity. Once lands leave public ownership, they should then be zoned consistent with how the surrounding private lands are zoned.
- The demand for sale of public land would average about 500 acres per year. This total includes direct sale, competitive sale, modified competitive sale, recreation, and public purpose (R&PP) lease, or exchange. Before any sales, lands would be examined for the presence of high-value resources. Lands containing high surface values would not be sold, or the sale would provide for those values to be preserved. H-2200-1 *Land Exchange Handbook* (BLM 2005d) discourages split estate, especially in areas where there are minerals. BLM CRVFO Land Exchange Criteria would be used to screen potential land exchanges for possible resource conflicts. Therefore, land sales would not substantially affect other resource programs. Lands identified for sale under Sections 203 and 206 of FLPMA and identified as such in this plan are hereby classified for sale under Section 7 of the Taylor Grazing Act of 1934, as amended (43 USC 315f), under Executive Order 6910, and under 43 CFR 2400.

- The appraisal of public lands as part of the disposal process, contemplates the value based on its highest and best use. This allows the BLM to receive the highest economic return for disposal of property which in turn allows for the possible acquisition of a greater value, or acreage, of private land.
- BLM may require common use of a ROW and may require, to the extent practical, location of new ROWs within existing or designated ROW corridors (43 CFR 2802.11). Safety and other considerations may limit the extent to which parties may share a ROW. BLM will designate ROW corridors through land use plan decisions.
- In terms of major utility lines, companies would focus first on the maintenance and upgrading of lines before they would undertake new construction of major utility lines.
- The effects of development and designation of transportation and utility ROW corridors would be mitigated on a case-by-case basis. Generally, mitigation would be accomplished by locating future transportation and utility ROWs adjacent to existing facilities (where possible). Designated ROW corridors identified on the figure for ROW Avoidance and Exclusion Areas for Alternatives B, C, and D in Appendix A (for the action alternatives) would have a variable width on either side of the centerline of the existing facilities (see Lands and Realty section, Chapter 2). The corridors would be designated for (1) aboveground and underground power lines, (2) telephone lines, (3) fiber optic lines, (4) pipelines, and (5) other linear-type ROWs. Specific proposals would require site-specific environmental analysis and compliance with established permitting processes. Activities generally excluded from ROW corridors include mineral materials sales, range, and wildlife habitat improvements involving surface disturbance and facility construction, campgrounds and public recreation facilities, and other facilities that would attract public use. ROW facilities would not be placed adjacent to each other if resource conflicts or issues with safety or incompatibility were identified. Designated corridors would vary by total width, number, type, extent, and compatibility of activities. New oil and gas wells would be sited outside these designated ROW corridors. The designated width, allowable uses, and excluded uses would be modified during implementation of the approved RMP.
- Land exchanges are an important tool to consolidate land ownership for more efficient management and to secure important objectives of resource management, enhancement, development, and protection; to meet the needs of communities; to promote multiple-use management; to foster sustainable development; and to fulfill other public needs. However, BLM will evaluate and consider the full range of land sale and acquisition tools available to accomplish these objectives before the Bureau would proceed with a land exchange proposal.
- An area designated as a ROW avoidance area is to be avoided due to some resource value that may become damaged or detracted from if development activities were allowed. Examples of an avoidance area may be a recreation site or known cultural site. An area may also be an avoidance area if some hazard exists such as a landslide area. The area may not be totally unavailable but should be avoided if possible.
- A ROW exclusion area is an area within which a land use authorization such as a right-of-grant would not be considered, due to some resource value that would be irreversibly damaged or diminished if development activities were allowed.
- Existing ROWs and communication sites would be managed to protect valid existing rights.

- Rights-of-way would be considered on a case-by-case basis, except where specifically excluded, using BMPs to minimize impacts.
- Existing ROWs may be modified at any time with an amendment or on renewal, if it were shown this action meets the objectives of the RMP.
- The demand for communication sites and ROW corridors would increase within the life of this plan.
- The demand for utility infrastructure on public lands is likely to increase in the future.
- Trespass issues on public lands would continue to be a high priority to resolve.
- The sale of small isolate parcels of BLM land would decrease conflicts between public land users and private landowners.
- Although exceptions, modifications, and waivers may be obtained to address some of the stipulations outlined in Appendix B, it is assumed that the stipulations specified for each alternative would be applied to all proposed surface-disturbing activities on decision area public lands.
- Existing withdrawals would be retained throughout the life of the plan unless it was determined, through a withdrawal review, that an existing withdrawal would be revoked or modified.
- The effects of development and designation of transportation and utility ROW corridors would be mitigated on a case-by-case basis. Generally, mitigation would be accomplished by locating future transportation and utility ROWs adjacent to existing facilities (where possible). Designation of the energy corridor in the CRVFO as described in the *Final Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States* (US DOE and BLM 2008), would provide beneficial impacts on the lands and realty program by providing for a preferred location for energy corridors. Designation of the energy corridor could also aid in addressing compatibility issues with other corridors and project planning efforts.
- Lands and interests in lands could be acquired from willing landowners by purchase, exchange, or donation.
- Land would mainly be acquired through exchange. Exchange would provide more flexibility and opportunity to site facilities or other lands and realty actions as well as improve the management of the public lands and their resources.
- Nonfederal land, interests in land (including access and conservation easements), and water rights would be considered for acquisition when they are within administratively designated areas or contain important resources (e.g., WSAs, ACECs, critical habitat, lands supporting listed species, and riparian-wetland areas).
- Analysis of the potential impacts on lands and realty management involved close collaboration among BLM resource specialists to compile information based on expertise and knowledge within the CRVFO. Impact analyses and conclusions were therefore based on the interdisciplinary team knowledge of resources and review of existing literature, as well as information provided by experts in the BLM and other agencies. The discussion of the impacts on lands and realty under each alternative is limited to the influences on community expansion opportunities and realty authorizations for other permitted activities. The following discussion addresses whether the effects of other resource actions could influence or modify the location, size, or design of a given proposal or, in some limited cases, preclude a lands and realty action from being approved. These include

constraints, costs, timeframes to complete lands and realty actions, and issuance or denial of proposals.

- Recommending withdrawal and closure of areas to locatable mineral exploration and development could have impacts on the lands and realty program. The magnitude of these impacts would depend on the number of acres withdrawn or closed to mineral exploration and development (Table 2-1, Comparative Summary of Resource Uses and Special Designations by Alternative).
- Unless a WSA or portion of a WSA was "previously withdrawn from appropriation under the mining laws, such lands shall continue to be subject to such appropriation during the period of review unless withdrawn by the Secretary under the procedures of section 204 of…[FLPMA]…for reasons other than preservation of their wilderness character." Existing withdrawals may be renewed if the withdrawal is still serving its purpose. No new withdrawals may be made except withdrawals that can satisfy the non-impairment criteria.
- Encouraging the collocation of communication sites and realty authorizations in the CRVFO along preferred and existing routes would likely result in beneficial impacts on the lands and realty program by allowing applicants to understand where these uses are desired. This enhanced understanding may result in fewer proposals being submitted that are ultimately denied, which could decrease processing costs and speed up timeframes required to complete realty authorizations. Collocating communication sites and realty authorizations could also result in beneficial impacts by reducing land use authorizations that would be required to construct roads and other infrastructure needed to access more distributed sites. However, prioritizing the collocation of realty authorizations and corridors in existing locations could increase the amount of pipeline or other linear infrastructure needed to reach the source or destination. This increase could result in long-term adverse impacts on the lands and realty program by requiring land use authorizations for more area, which would likely reduce the availability of land for future authorizations. Realty authorization facilities would not be located adjacent to each other if resource conflicts or issues with safety or incompatibility were identified.
- Management of cultural resources would influence the timing, location, size, and coloration of, but would rarely preclude development or completion of, lands and realty actions. In most cases, facilities would be relocated to avoid disturbance to intact, buried cultural resources. In areas where the integrity of the setting contributes to NRHP eligibility, proposals resulting in visual elements that diminish the integrity of a property's setting would be redesigned according to applicable requirements.
- ROW exclusion areas to benefit: fish and wildlife, special status species, water resources, soils, mineral resources, or associated with WSAs; would result in less BLM land available for realty authorizations.
- Avoidance areas, requiring resource inventories, surveys, and analysis before any ground disturbance occurs, could in some cases result in the relocation of realty authorizations, communication sites, and renewable energy facilities authorized under the lands and realty program, which would likely increase project costs and result in project delays.
- Exclusion and avoidance areas impact realty authorizations by restricting the placement of ROWs and facilities, limiting future access, delaying or increasing the cost of energy supplies, and creating communications dead zones or delaying the availability of communications services. Limitations on

the placement of ROWs could also result in ROWs being located in less desirable or less economically feasible locations.

- Land tenure adjustments consolidate and reduce fragmented ownership of lands within the planning area, thereby improving management of public lands. Disposing of scattered and isolated parcels reduces management costs and eliminates inefficiencies in the lands and realty program. The impacts on overall management logistics and budgets would be beneficial and would likely occur as long as the ownership does not change further. Land sales may benefit ongoing development of private lands by making additional lands available.
- Impacts to opportunities for land use authorizations, utility corridors, and communication sites would primarily occur from the implementation of management actions designed to protect natural, scenic, or cultural resources and limit impacts on those resources from surface-disturbing activities. Therefore, the type and degree of limitations and restrictions placed on rights-of-way proposals depend on the location of sensitive or high-value resources and the potential for environmental impacts on those resources.
- Land use restrictions that result in the relocation or redesign of proposed rights-of-way would increase management efforts and costs related to proposals submitted by ROW applicants. This impact would be further increased if relocation resulted in longer linear routes or placement of rights-of-ways in areas that are difficult to develop. If avoidance of sensitive resources is not possible, other mitigation measures would be required to meet the goals and objectives for other resources.
- Direct impacts on realty authorizations are anticipated from resources and resource uses prescribing ROW exclusion and avoidance areas and stipulations (as outlined in Appendix B). ROW exclusion areas would reduce route options for realty authorizations. ROW applications could be submitted in ROW avoidance areas; however, a project proposed in these areas would be subject to additional requirements such as resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, and re-routing. As a result of special surveys and reports, alternative routes may need to be identified and selected to protect sensitive resources.
- Realty authorization holders would continue to maintain access to lands and realty authorizations for maintenance and on-going administration.

Environmental Consequences

Land and realty decisions include the disposal of BLM lands, acquisition of nonfederal lands, modification of utility corridors, and designation of ROW exclusion and avoidance areas. These decisions fall under the purview of the land and realty program but are dependent on decisions proposed for other resources.

Impacts on lands and realty would result from actions proposed under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on lands and realty under any of the four alternatives. Impacts from vegetation management, wildland fire management and WSAs would be similar under all alternatives.

Alternative A

Impacts from Soils Management. Implementing stipulations to minimize detrimental effects from realty authorizations in order to maintain soils would help to reduce soil erosion, surface runoff, sedimentation in

streams, and stream channel characteristics. However, these stipulations may impact the size, location, design, or siting of realty authorizations.

Communication sites require high elevation or peak top site locations to reduce dead zones cause by terrain obstructions. Application of NSO and CSU stipulations for steep slopes and erosive soils could cause relocation of facilities and access roads. It would also require proponents to include special design, construction, operation, and reclamation measures in realty actions in order to limit the amount of surface disturbance, reduce erosion potential, maintain site stability and productivity and ensure successful reclamation.

Mitigation measures or BMPs for realty authorizations to benefit soil resources would be applied on a case-by-case basis in compliance with the NEPA process. Impacts from soils management would be similar across all alternatives however the scope or extent of the impact increases as acres of the various stipulations increase.

Impacts from Water Resources Management. Realty actions such as pipelines or roads often involve crossing wetlands or streams. Ditches directly involve disturbance of waterways. Stipulations to protect municipal watersheds for the communities of Rifle and New Castle or major river corridors could cause relocation of facilities, pipelines or roads. It would also require proponents to include special design, construction, operation, and reclamation measures in realty actions in order to protect these riverine and adjacent areas and ensure successful reclamation.

Mitigation measures for realty authorizations to benefit water resources would be applied on a case-by-case basis in compliance with the NEPA process. Impacts from water resources would be similar across all alternatives however the scope or extent of the impact increases as acres of the various stipulations increase.

Impacts from Vegetation Management. Realty actions such as new pipelines or road construction involve removing or disturbing vegetation. Stipulations to protect riparian areas and other vegetation types could cause relocation of facilities, pipelines or roads. It would also require proponents to include special design, construction, operation, and reclamation measures in realty actions in order to protect these riverine and adjacent areas and ensure successful reclamation.

Mitigation measures for realty authorizations to benefit vegetation would be applied on a case-by-case basis in compliance with the NEPA process. Impacts from vegetation management would be similar across all alternatives however the scope or extent of the impact increases as acres of the various stipulations increase.

Under all alternatives, BLM holds project proponents--including livestock operators, rights-of-way holders, and other permittees deemed necessary by the Authorized Officer--responsible for monitoring and controlling noxious weeds that result from any new facilities, improvements or other surface disturbances authorized on BLM land (e.g., roads, communication sites, pipelines, stock ponds, fences). All lessees are required to report to the Authorized Officer annually on the ongoing progress of reclamation and the status of weeds and weed control at locations developed on the lease.

Impacts from Fish and Wildlife Management. Every realty authorization must be evaluated for potential impacts to a variety of fish or wildlife species. The presence of fish and wildlife and their habitats might constrain areas proposed for realty authorizations. Proposed realty action locations could be precluded (e.g.,

NSO stipulations or lands identified for ROW avoidance) or could require mitigation if found to negatively affect the habitats of fish or wildlife species. TLs could constrain ROW construction or maintenance seasonally. Realty applicants would be encouraged (or even required) to collocate facilities to avoid or reduce habitat fragmentation.

Mitigation measures or BMPs to protect fish and wildlife and their habitat could modify proposed realty authorizations. Mitigation measures for realty authorizations would be applied on a case-by-case basis in compliance with the NEPA process. Impacts would be similar across all alternatives however the scope or extent of the impact increases as acres of the various stipulations increase.

Impacts from Special Status Species Management. The goals of special status species management are to protect or improve habitats to a point where their special status recognition is no longer warranted and to take necessary actions by implementing actions and protections that assist in their recovery. Every realty authorization must be evaluated for potential impacts to a variety of special status plant, fish or wildlife species. The presence of special status species and their habitats might constrain areas proposed for realty authorizations. Proposed realty action locations could be precluded (e.g., NSO stipulations or lands identified for ROW avoidance) or could require mitigation if found to negatively affect the habitats of special status species. TLs could constrain ROW construction or maintenance seasonally. Realty applicants would be encouraged (or even required) to collocate facilities to avoid or reduce habitat fragmentation.

Mitigation measures or BMPs to protect special status species and their habitat could modify proposed realty authorizations. Mitigation measures for realty authorizations would be applied on a case-by-case basis in compliance with the NEPA process. Impacts would be similar across all alternatives however the scope or extent of the impact increases as acres of the various stipulations increase.

Impacts from Cultural Resource Management. The application of stipulations and other protective measures for the protection of cultural resources could require avoidance and other mitigation measures for rights-of-way proposed near cultural resources. In some cases, evaluating, mitigating, and protecting cultural resources would result in a modification or relocation of realty authorizations. Because cultural resources occur throughout the planning area, and because it is likely that additional cultural resources would be discovered in the future, impacts would vary by project and could be considerable in certain cases. Management actions to protect cultural resources would affect relatively small, localized areas and would not have a measurable impact on lands and realty action. Construction costs could be higher from the realignment necessary to avoid cultural sites.

Impacts from Visual Resource Management. VRM designations do not preclude land use activities if the impacts of those activities can be mitigated to meet VRM Class objectives. New realty authorizations would be required to meet VRM class objectives. VRM Class I and II areas would be aimed at greater retention of existing landscape character than would VRM Class III and IV areas. The class designation could affect realty authorization design and reclamation by requiring that proposed projects meet VRM class criteria and could affect associated costs on new or amended realty authorizations.

Realty authorizations would generally be compatible with VRM class IV objectives because this classification would allow for increased opportunities for land use actions. This is also true for VRM class III objectives; however, some additional project planning may be necessary within VRM class III areas to ensure that the landscape character is partially retained. Any rights-of-way proposed in VRM class I or II areas would be

subject to intensive mitigation at levels dictated by the class and, in some cases, could be precluded. Impacts from VRM would be similar across all alternatives however the scope or extent of the impact increases as acres Class I and II (including the associated stipulations) increase.

Stipulation GS-NSO-18 would prohibit surface occupancy and surface-disturbing activities on slopes over 30 percent with high visual sensitivity within 5 miles of the Interstate-70 viewshed. Towns and cities (Eagle, Wolcott, Gypsum, Glenwood Springs, New Castle, Silt, Rifle, and Parachute) in need of infrastructure expansion could be negatively affected and would be required to apply mitigation measures (e.g., BMPs, design criteria) to meet the stipulation's exception criteria.

Impacts from Wildland Fire Management. Wildland fire management gives first priority protection to life and property would offer long-term benefits to the lands and realty program. Protection of WUIs zones and reducing fuel loading around BLM land infrastructure offers increased protections for realty authorizations (e.g., communication sites housing 911 emergency systems, aerial utility grids) from unplanned wildland fire.

Impacts from Recreation and Visitor Services Management. Recreation use occurs on literally every acre of BLM land open to public use. Dispersed recreation use across the CRVFO is highest during the fall big game hunting seasons. During other times of the year recreation use is highest near communities, near public land attractions and within RMAs. Within SRMAs and to a lesser extent ERMAs, BLM R&VS management focuses on maintaining a desired physical, social and operational recreation to facilitate offering a specific set of recreation outcomes. Because recreation is an extensive use of BLM lands, realty actions must consider impacts from recreation use and R&VS management actions.

The application of stipulations and other protective measures for the protection of recreation resources would: limit surface-disturbing activities, require ROW authorizations to avoid recreation areas and sites, or necessitate the addition of mitigation measures; in SRMAs, ERMAs or near recreation sites. These stipulations and protective measures could result in the relocation or redesign of proposed realty authorizations. Based on a qualitative use of acres, Alternative A places more constraints on realty authorizations than under the Proposed RMP and Alternatives C and D. Construction costs for realty actions could potentially be higher from the realignment necessary to avoid RMAs or recreation sites.

Impacts from Energy and Minerals Management. Under Alternative A, BLM would continue to manage (through application of oils and gas lease stipulations or discretionary ROW stipulations) the exploration, production, and conveyance of oil and gas and associated produced water. The level of protection under current management would be somewhat lower than the other alternatives, with a total of 672,500 acres open to fluid minerals leasing and development. However, the actual difference between this alternative and the others is lessened by the fact that most of the area with high potential for oil and gas resources has already been leased. In addition, closing to fluid mineral leasing would not apply to development of private minerals that does not involve use of federal surface lands.

Impacts from Special Designations. ACECs are managed to protect relevant and important values. Under Alternative A there are also 26 segments of river or streams managed as eligible for WSR designation. Interim management objectives would preserve the free-flowing condition, water quality, and ORVs for eligible WSR segments. Realty actions that involve surface-disturbing activities, use or occupancy usually are typically excluded or must be mitigated within ACECs and WSR segments in order to protect their identified values. Alternative A and C designate the least acreage of these special designationss and qualitatively would cause

the fewest impacts to realty actions. Special designations could also affect realty authorization needs from private inholdings or adjacent private landowners for linear infrastructure, such as pre-FLPMA ditch improvements, access, or utility grid requests.

Impacts from Wilderness Study Area Management. Continued management of four existing WSAs is considered under all alternatives. These areas are managed to preserve wilderness characteristics so as not to impair their suitability for designation by Congress as wilderness. WSAs would also be retained for long-term management. WSAs due to their locations and terrain are likely to see few applications for realty authorizations.

Any permit or lease issued under 43 CFR 2920 must contain a stipulation that if the WSA is designated as a wilderness area, the lease or permit may be terminated. Commercial filming may be permitted under 43 CFR 2920 if it is determined to meet the non-impairment standard or one of the exceptions. Commercial filming permits must stipulate that if the WSA is designated as a wilderness, the permit will be terminated. Existing rights-of-way may be renewed if they are still being used for their authorized purpose. Except as described in BLM Manual 6330—*Management of Wilderness Study Areas*, no new ROWs will be approved for uses that do not satisfy the non-impairment standard. Where nonfederal lands are surrounded by WSA lands and an access route exists, a right-of-way authorization may be approved (as appropriate) under 43 CFR 2800 on the existing access. Protective management of WSAs would exclude realty authorizations that do not satisfy the non-impairment standard in all alternatives to ensure protection of wilderness characteristics.

Alternative B (Proposed RMP)

Impacts from Soils Management. Stipulations for soils management would have the same types of impacts as those described under Alternative A, except that more acres are covered by CRVFO-CSU-1: Slopes Greater than 30 Percent or Fragile/Saline Soils. This CSU stipulation constrains surface-disturbing activities on areas: (1) with slopes steeper than 30 percent or (2) areas with fragile and saline soils regardless of slope based on the NRCS soil description and surveys.

Impacts from Water Resources Management. NSO and CSU **s**tipulations for water resources would have the same types of impacts as those described under Alternative A, except that more acres are constrained by stipulation CRVFO-NSO-5 and stipulation CRVFO-CSU-3. These stipulations prohibit surface occupancy and surface-disturbing activities within a buffer distance of 325 horizontal feet from the outer edge of the riparian/wetland zones and apply a CSU constraint within 100 feet from the edge of intermittent or ephemeral stream drainages. Due to the extensive presence of: intermittent and ephemeral streams, perennial streams, water bodies, riparian areas, and aquatic dependent species, it is likely that a high number of proposed realty actions will be constrained by these stipulations. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands identified as major river corridors, wetlands and perennial stream corridors.

Impacts from Vegetation Management. Impacts would be similar to Alternative A, although under the Proposed RMP and Alternatives C and D more actions would be taken to improve the quantity and quality of the vegetation resource.

Impacts from Fish and Wildlife Management. Impacts would be similar to those under Alternative A, except that more lands would emphasize the management of fish and wildlife species and their habitat in the proposed RMP as well as Alternative C. Stipulations and other proposed actions to protect fish and wildlife

species place more constraints in terms of both scope and extent, on realty authorizations. For example, proposed NSO stipulation to protect priority wildlife habitat would have a higher impact because the NSO stipulation would encompass BLM lands near communities where infrastructure demands are anticipated to be the greatest. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands mapped as priority wildlife habitat.

Impacts from Special Status Species Management. Impacts would be similar to those under Alternative A, except that more lands would emphasize the management of special status plant, fish and wildlife species and their habitat in the Proposed RMP as well as Alternative C. Stipulations and other proposed actions to protect special status species place more constraints on realty authorizations. For example, proposed NSO stipulations, CSU stipulations and ACEC designations to protect special status plant would have a greater impact because plant locations are scattered throughout the CRVFO. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands mapped as habitat for proposed, candidate and federally listed species. If lands are available for acquisition to facilitate the conservation or recovery of special status species, they would be a high priority.

Impacts from Cultural Resource Management. Impacts would be similar to those under Alternative A, except ACECs where cultural resources are identified as relevant and important values would exclude realty authorizations. In addition, propose NSO stipulations will constrain realty actions in a 0.25 radius around heritage areas. The processing of applications may take more time due to additional field surveys and consultation with Native American tribes than currently exists. Construction costs could be higher because surveys and realignment of realty actions. Impacts would be similar across the Proposed RMP and Alternatives C and D. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands mapped as heritage areas and ACECs for the protection of cultural resources.

Impacts from Visual Resource Management. Qualitatively based on acres of VRM classes, the Proposed RMP then Alternative C would be the most constraining on realty authorizations due to increases in acres of VRM Class I and Class II areas and the associated stipulations. Within VRM Class II areas, all new disturbances would be concentrated within existing ROWs or within 200 meters (656 feet) of existing disturbances in order to maintain overall scenic quality in utility corridors and in high-sensitivity transportation corridors. This recognizes existing disturbances while not foregoing protections for high-sensitivity transportation corridors.

Impacts from Wildland Fire Management. Impacts from wildland fire management decisions would be the same as or similar to those considered under Alternative A .

Impacts from Managing to Protect Wilderness Characteristics. BLM would manage 34,400 acres outside of existing WSAs to protect their wilderness character. Surface occupancy and surface-disturbing activities on these lands would be constrained by an NSO stipulation to protect their wilderness characteristics. In addition Appendix F identifies prescriptions for management of these lands. The prescriptions for the lands and realty program include the following:

- Lands with wilderness characteristics would be retained in public ownership. They would not be disposed through any means, including public sales, exchanges, patents under the Recreation and Public Purposes Act, State selections, or other actions (except where a vested right was established prior to October 21, 1976).

- Prior existing rights, such as leases under the Recreation and Public Purposes Act, leases/permits under 43 CFR 2920, and rights-of-ways (ROWs) may be renewed.
- These lands would be designated as ROW avoidance areas. New authorizations, leases, or ROWs would not be authorized that are not compatible with the defined values.
- The BLM would acquire State and private inholdings when practicable. In unique situations and subject to public review, exchanges may be made involving federal and nonfederal lands when such action would significantly benefit that area's wilderness characteristics.
- Adequate access to inholdings that are compatible with the defined values would be authorized.
- New administrative use authorizations would be granted on a case-by-case basis if it is: (1) compatible with the defined values, or (2) necessary to administer and protect the lands with wilderness character, and (3) necessary to protect the health and safety of persons within the area.

NSO stipulations and the proposed prescriptions to protect wilderness characteristics would place additional constraints on realty authorizations. Alternatives A and D do not propose managing for wilderness characteristics outside of WSAs so opportunities for realty authorizations would not be impacted.

Impacts from Recreation and Visitor Services Management. Impacts from R&VS decisions would be similar to those considered under Alternative A. Based on a qualitative use of acres, the Proposed RMP, based on acreage, places fewer constraints on realty authorizations however the Hardscrabble-East Eagle SRMA, The Crown SRMA, Red Hill SRMA and the Upper Colorado River SRMA are in locations that have a high probability for future realty actions due to the interspersed nature of public-private lands and the proximity to growing communities. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands managed as SRMAs or ERMAs and developed recreation sites.

Impacts from Energy and Minerals Management. Despite the variance in acres open to leasing and gas development under the Proposed RMP and Alternatives C and D, the extent of gas development is not expected to vary among the alternatives. Based on information provided by the RFD, the intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback. In those areas applications for realty authorizations related to natural gas development is expected to increase.

Impacts from Special Designations. The Proposed RMP would determine Deep Creek Segment 2 (wild) and Deep Creek Segment 3 (recreational) as suitable. The Proposed RMP would rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Appendix Q) in concert with BLM land management authorities to protect the free-flowing condition, water quality, ORVs, and tentative classifications for the Colorado River segments. The lands and realty program would be subject to the following supplemental decisions:

- Designate Deep Creek Segment 3, along with Colorado River Segments 6 and 7, as ROW avoidance areas.
- Designate Deep Creek Segment 2 as a ROW exclusion area.
- Petition for withdrawal Deep Creek Segment 2 and Deep Creek Segment 3 from locatable exploration.

- Retain for long-term management Deep Creek Segments 2 and 3 along with Colorado River Segments 6 and 7.

The Proposed RMP would designate 46,400 acres as ACECs. ACECs are designated as either a ROW avoidance or exclusion area and generally are constrained with NSO stipulations. BLM would petition the Secretary of the Interior for closure of ACECs to the mining laws for locatable exploration or development (locatable minerals).

Proposed NSO stipulations and other decisions to protect values within special designations would place additional constraints on realty authorizations as opposed to Alternatives A and D which proposed fewer special designations and constraints. There would be the possibility of denying some land use authorizations that could not avoid these areas. Construction costs could be higher because of potential realignments. These designations could affect realty authorizations for inholdings and adjacent private landowners (who need access or linear distribution utility service) and cross-country utility grid needs. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands designated as ACECs and stream segments managed as suitable WSR segments.

Impacts from Wilderness Study Area Management. Impacts from WSAs would be the same as or similar to those considered under Alternative A.

Alternative C

Impacts from Water Resources Management. Impacts would be similar to those under Alternative A, although under the Proposed RMP and Alternatives C and D more prescriptive measures would be taken to improve the quantity and quality of streamside management, and perennial waters to prohibit surface occupancy and surface-disturbing activities. These measures could impact issuing, modifying, relocating, or denying realty authorizations to protect water quality and aquatic values and to prevent channel degradation. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands identified as major river corridors, wetlands and perennial stream corridors.

Impacts from Vegetation Management. Impacts would be similar to those under Alternative A, although under the Proposed RMP and Alternatives C and D, more prescriptive measures would be taken to improve the quantity and quality of the vegetation resource.

Impacts from Fish and Wildlife Management. Impacts would be similar to those under Alternative A and the Proposed RMP, except that more lands would emphasize the management of fish and wildlife species and their habitat. Stipulations and other proposed actions to protect fish and wildlife species place the most constraints in terms of both scope and extent, on realty authorizations. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands mapped as core wildlife areas.

Impacts from Special Status Species Management. Impacts would be similar to those under Alternative A and the Proposed RMP, except that more lands would emphasize the management of special status species and their habitat. Stipulations and other proposed actions to protect special status species place the most constraints in terms of both scope and extent, on realty authorizations. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands mapped as habitat for proposed, candidate and federally listed species. If lands are available for acquisition to facilitate the conservation or recovery of special status species, they would be a high priority.

Impacts from Visual Resource Management. Qualitatively based on acres of VRM classes, then Alternative C would be slightly more constraining on realty authorizations due to the most acres in VRM Class I and Class II areas and the associated stipulations. This would increase the level of restrictions designed to protect visual resources and subsequently would limit opportunities for rights-of-way authorizations.

Impacts from Wildland Fire Management. Impacts from wildland fire management would be the same as or similar to those considered under Alternative A .

Impacts from Managing to Protect Wilderness Characteristics. Impacts would be similar to those considered under the Proposed RMP however 45,900 acres would be managed to protect their wilderness characteristics. Based on acreage, this alternative would be the most restrictive on realty authorizations. Alternatives A and D do not proposed managing for wilderness characteristics outside of WSAs so opportunities for realty authorizations would not be impacted.

Impacts from Recreation and Visitor Services Management. Impacts would be similar to those described under Alternative A and the Proposed RMP, except there would be only two SRMAs (Red Hill and Upper Colorado River) designated. The Crown area would be managed as an ERMA instead of a SRMA and would be protected with a CSU instead of an NSO, which would be less constraining to the placement and design of realty authorizations. Other areas formerly managed as SRMAs or RMAs would be managed as ERMAs. Based on a qualitative use of acres, the Proposed RMP places the least constraints on realty authorizations.Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands managed as SRMAs or ERMAs and developed recreation sites.

Impacts from Energy and Minerals Management. Despite the variance in acres open to leasing and gas development under the Proposed RMP and Alternatives C and D, the extent of gas development is not expected to vary among the alternatives. Based on information provided by the RFD, the intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback. In those areas applications for realty authorizations related to natural gas development is expected to increase. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands identified as high- and moderate-potential federal mineral estate under federal surface.

Impacts from Special Designations. Management actions would designate the most (16) ACECs, totaling 79,800 acres.. This alternative also determines all 26 eligible rivers in CRVFO as suitable. The lands and realty program would be subject to the similar supplemental decisions as proposed in the Proposed RMP. Impacts would be similar to those described under the other alternatives, especially the Proposed RMP. Alternative C would be the most constraining on realty authorizations due to (1)the number, size and location of ACECs, (2) the proposed protective stipulations and protective measures, and (3) the number of rivers determined to be suitable. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands designated as ACECs and managed as suitable WSR segments.

Impacts from Wilderness Study Area Management. Impacts from WSAs would be the same as or similar to those considered under Alternative A.

Alternative D

Impacts from Water Resource Management. Impacts would be similar to those discussed under the other alternatives. Alternative D is the least restrictive of the action alternatives (Proposed RMP and Alternatives C

and D) due to the fewest constraints on realty authorizations for the protection of water resources. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands identified as major river corridors, wetlands and perennial stream corridors.

Impacts from Vegetation Management. Impacts would be similar to those discussed under Alternative A, although more prescriptive measures would be taken to improve the quantity and quality of the vegetation resource under the Proposed RMP and Alternatives C and D.

Impacts from Fish and Wildlife Management. Impacts would be similar to those discussed under the other alternatives. Alternative D is the least restrictive of the action alternatives (Proposed RMP and Alternatives C and D) due to the fewest constraints on realty authorizations for the protection of fish and wildlife species and their habitats resources.

Impacts from Special Status Species Management. Impacts would be similar to those described under the other alternatives, but with fewer restrictive management actions. Where conflicts arise, they would be likely addressed with the land and realty projects through mitigated measures. A no surface occupancy and ground disturbance stipulation for threatened, endangered, proposed, and candidate species would impact land use authorizations proposals by causing avoidance and realignment. There would be the possibility of denying some realty authorizations that could not avoid the special status species habitat.

Impacts from Cultural Resource Management. Impacts would be similar to those described under Alternative A, except slightly higher prescriptive measures would be taken to protect cultural and historic resources. Surface occupancy and surface-disturbing activities within 100 meters of historic properties would be prohibited.

Impacts from Visual Resource Management. Impacts would be similar to those described under the other alternatives. VRM Class I acreage is basically the same as under the Proposed RMP and Alternative C. VRM Class II acres would be fewer than the Proposed RMP or Alternative C. Opportunities for realty authorizations would be the least constrained and likely be subject to the least mitigation and design requirements.

Impacts from Wildland Fire Management. Impacts from wildland fire management would be the same as or similar to those considered under Alternative A.

Impacts from Recreation and Visitor Services Management. Impacts would be the similar to those described under the Proposed RMP and Alternatives A and C, except there would be seven SRMAs, totaling approximately 63,600 acres, and five separate ERMAs totaling approximately 33,000 acres. Alternative D has the most RMAs, especially in the Roaring Fork Valley. However the SRMAs are not designated as ROW avoidance areas and only Red Hill, Fisher Creek, and the Upper Colorado River SRMAs are covered by NSO stipulations. Overall Alternative D would be the least constraining to the placement and design of realty authorizations. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands managed as SRMAs or ERMAs and developed recreation sites.

Impacts from Energy and Minerals Management. Despite the variance in acres open to leasing and gas development under the Proposed RMP and Alternatives C and D, the extent of gas development is not expected to vary among the alternatives. Based on information provided by the RFD, the intensity of impacts

could increase in areas with a high potential for natural gas located west of the Grand Hogback. In those areas applications for realty authorizations related to natural gas development is expected to increase. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands identified as high- and moderate-potential federal mineral estate under federal surface.

Impacts from Special Designations. This alternative would manage the fewest ACECs. This alternative would also propose the fewest river and stream segments as suitable for inclusion into NWSRS. Opportunities for realty authorizations would be the least constrained and likely be subject to the least mitigation and design requirements. Land tenure adjustments would be affected by land tenure criteria to retain in federal ownership BLM lands designated as ACECs.

Impacts from Wilderness Study Area Management. Impacts from WSAs would be the same as or similar to those considered under Alternative A.

Cumulative Impacts

Effects of past actions include various authorizations and agreements to use BLM land, such as ROW grants and road use agreements under several different authorities, permits, and leases, pursuant to Section 302 of the FLPMA and Recreation and Public Purposes Act leases. Designation of the energy corridor in the CRVFO, as described in the *Final Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States* (US DOE and BLM 2008), was approved in January 2009. No new potential ROW corridors on BLM lands within the CRVFO have been identified.

Alternative C would have the greatest effect on realty authorizations by contributing to an overall reduction in land available for realty actions. Implementation of the ACECs, along with the four existing WSAs, future actions such as ESA listings, and increased tribal coordination, could result in limitations imposed on realty authorizations in additional areas. However, in the future, there would be increased demands for many kinds of uses on the public lands, such as ROWs, leases, permits, recreation, and extractive uses, as a result of increased population in the area. Restrictions on public lands may drive more development on privately owned surface, and the increase in population expected would add to the future development demands on private ranches. Areas close to existing communities would be impacted the most. Infrastructure demands by local towns and cities could make it difficult to expand onto public land for their utility requests because of factors from increased restrictions. Overall, the cumulative effects of realty authorizations in the greater planning area would be moderate based on the large percentage of land that is managed by the BLM that is intermixed with the growing communities along the Interstate 70 and State Highway 82 corridors.

Land tenure adjustments for BLM lands that have occurred within the planning area during the most recent 20-year period have included acquisition of 14,567 acres and sale of 13,917 acres. These totals do not include title transactions related to oil shale, other minerals, corrective actions, recordable disclaimers of interest, the Recreation and Public Purposes Act, or transfer of Naval Oil Shale Reserves Nos. 1 and 3 from the DOE to the BLM. Consolidating existing BLM lands would be a high priority, along with acquiring public easements of special importance to the public. Acquisitions of key parcels for resource protection and scenic values are important contributions to the quality of life and the environment in the planning area. Continued realty actions to consolidate parcels and acquire new holdings (including public easements) would result in positive cumulative effects for the planning area.

4.3.6 Energy and Minerals

4.3.6.1 Coal

This section presents the impacts on coal resources from management actions of other resources and resource uses discussed in Chapter 2. Existing conditions concerning coal resources are described in Chapter 3, Section 3.3.6.

Federal regulations for the management of coal resources are at 43 CFR 3400. Land use planning for coal leasing requires an evaluation to identify the coal resources that have development potential by surface or underground mining methods. In addition, a subsequent evaluation is required under the coal unsuitability criteria, as defined at 43 CFR 3461.5, to determine the coal resources that are acceptable for further consideration of leasing.

Coal resources are estimated at approximately 1.6 billion tons. Historic mines near Carbondale have been inactive since the mid-1980s and are identified in the current land use plan as unacceptable for further consideration for coal leasing and development due to multiple-use conflicts. Farther northwest within the CRVFO, coal seams are exposed at or near the surface in several places along the Grand Hogback. However, these deposits are not considered to be represent potentially developable coal resources based on a lack of expressions of interest over the past few decades and geologic constraints. The steep dip of the thin, relatively low-quality seams limits along the Grand Hogback, limit the quantity accessible with either surface or subsurface mining operations. Elsewhere in the CRVFO, large quantities of coal are interbedded with mostly flat-lying, near-shore sedimentary deposits in the Piceance Basin west of the Grand Hogback. However, these resources are too deep, lying at depths of several thousand feet, to be considered potentially developable with current technologies.Because of a lack of potentially developable coal resources in the CRVFO, the Proposed RMP does not include a suitability analysis by applying the screening process in 43 CFR 3420.1. In the unlikely event of a future coal exploration, proposal for coal leasing and development within the CRVFO, a suitability analysis and evaluation of acceptability for further consideration would be conducted.

Methods and Assumptions

The analysis was based on the following assumptions:

- The current evaluation of federal coal resources within the CRVFO area is a reasonable estimation for the RMP planning horizon.
- No potentially developable coal resources are identified in the CRVFO based on geological and economic constraints and the lack of expressions of interest since publication of the 1988 RMP (BLM 1988).
- If the BLM receives an application for an exploration license, the application would be evaluated to determine if the lands are subject to leasing under 43 CFR 3400.2. If so, and if an exploration permit were granted, it would be subject to the NSO, CSU, and TL stipulations for the protection of other resources and resource uses as applicable to other surface disturbance and surface use under the Proposed RMP.
- In the unlikely event of a proposal for coal leasing and development, the BLM would conduct the screening process described at 43 CFR 3461 to determine suitability/unsuitability. This process would be conducted in conjunction with preparation of an EIS and RMP Amendment, including publication of notice in the *Federal Register* to solicit public comments. Any lands found suitable for

leasing and development in response to a specific proposal would then be subject to the further screening set forth at 43 CFR 3420.1-4(e)(3), which applies further screens such as Screen 2 (acceptability for mining), Screen 3 (multiple resource use), and, for split-estate lands, Screen 4 (surface owner preference).

- Note that the Proposed RMP/Final EIS differs from the Draft RMP/Draft EIS, which did not make an a-priori determination regarding the absence of potentially developable coal resources but instead assumed that future exploration, leasing, and development are unlikely but potential occurrences. Under the approach of the Draft RMP/Draft EIS and current management, proposals for future leasing and development of federal coal resource would be limited to the Grand Hogback, designated as open and suitable for coal leasing and development. Under the Proposed RMP, a proposal for leasing and development would be analyzed in an RMP Amendment/EIS to evaluate its suitability/unsuitability for mining. If found suitable, the same process would them be applied as under current management and the Draft RMP/Draft EIS to determine whether it is acceptable for further consideration for coal leasing and development. Therefore, the outcomes of the two processes are likely to be the same for any coal resource identified as suitable for mining, being affected primarily by the subsequent application of Screen 2 (multiple resource use), given the resource values along the Grand Hogback. These include sensitive visual resources, critical wildlife habitat, and wilderness characteristics.

Environmental Consequences

Impacts on coal resources would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no impacts or only negligible impacts on coal resources under any of the four alternatives.

Alternative A

Impacts from Coal Management. Under Alternative A, approximately 28,500 acres of federal mineral estate along the Grand Hogback would be open to further consideration for coal leasing. However, no areas of potentially developable coal are currently identified, based on geologic constraints and lack of expressions of interest. Also under this alternative, an additional 1,600 acres of coal resources near Carbondale would be remain designated as unacceptable for further consideration for coal leasing and development due to multiple use conflicts. In the unanticipated event of future coal leasing and development, stipulation GS-NSO-1 for surface coal mines would prohibit surface occupancy and surface-disturbing activities within the area of an approved mine, and stipulation GS-CSU-1 for underground mines would apply CSU restrictions to oil and gas operations within the area of federally leased coal lands. These stipulations would prevent potential conflicts associated with oil and gas development in those areas.

Impacts from Soils Management. Under Alternative A, GS-NSO-15 would prohibit surface occupancy and surface-disturbing activities on slopes greater than 50 percent, and stipulation GS-CSU-4 would require special design, construction, operation, and reclamation measures on slopes steeper than 30 percent with erosive soils. Since most of the potential coal reserves on the Grand Hogback are in areas with steep slopes and erosive soils, these stipulations could prevent or limit the development of coal resources, resulting in a moderate to major adverse impact on this resource.

Impacts from Water Resource Management. Under Alternative A, GS-NSO-3 would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of six major rivers. Coal resources along the Grand Hogback are located in relative proximity to the Colorado River where it cuts through the

Grand Hogback at New Castle, where mining historically occurred, which was named for the coal-mining district in England. GS-NSO-13 for municipal watershed areas would prohibit surface occupancy and surface-disturbing activities within watersheds providing domestic water for the communities of Rifle and New Castle. The Town of New Castle municipal watershed is located along elk Creek upstream from where it cuts through the Grand Hogback near its confluence with the Colorado River. Therefore, these restrictions could have minor to moderate impact of future, but currently unanticipated, development of Grand Hogback coal seams near New Castle.

Impacts from Vegetation Management—Riparian. Under Alternative A, GS-NSO-2 would prohibit surface occupancy and surface-disturbing activities within riparian vegetation. A substantial amount of additional acres would be protected by stipulation GS-CSU-2, which requires special design and construction and implementation measures within 500 feet of riparian or wetland vegetation. The highest potential for coal development in the resource area is along the Grand Hogback, which contains little or no riparian vegetation except along the Colorado River and Elk Creek near the Town of New Castle.

Impacts from Terrestrial Wildlife Management. Alternative A would protect a substantial number of acres with NSO stipulations for wildlife seclusion areas and the Garfield Creek State Wildlife Area. However, neither of these occurs in areas of potentially developable coal resources. Stipulations also include TL stipulations to protect wildlife use of seasonally important habitats and specific use areas, such as a 5-month TL stipulation in big game winter range and other TL stipulations for big game birthing areas, raptor nesting areas, and waterfowl and shorebird nesting areas. These areas could coincide with areas of coal resources along the Grand Hogback. In most cases in the area of the Grand Hogback, wildlife-related stipulations NSO, CSU, and TL stipulations would have major, moderate, and minor constraints on any future coal development in areas covered.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Under Alternative A, a substantial number of acres would be protected by various NSO stipulations that prohibit surface occupancy and surface-disturbing activities in occupied habitat for special status plants and terrestrial wildlife. Where these areas occur in conjunction with potential coal development, they would probably limit, prevent, or relocate coal development activities. Few such species are currently known to occur on the Grand Hogback.

Impacts from Cultural Resource Management. Under Alternative A, cultural resources would be protected by general stipulation CRV-NSO-38, which would prohibit surface occupancy and surface-disturbing activities within 100 meters (328 feet) of historic properties. Identified and likely undiscovered cultural sites exist throughout the Grand Hogback, where the highest potential for coal development exists. This would have a major constraint of future coal development in protected areas, although less so for underground than surface mining operations.

Impacts from Visual Resource Management. VRM designations do not preclude land use activities if the impacts can be mitigated to meet VRM Class objectives. . Most of the coal resources in the CRVFO are along the Grand Hogback, generally designated as VRM Class II, which aims for a low level of change to the landscape. Stipulation GS-NSO-18 would prohibit surface occupancy and surface-disturbing activities on slopes over 30 percent with high visual sensitivity from Interstate-70. These conditions exist along portions of the Grand Hogback, where most of the near-surface coal deposits are known to occur within the CRVFO.

This would have a major impact on any surface coal mining in the protected area but less so on underground mining.

Impacts from Lands and Realty Management. The ROW authorization process under Alternative A would consist of responding to specific proposals for coal development on a case-by-case basis. Issuing rights-of-way required for specific coal projects, including routes across BLM lands to access federal or private coal developments, would be constrained by NSO, CSU, and TL stipulations for lands with specific resource values and management directions. These stipulations would be attached as terms and conditions for coal-related right-of-way grants.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts from fluid minerals management on coal resources would be negligible under Alternative A. Although the Grand Hogback area contains coal and oil and gas resources, any coal mining would be limited in areal extent by the thin, steeply dipping coal seams. Fluid mineral resources potentially accessed from the Grand Hogback are at depths several thousand feet deeper than the potentially developable near-surface coal deposits, allowing potential downhole targets to be reached by directional drilling from surface locations offset by horizontal distances of up to 0.25 mile. Existing stipulations for coal resources (GS-NSO-1 for surface mines and stipulation GS-CSU-1 for underground mines) under Alternative A are specifically intended to avoid or minimize development conflicts between coal and fluid minerals development.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The potential for mining of locatable, salable, and non-energy leasable minerals in proximity to coal resources is negligible under Alternative A. Although the Grand Hogback contains both coal and potentially other solid minerals, the occurrences of any solid minerals are expected to be of such limited quality, quantity, economic value, and areal extent that conflicts between these types of developments are not anticipated during the current planning horizon.

Alternative B (Proposed RMP)

Impacts from Coal Management. Under the Proposed RMP, no coal occurrences within the CRVFO are considered to be potentially developable based on geologic and economic constraints and lack of expressions of interest. In the unanticipated event of a future proposal for coal exploration, the various NSO, CSU, and TL stipulations for the protection of other resources and uses would be applied. If any future proposal passing through the screening process pursuant federal coal leasing regulations, an EIS and RMP Amendment would be prepared as a basis for public participation, analysis of potential impacts on the natural and human environments, and application of restrictions (lease stipulations) to ensure adequate protections of other resources and resource uses. As described previously, any future proposals for coal leasing and development would be evaluated using the screening criteria set forth in 43 CFR 3420.1 in conjunction with project-specific NEPA and an RMP amendment.

For the reasons cited above, none of the management actions and protective stipulations associated with other resources is expected to affect coal resources during the planning horizon.

Alternative C

Impacts from Coal Management. Impacts under Alternative C would be the same as the Proposed RMP. No effects from management of other resources or resource uses and associated protective stipulations are anticipated due to a lack of potentially developable coal resources.

Alternative D

Impacts from Coal Management. Impacts under Alternative D would be the same as under the Proposed RMP and Alternative C. No effects from management of other resources or resource uses and associated protective stipulations are anticipated due to a lack of potentially developable coal resources.

Cumulative Impacts

The geographic extent of the cumulative impacts analysis as it pertains to coal resources would be the CRVFO boundary and would include all federal, state, private, and other lands within this boundary. No potentially developable coal resources are currently identified, although Alternative A includes 28,500 acres along the Grand Hogback as open to coal leasing and development. The CRVFO has received no expressions of interest in coal leasing and development in the past few decades due to the combination of geological and technological constraints described above. Throughout all alternatives, NSO and CSU stipulations applied to avoid or minimize impacts to a variety of other resources and resource uses would limit any future coal exploration projects, not currently anticipated.

Because only Alternative A designates any BLM lands as open to coal mining, it is less restrictive than the Proposed RMP and Alternatives C and D. Under all alternatives, any future proposals for coal leasing and development would be evaluated under the screening criteria of 43 CFR 3420.1 in connection with a project-specific NEPA analysis. However, all alternatives except under Alternative A would require an RMP amendment for authorizing future coal developments.

4.3.6.2 Fluid Minerals (Oil and Gas, Oil Shale and Geothermal Resources)

Methods and Assumptions

This section presents the impacts on fluid minerals from management actions related to fluid minerals and other resources and resource uses discussed in Chapter 2. Existing conditions concerning geothermal resources are described in Chapter 3, Section 3.3.7. At present, no potentially commercially developable geothermal resources have been identified on BLM lands. The Final Oil Shale and Tar Sands (OSTS) Programmatic EIS (PEIS) (BLM 2012i) identified a small area of "most geologically prospective oil shale resource" in the planning area (i.e., outside the Roan Plateau planning area). Oil shale resources outside the Roan Plateau area are considered unsuitable for development using non-traditional recovery technologies currently being evaluated. Consequently, no oil shale research leases have been issued in the planning area, and no commercial oil shale development is anticipated during the life of this RMP. In the unlikely event of any future leasing and development, the CRVFO would apply protective lease stipulations and other mitigations specified in the Final OSTS PEIS.

Fourteen oil and gas fields are identified in the planning area, all within the high-potential area for oil and gas located west of the Grand Hogback (BLM 2008g). Most of the existing production is from the Cretaceous Mesaverde Group, with lesser production from the Wasatch Formation. It is estimated that 99 percent of future production will occur in the high-potential area, with the remainder in medium- to low-potential areas. It is also assumed that no drilling activity would occur in areas mapped as "no known potential."

Directional drilling technologies are used in the large majority of new oil and gas projects. Directional drilling enables operators to drill multiple wells (currently as many as 40 or more) from a single well pad, greatly reducing the amount of surface disturbance and potential for adverse impact to surface resources. Directional drilling also makes it possible to develop fluid minerals underlying lands with no surface access. Examples

include using drilling directionally to reach beneath steep slopes and other difficult terrain, streams and rivers, areas supporting special status species, visually sensitive areas, and other lands with a special designation requiring application of an NSO stipulation to the lease. The amount of directional offset (lateral reach) from the surface location to the bottomhole location is not unlimited and is generally been less than 2,500 feet for the target formations using current technologies.

The analysis of impacts on fluid minerals incorporates assumptions about different levels of future development among the alternatives analyzed. The starting point for a range of development intensities was the RFD (Appendix R). The BLM prepares RFDs in conjunction with its land use planning process to characterize the general type, location, and quantity of recoverable fluid mineral resources, including both federal and private mineral estate lands. An RFD is not an estimate or prediction of specific numbers or locations oil and gas wells that will be drilled during the planning period. Instead, an RFD is intended to provide a basis for planning by describing general locations and quantities of recoverable fluid mineral resources in a relatively unconstrained scenario. In reality, development is not unconstrained but limited by physical, economic, geopolitical, technological circumstances, and legal constraints. Another important consideration relative to an RFD is that is not intended to be used as a cap on future mineral leasing and development, since it is based only on the best information available at the time. Rapid advances in technology and dramatic fluctuations in economics can affect the accuracy of an RFD over time.

The RFD presented in Appendix R was prepared in accordance with IM No. 2004-089, "Policy for Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas Resources," dated January 16, 2004. Its baseline assumption for the purpose of defining the fluid mineral resource was that all potentially productive areas would be open to development under standard lease terms, except for areas closed to leasing under law, regulation, or executive order. Five Total Petroleum Systems (TPSs) and 20 assessment units (AUs) that extend into the Piceance Basin were used to delineate the areas of greatest potential for oil and gas occurrence. In addition to the conventional Mesaverde and Wasatch plays, the RFD analyzed and considered possible unconventional gas plays of the Niobrara, Mancos, and Eagle Basin formations. Information related to potential development of deep tight-gas marine shales of the Niobrara and Mancos formations using horizontal drilling technologies has been mostly treated by the operators as proprietary during the timeframe of the current planning process. To date, use of horizontal drilling in relation to the deep marine shales has been limited and is considered experimental. As a result, the development intensity, timing, and location of development of the deep marine shales was considered too speculative for quantitative impact analysis in connection with this planning process. Moreover, any Mancos or Niobrara wells would be applied against the well numbers assumed in the RMP when tracking development in relation to potential environmental impacts. To date, operators indicate that development of the deep marine shales may reduce the number of Mesaverde wells. If and when total well numbers approach those analyzed in the RMP, the CRVFO would evaluate the need for supplemental analysis. During the past 3 years (FY10 – FY12), the CRVFO processed an average of 266 APDs per year from 2010 through 2012, similar in scale to the level presented in the RFD and used in the impact analysis of the Proposed RMP/Final EIS.

In arriving at a range of well numbers for the various alternatives analyzed, the BLM did not apply specific development constraints (closures or NSOs) contained within the alternatives as presented in the Draft RMP/Draft EIS. The reason is that the air quality model used to estimate potential air impacts from oil and gas activities required numbers representing a reasonable range early in the process and before management actions had been fully identified. Consequently, the range of well numbers in the Draft RMP/Draft EIS was

not based on the effect of management actions but hypothetical numbers for use in the air model. Those numbers ranged from 2,206 for the Proposed RMP and Alternative C to 2,262 for Alternative A and 4,198 for Alternative D. Each alternative also assumed certain types and levels of air quality mitigation, which were also input to the air model (see Section 4.2.1). The air quality modeling also incorporated previously mentioned 1,570 wells for the Roan Plateau planning area and 872 wells on NFS lands under each alternative.

When results of the air quality modeling indicated that well numbers for Alternative D, with associated mitigation, would not result in significant adverse impacts on air quality, BLM determined that use of the higher well numbers of that alternative would also be appropriate for the Proposed RMP/Final EIS to ensure that impacts are not underestimated. The number of future wells actually developed during the 20-year planning horizon is expected to be driven primarily by external factors such as technology, economics, and geopolitical consideration. BLM management actions arising from this planning process—e.g., NSO stipulations and closures to leasing—would directly affect only the 5 percent of the high-potential area for oil and gas that is currently unleased.

The analysis of impacts associated with leasing and development of fluid minerals presented below was based on the following assumptions:

- Oil and gas operations on existing leases would be subject to stipulations attached to the leases when issued and to COAs attached to individual APDs or other authorizations as developed in project-specific NEPA analysis. The COAs would be applied under BLM's authority to impose reasonable measures to minimize impacts on other resource values, including restricting siting or timing of lease activities (43 CFR 3100, 3160; IBLM 2006-213, 2006-226, 2008-197, 2008-200).
- Leasing and development of federal oil and gas resources or use of BLM lands to access privately owned oil and gas resources could occur throughout the planning area, but with 99 percent of future development within the high-potential area for oil and gas located west of the Grand Hogback (Figure 3.3.6-1), except where restricted by management actions described in Chapter 2.
- Lease stipulations and lease notices (Appendix B) would be applied to all new leases, including expired leases subsequently reissued. Areas designated as closed to leasing would not be made available for leasing and development. Some areas not designated as closed to leasing in the RMP may, as a result of the pre-leasing NEPA process now applied by the BLM in Colorado, be found unsuitable and withdrawn from leasing at that time. Project-specific COAs would be applied to development of new leases, consistent with BLM's authority as cited in the first bullet, above.
- No federal geothermal resources with the potential for development as an energy source are currently identified. In the unlikely event of a future discovery of such resources, exploration, drilling, and production activities would be managed according to applicable law, federal regulations, and onshore orders, and would be managed through the application of NSO, CSU, and TL stipulations applicable to oil and gas developments.
- No federal oil shale resources with the potential for development during the timeframe of this RMP are currently identified. In the unlikely event of a future proposal for commercial development, the CRVFO would apply the protective stipulations and other restrictions and mitigations identified in the Final OSTS PEIS (BLM 2012i).

Acres of federal mineral estate opened or closed for future development of fluid mineral resources are shown in Table 4.3.6-1.

Table 4.3.6-1
Acres of High-Potential Area for Oil and Gas Open to Fluid Mineral Leasing and Development by Alternative and Most Restrictive Stipulation

Alternative	Open to Leasing	Open/Most Restrictive Stipulation			
		NSO	CSU	TL	Standard
Alternative A	147,500	52,100	68,500	97,000	18,800
Alternative B (Proposed RMP)	147,500	45,900	126,700	60,000	7,800
Alternative C	147,500	51,400	131,400	60,000	8,700
Alternative D	147,500	33,700	114,800	60,000	15,500

Source: BLM 2008g

Acronyms and Abbreviations:

CSU controlled surface use
NSO no surface occupancy or surface-disturbing activities
TL timing limitation (seasonal restriction)

Currently, approximately 88 percent of the federal mineral estate in the planning area with high potential for oil and gas has been leased (BLM 2007g). The closures listed in the table would apply only to currently unleased areas or to leases that expire or are withdrawn.

Master Leasing Plans

Another aspect of the planning process in areas with the potential for leasing of federal fluid minerals is the Master Leasing Plan (MLP) concept, introduced in Washington Office Leasing Reform Instruction Memorandum (IM) 2010-117. The MLP concept promotes a proactive approach to planning for oil and gas development. Generally, the BLM uses RMPs to make oil and gas planning decisions, such as areas closed to leasing, open to leasing, or open to leasing with major or moderate constraints (lease stipulations) based on known resource values. However, additional planning and analysis can be necessary prior to oil and gas leasing because of changing circumstances, updated policies, and new information. Under IM2010-117, the BLM can reevaluate its leasing decisions in light of such changing circumstances. IM2010-117 lists multiple criteria for the BLM to consider when determining whether circumstances warrant such additional planning and analysis. An MLP is prepared when all four of the following criteria are met:

- A substantial portion of the area to be analyzed in the MLP is not currently leased.
- There is a majority federal mineral interest.
- The oil and gas industry has expressed a specific interest in leasing, and there is a moderate or high potential for oil and gas confirmed by the discovery of oil and gas in the general area.
- Additional analysis or information is needed to address likely resource or cumulative impacts if oil and gas development were to occur where there are:
  - Multiple-use or natural/cultural resource conflicts
  - Impacts to air quality
  - Impacts on the resources or values of any unit of the National Park System, national wildlife refuge, or National Forest wilderness area, as determined after consultation or coordination with the NPS, USFWS, or USFS

- Impacts on other specially designated areas.

When the new guidance was issued, the BLM Colorado State Office conducted a review of possible areas where an MLP analysis would be beneficial and appropriate. Although the CRVFO did not meet the four criteria, the current RMP revision contains a hard look at the impacts of oil and gas development.

The alternatives analyzed in the Draft RMP/Draft EIS captured in detail the requirements of an MLP. Chapter 2 discussed the alternatives analyzed in the Draft RMP/Draft EIS. Chapter 3 provided an analysis of those resources and resource uses managed by the CRVFO, including resources and resource uses, and the current conditions and characterization of each resource and its use. The characterization of the resources and resource uses included indicators that assessed the resource condition, trends that expressed the direction of change between the present and some point in the past, and forecasts that predicted changes in the condition of resources given current management. Chapter 4 evaluated how each alternative would impact the environment.

Environmental Consequences

Impacts on fluid mineral resources would result from management actions related to fluid minerals and some of the management actions associated with other resources and uses. Programs not addressed below were deemed to have no impacts or only negligible impacts on fluid mineral resources under any of the four alternatives.

Alternative A

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under Alternative A, the 153,400 acres of BLM lands and private lands with underlying federal mineral estate would continue to be managed as open to oil and gas leasing and development (Table 4.3.6-1). Of that area, 34 percent would be protected by one or more NSO stipulations, and 12 percent would have standard stipulations. The remaining 54 percent would have CSU and/or TL stipulations. By making the entire high-potential area open to fluid minerals development, Alternative A (and Alternative D) would provide the maximum potential among the alternatives analyzed for production of natural gas as an energy source for the American public. Within the open areas, lands with NSO, CSU, and TL stipulations would represent major, moderate, and minor constraints, respectively, on fluid minerals development. However, advances in directional drilling in recent years have reduced the extent of the constraints by sometimes allowing the underlying fluid minerals to be reached from surface lands not encumbered with the protective stipulations.

Impacts from Air Quality Management. Construction associated with oil and gas development projects, specifically facility, road, and ROW construction, would be required to apply fugitive dust abatement measures during construction, drilling and completion, and long-term production phases. Construction and operation equipment also would be a source of engine exhaust emissions, which include both criteria pollutants and greenhouse gases. Owners and operators of these projects are required to comply with federal, state, and local air-quality management requirements and guidelines, including obtaining air quality permits and implementing fugitive dust control plans. Additionally, all new federal oil and gas pads would be required to use "green completions" to reduce emissions of hydrocarbons and related VOCs and use pipelines instead of trucks for transport of at least 60 percent of liquid condensate and produced water to consolidation facilities for storage, dehydration, treatment, or transfer to trucks for haulage to treatment, disposal, or sales. Operators must also comply with requirements of the COGCC for limiting emissions of VOCs from production equipment. These measures, while representing additional costs, would not be expected to affect

the location, extent, or intensity of future oil and gas development, and impacts on fluid minerals development would be minor.

Impacts from Soils Management. Currently Alternative A includes stipulation GS-NSO-15 for slopes steeper than 50 percent, which prohibits surface occupancy and surface-disturbing for access roads, well pads, and ancillary facilities but exempts pipelines. In addition, stipulation GS-CSU-4 for erosive on slopes steeper than 30 percent enables the BLM to require special design and construction, operation, and reclamation measures to limit erosion potential and to requirerelocation of operations beyond 200 meters (656 feet) to avoid these areas. At the project level, mitigation measures are identified and applied as COAs attached to APDs, ROWs, and associated NEPA documents.

The NSO and CSU stipulations related to soil resources would have minor to locally moderate impacts on oil and gas development. Operators routinely avoid steep or unstable slopes for safety reasons, and the use of directional drilling often allows underlying fluid minerals to be accessed from more suitable locations.

Impacts from Water Resource Management. Stipulation GS-NSO-3 for major river corridors would prohibit surface-disturbing activities or surface occupancy within 0.5 mile of six major rivers within the CRVFO. Of these, only the Colorado River flows through the area with high potential for oil and gas. Stipulation GS-NSO-13 would prohibit surface occupancy and surface-disturbing activities to protect municipal watersheds providing domestic water for the communities of Rifle and New Castle. The Rifle watershed is in the high-potential area and in proximity to existing oil and gas developments. Project-specific design requirements applied as COAs would minimize impacts to surface waters and associated resources as well as groundwater resources groundwater aquifers potentially encountered drilling of oil and gas wells. Impacts to water resources including groundwater were analyzed for all alternatives in Section 4.2.4 of the Draft RMP/Draft EIS. The conclusion of no significant adverse impacts was based on the much greater depth of hydrocarbon-bearing strata than freshwater aquifers that have the potential to affect surface water resources or be used as domestic water sources. The protective measures required of oil and gas drilling operations are designed to isolate water-bearing zones from the well bore.

The NSO stipulations for municipal watersheds would have minor impacts on oil and gas because of the availability of directional drilling to reach underlying fluid mineral resources. Requirements by the BLM and COGCC for proper design of oil and gas wells and appropriate implementation of drilling and completion technologies for the protection of groundwater are not expected to affect the location, extent, or intensity of future oil and gas developments and therefore would have minor impacts related primarily to cost.

Impacts from Vegetation Management—Riparian. Under Alternative A, stipulation GS-NSO-3 would prohibit surface disturbance and occupancy within 0.5 mile of major river corridors, including the Colorado River in the high-potential area for oil and gas. Stipulation GS-NSO-2 would apply similar restrictions within areas of riparian vegetation, and stipulation GS-CSU-2 would require special design and construction and implementation measures within 500 feet of riparian or wetland vegetation. These stipulations would have minimal impact on fluid mineral resources due to the linear nature of these features and the availability of directional drilling to access underlying fluid minerals from surface locations outside the restricted areas or, in the case of stipulation GS-CSU-2, by relocation or special design to avoid impacts.

Impacts from Vegetation Management—Weeds. Surface-disturbing activities associated with oil and gas have the potential to spread invasive and noxious weeds during construction of well pads, access roads,

pipelines, and associated facilities. Monitoring and controlling of noxious weeds is required by standard lease terms, COAs, and lease stipulations. Lease notice GS-LN-1 requires all oil and gas lessees in the CRVFO to report annually about ongoing progress of reclamation and the status of weeds and weed control at locations developed on the lease. Reclamation requirements are also intended to minimize the potential for invasion and spread of weeds by promptly returning disturbed areas to a self-sustaining cover of native plants. These requirements would have minor impacts on oil and gas development, primarily through increased cost.

Impacts from Fisheries and Aquatic Wildlife Management. Under Alternative A, GS-NSO-5 would prohibit surface occupancy and surface-disturbing activities within a 2-mile radius of the Rifle Falls and Glenwood Springs fish hatcheries. However, neither of these hatcheries is located within the high-potential area for oil and gas.

Impacts from Terrestrial Wildlife Management. Management of wildlife habitat under Alternative A would have an impact on oil and gas exploration and development by continuing current restrictions on surface-disturbing activities in certain areas. Stipulation GS-NSO-11 applies to mapped wildlife seclusion areas, while GS-NSO-04 applies to the Garfield Creek State Wildlife Area, both of which are located in the high-potential area for oil and gas. In addition, seasonal stipulation GS-TL-1 for big game winter range, like other TL stipulations, would prohibit construction, drilling, and completion activities and use of access roads requiring ROW grants to support those activities within relevant habitats and timeframes. Similarly, stipulations GS-NSO-7 and stipulation GS-TL-6 would protect raptor nesting areas and post-nesting fledgling areas with buffer widths of 0.125 mile and 0.25 mile, respectively.

These restrictions have the potential for substantial impacts on oil and gas operations because of their widespread applicability within the high-potential area. The greater use of directional drilling to develop multiple wells from a single location increases this level of impacts to operations because of the cost and impacts of suspending operations during restricted seasons and restarting operations when the season has ended. However, this potential is lessened by the availability of exception criteria, such as when a raptor nest is inactive in a given year and when mild winter conditions justify an early end to the big game TL stipulation. In general, impacts of management of terrestrial wildlife would be moderate overall but locally minor or major, depending on specific situations.

Impacts from Special Status Species Management—Plants and Terrestrial Wildlife. All oil and gas actions would be subject to the requirements of the ESA, as amended. Any action potentially affecting any listed threatened or endangered species would require the appropriate level of Section 7 consultation with the USFWS. Necessary mitigation, such as timing and avoidance, would be implemented to protect federally listed, proposed, or candidate plant and animal species, as well as BLM and USFS sensitive species. Grouse leks (courtship areas) are protected under Alternative A by stipulation GS-NSO-6, prohibiting surface occupancy and surface disturbance within 0.25 mile of an active lek, while stipulation GS-TL-3 places seasonal restrictions within both nesting and wintering habitat. No active leks or other occupied habitats have been identified in the high-potential area for oil and gas except for a small area of private land west of Parachute Creek and north of Mount. Logan.

Seasonal TL and NSO stipulations related to peregrine falcon, greater sandhill crane, and American white pelican nesting sites under Alternative A do not include high-potential areas for oil and gas. Seasonal (TL) and NSO restrictions to protect bald eagle nesting and winter roost sites would apply throughout the planning area, including historic and currently active sites along the Colorado River in the area of high potential for oil

and gas. For the most part, these restrictions overlap with the 0.5-mile NSO for major river corridors. In areas occupied for nesting or roosting by bald eagles, the BLM would apply protections as COAs at the project-specific level, and the project would be subject to the MBTA and BGEPA. Similar TL and NSO stipulations would apply to any documented occurrences of the Mexican spotted owl. Fledgling and nesting habitat of ferruginous hawks would be protected by NSO and TL stipulations with buffers of 0.125 and 1 mile, respectively. Neither Mexican spotted owl nor ferruginous hawks are known or expected to nest in the planning area.

Stipulation GS-NSO-12 would prohibit surface occupancy and surface-disturbing activities on habitat areas for federally listed, proposed, or candidate threatened or endangered species, and stipulation GS-CSU-3 for BLM sensitive species requires avoidance of those species, including relocation of operations by more than 200 meters (656 feet) if necessary for maintenance and recovery of the species or communities. Stipulation GS-NSO-8 for special status plants prohibits surface occupancy and surface-disturbing activities on habitat areas to protect special status plant species. Mitigation may be required to reduce impacts of surface disturbance on affected species and their habitat such as by relocation of roads, well pads, pipelines, and other facilities.

The combination of various NSO and TL stipulations for special status species may adversely affect oil and gas operations by requiring that some proposed surface facilities be relocated or denied, potentially reducing the number of bottomhole targets that can be reached in an area. Seasonal restrictions would affect oil and gas projects primarily by reducing the efficiency and increasing cost from periodic suspension of operations. In some cases, the BLM may grant a TL stipulation exception based on site-specific conditions, proposed mitigation, and collaboration with other agencies responsible for managing or enforcing protections for the special status species. Such exceptions are considered when the protected species would not be adversely affected and would benefit from the mitigation or shorter project duration by drilling and completing all wells on a pad in a continuous operation.

In general, management of special status species has a moderate impact on oil and gas, but potentially minor or major on a localized level depending on the specific situation.

Impacts from Cultural Resource Management. Managing public lands to protect cultural resources would impact oil and gas activity as mitigations or restrictions are identified on a case-by-case, project-specific basis. Under Alternative A, surface occupancy and surface-disturbing activities are prohibited within 100 meters (328 feet) of eligible historic sites. Modifying proposed exploration and development activities may have adverse impacts by delaying the approval until mitigation of the eligible site is completed or requiring relocation of the project to avoid impacts and potentially reducing the number of wells that can be developed. In general, the small size and widely dispersed nature of eligible cultural sites and the flexibility of oil and gas operations to relocate sufficiently to avoid impacts results in minimal effects on oil and gas operations.

Impacts from Paleontological Resource Management. Managing paleontological resources on public lands would have an impact on oil and gas development if surface-disturbing activities related to oil and gas development are planned in known areas of vertebrate or scientifically important invertebrate and plant fossils or if such fossils are uncovered during operations. However, oil and gas exploration and development are generally not precluded and instead are subject to mitigation measures such as construction monitoring.

Impacts from Visual Resource Management. Managing visual resources on BLM lands would have an impact on fluid mineral activity in areas mapped as VRM Class II or Class III if mitigation sufficient to meet VRM class objectives is impracticable. Of these, VRM Class II has the stricter standard by allowing for minimal change to its landscape character. Areas of VRM Class II include substantial portions of the backdrop both north and south of Interstate 70 in the high-potential area for oil and gas. However, use of directional drilling has increased the potential for locating well pads and other facilities to avoid or minimize visual impacts through use of topographic and vegetation and also reduced the number of pads needed to fully develop fluid mineral leases.VRM Class II areas are protected by stipulation GS-CSU-5, which applies site-specific restrictions such as relocation by more than 200 meters (656 feet) and incorporating special design and mitigation if necessary to protect visual values.

Also under Alternative A, stipulation GS-NSO-18 prohibits surface occupancy and surface disturbance activities on slopes over 30 percent and with high visual sensitivity in the Interstate-70 viewshed. This includes lands within 5 miles of Interstate70 where changes in visual contrast can be easily noticed by the casual observer on highway, of which a substantial amount is located in the high-potential area. However, as with Class II areas, the use of directional drilling and the general availability of topographic or vegetation screening increases the potential for siting well pads and other facilities in a way that allows the project to proceed, thereby minimizing adverse impacts of fluid minerals.

Impacts from Lands and Realty Management. Lands and realty objectives are to provide for the development of transportation systems, utilities, communication sites, and renewable energy resources when such needs are consistent with other resource values. Incorporated municipalities are closed to oil and gas leasing. ROW avoidance areas, which include utility and communication sites and Category I and II lands suitable for public disposal, are currently managed under CSU stipulations. These areas are generally small enough to be avoided by oil and gas developments with the use of directional drilling and therefore would have minor impacts on fluid minerals.

Impacts from Coal Management. No leases or operating coal mines exist within the planning area. However, management objectives identify 28,500 acres of federal mineral estate along the Grand Hogback as open to further consideration for coal leasing. An additional 1,600 acres in the Coal Basin area near Carbondale are identified as unacceptable for further consideration to leasing based on multiple-use conflicts. Surface use restrictions would be applied to oil and gas operations within areas of federally leased coal. These would require site-specific relocation of oil and gas operations to outside the area to be mined using either surface or underground mining techniques. .

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, most of the planning area would be open to locatable, salable, and non-energy leasable mineral development. However, the potential for these activities to occur in areas also having high-potential for fluid minerals development areas is low, and impact on fluid minerals would be minor.

Impacts from Areas of Critical Environmental Concern Management. Alternative A would close 960 acres within a portion of the Thompson Creek Natural Environment Area is closed to leasing for fluid minerals, but this area is outside the high-potential area for oil and gas. A total of 120 acres of the Lower Colorado ACEC, while open to leasing, would continue to be managed as riparian habitat under Alternative A, with the associated GS-NSO-2 for riparian and wetland zones and stipulation GS-NSO-3 for major river corridors, precluding siting of oil and gas surface facilities. However, use of directional drilling would allow

underlying fluid minerals to be reached from outside the ACEC and NSO boundaries, resulting in minor impact on oil and gas.

Impacts from Wild and Scenic Rivers Management. Management guidelines under Alternative A call for interim protection to preserve the free-flowing condition of the stream segments eligible for inclusion in the NWSRS and their associated ORVs. This designation under Alternative A includes a segment of Battlement Creek in the high-potential area for oil and gas. Management guidelines would place restrictions on the development in some portions of the affected 1.7-mile segment on BLM land (2.9 miles total) and extending 0.25 mile from the ordinary high water mark on both sides of the stream. However, because of the linear configuration of this area and advances in directional drilling, most of the underlying fluid minerals could be accessed from surface locations outside the corridor. Consequently, management of WSRs under Alternative A would have minor impacts on oil and gas.

Impacts from Public Health and Safety Management. Management of health and safety objectives on public lands is intended to protect lives, resources, and property within the local communities and adjacent BLM lands. Management objectives are defined under standard lease terms and conditions. Under GS-LN-4, oil and gas operators (lessees) are required to prepare and maintain emergency communication plans. Lease Notice GS-LN-7 requires oil and gas operators drilling on federal mineral estate to consider the impact of their operations on nearby communities and residences. Under this notice, operators may be required to adjust operations to accommodate local residential concerns. Lease Notice GS-LN-9 includes a 3-mile buffer around the Project Rulison site, where oil and gas wells proposed or located would be subject to oversight measures established by the COGCC.

Hydrogen sulfide (H_2S) is a natural component of some hydrocarbon-producing formations, but no such formations are present. However, some wells produce minor quantities of H_2S as a result of decomposition of organic matter by anaerobic bacteria becoming established in the wells. Current management under Alternative A requires use of H_2S detection and monitoring equipment on drilling and completion sites sensitive enough to detect concentrations as low as 10 ppm in ambient air. Measured H_2S concentrations of 100 ppm or greater trigger immediate activation of H_2S Drilling Operations Plans and Public Protection Plans required of oil and gas operators. Wind direction warning flags and hazard signs are required on well facilities that have detectable concentrations of 10 ppm or greater. Additional safety measures in the form of personal protection equipment (PPE) are required for essential personnel in areas where a visible warning is posted.

The requirements related to protection of public health and safety would have minor impacts on oil and gas developments, primarily by increasing cost.

Alternative B (Proposed RMP)

Impacts to fluid minerals under the Proposed RMP would be the same as Alternative A from management of air quality, weeds, paleontological resources, and public health and safety. Impacts from management of other resources and resource uses would be similar to Alternative A except as described below. Resources and uses not addressed would have no or negligible impacts on oil and gas leasing and development.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts on fluid minerals under the Proposed RMP would be similar overall to those under Alternative A. Although the portion of lands open to leasing with NSO stipulations (major constraints) would decrease from 34 percent to 31 percent by eliminating the stipulation for wildlife seclusion areas, a similar portion would

increase from standard stipulations (minor constraints) to CSU and/or TL stipulations (moderate constraints) under the Proposed RMP (Table 4.3.6-1). The stringency of the NSO, CSU, and TL stipulations would be lessened by the fact that approximately 88 percent of the high-potential area is currently leased. As under all alternatives, these stipulations would apply only to new leases and to existing leases that expire and are reissued. Advances in directional drilling would also reduce the impact levels by allowing some of the underlying fluid mineral resources to be reached from unaffected surface lands.

Impacts from Soils Management. Impacts on oil and gas would be similar to Alternative A, except that stipulation GS-CSU-4 for areas with slopes over 30 percent and erosive soils would be replaced by the somewhat more restrictive stipulation CRVFO-CSU-1 for areas with slopes over 30 percent or fragile/saline soils—i.e., either criterion would be sufficient to apply the CSU stipulation instead of both. Although the stipulation under the Proposed RMP includes a much larger area, the use of directional drilling would generally allow affected areas to be avoided without substantially limited development. In addition, the CSU stipulation is not a bar on development at a site but instead allows the BLM to relocate the proposed project by more than 200 meters and to require special design and reclamation measures. Stipulation CRVFO-NSO-2 for slopes steeper than 50 percent would continue the protections under Alternative A, but would also apply to pipelines, while the NSO in Alternative A did not. This would be expected to have minimal impacts on development potential because construction on such steep slopes, and on other unstable sites, are normally avoided by operators due to unsafe conditions.

Impacts from Water Resource Management. Impacts on oil and gas development would be greater under the Proposed RMP than Alternative A. Greater constraints under the Proposed RMP would include stipulation CRVFO-NSO-5, which establishes a 100-meter buffer adjacent to perennial streams and other water bodies, and stipulation CRVFO-CSU-3 that provides a 30-meter buffer along intermittent and ephemeral streams. The protection for municipal watersheds (CRVFO-3), including the City of Rifle watershed located in the high-potential area, prohibits surface disturbance and surface facilities within 1,000 horizontal feet of either side of a classified surface water supply stream segment for a of 5 miles upstream from the intake. This restriction covers a greater width and stream length than under Alternative A. Additional protection is provided by stipulation CRVFO-CSU-2, which enables the BLM to require relocation or special design and mitigation of projects for a horizontal distance of 1,300 feet beyond the 1,000-foot NSO area along the public water supply stream. Because of advances in horizontal drilling, allowing operators to access fluid minerals from surface locations not directly overlying the minerals, the measures are not anticipated to substantially reduce future oil and gas development.

In addition to the protections above, the requirements for adequate protection of groundwater resources through proper well design, drilling, and completion would also apply to the Proposed RMP and would not be expected to affect the scale of future oil and gas development.

Impacts from Vegetation Management—Riparian. Under the Proposed RMP, stipulation CRVFO-NSO-5 would prohibit surface disturbance and occupancy within 100 meters (328 feet) of riparian or wetland vegetation. This is more restrictive than the NSOs under the other alternatives, which are limited actual areas of riparian and wetland vegetation. Stipulation CRVFO-CSU-4 would enable the BLM to require relocation by more than 200 meters and special design and mitigation 328 to 500 feet outside riparian or wetland vegetation zones, similar to CSU stipulations under the other alternatives. Because of the greater protection of an NSO not restricted to the area of riparian and wetland vegetation, the Proposed RMP is the most

restrictive alternative relative to this resource. However, because of the linear shape of these areas and the availability of directional drilling, impacts on oil and gas development would be minor.

Impacts from Fisheries and Aquatic Wildlife Management. Under the Proposed RMP, stipulation CRVFO-NSO-5 would create a 100-meter (328-foot) buffer along perennial streams, water bodies, fisheries, and riparian areas. A seasonal restriction, stipulation CRVFO-TL-1 for salmonid (trout) and native non-salmonid fishes, would prohibit construction affecting an applicable stream segment during the spawning or high-flow seasons. The NSO for hydrologic features and the TL stipulation for salmonid and native fisheries would not adversely affect oil and gas development because of the narrow, linear configuration of these features and the ability of directional drilling to access underlying fluid minerals from surface locations outside the associated buffers. The NSO stipulation for the Rifle Falls hatchery would not affect oil and gas because it is outside the high-potential area.

Impacts from Terrestrial Wildlife Management. Most of the wildlife-related stipulations described for Alternative A would also apply to the Proposed RMP, with the exception of the NSO for wildlife seclusion areas. The Garfield Creek State Wildlife Area would be closed to leasing for oil and gas under this alternative instead of leased with an NSO stipulation as in Alternative A. However, approximately 75 percent of the federal minerals in that area have already been leased, some of which are currently being developed. Although stipulation CRVFO-NSO-7 for priority wildlife habitat would apply under the Proposed RMP, it would include on the Garfield Creek State Wildlife Area in the high-potential area for oil and gas. The NSO would apply to activities not affected by the closure to leasing. Because of the importance of riparian corridors to a variety of terrestrial species, stipulation CRVFO-NSO-5 for hydrologic features, which includes a 100-meter (328-foot) buffer, would provide somewhat greater protection than Alternative A, which limit the NSO restriction to areas of riparian and wetland vegetation, with the buffer protected by a CSU stipulation. Stipulations CRVFO-NSO-8 and CRVFO-NSO-4 would provide protections for raptor nesting and fledgling habitat within wider buffers than under Alternative A. Stipulation CRVFO-TL-2 for big game winter range and stipulation CRVFO-TL-3 for big game birthing areas would be similar to analogous stipulations under Alternative A.

On balance, impacts on oil and gas from management of terrestrial wildlife under this alternative would be similar or slightly greater than under Alternative A, but would not be expected to substantially affect the location, extent, or intensity of future development.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under the Proposed RMP, stipulation CRVFO-NSO-4 establishes a 0.5-mile buffer along major river corridors, including the Colorado River in the high-potential area for oil and gas. Stipulation CRVFO-NSO-19 for threatened or endangered species would provide habitat buffers as necessary to maintain habitat integrity needed for maintenance or recovery of the four federally endangered big-river fishes in the Colorado River, two of which area present as far upstream as Rifle. The NSO for major rivers would also provide protections for three additional big-river fishes classified as sensitive by the BLM. In addition, stipulation CRVFO-NSO-5 would prohibit long-term surface occupancy and surface-disturbing activities within 100 meters (328 feet) of perennial streams. These NSOs and stipulation CRVFO-CSU-5 would provide greater protection for special status amphibians within 800 meters (0.5 mile) of ponds or streams used for breeding, compared with 200 meters (656 feet) under Alternative A. Designation of habitat for special status species as ROW exclusion areas would provide additional restrictions for all of these species.

While these restrictions would represent moderate or major constraints on oil and gas projects in specific areas, their relatively limited distribution within the high-potential area, the linear shape of many such areas, and the availability of directional drilling to access some of the underlying fluid minerals from other surface locations is expected to result in minor constraints in most cases.

Impacts from Special Status Species Management—Plants and Terrestrial Wildlife. The types of impacts experienced from management of special status species would be similar to those described under Alternative A, but with additional protections. Stipulation CRVFO-NSO-9 would prohibit surface occupancy and surface-disturbing activities within 200 meters (656 feet) of habitat areas for federally listed, proposed, or candidate threatened or endangered plant species. Where development is allowed following consultation with USFWS, conservation measures arising from the consultation may include special design, construction, and implementation measures in addition to relocation to sites selected to avoid adverse impacts. Threatened or endangered wildlife in the high-potential area are limited to a small amount of habitat suitable for use by lynx at the extreme southern edge of the planning area.

Core populations of Harrington's penstemon, a BLM sensitive species, would be protected by stipulation CRVFO-NSO-10, which would establish a 200-meter (656-foot) buffer around occupied habitat. Stipulation CRVFO-NSO-9 would prohibit similar protection for threatened or endangered plant species, while stipulation CRVFO-NSO-11 would prohibit surface occupancy and surface-disturbing activities within 30 meters (100 feet) of suitable habitat for DeBeque phacelia. For BLM sensitive species outside ACECs, stipulation CRVFO-CSU-6 would apply within 100 meters (328 feet) of occupied habitat. Protections for greater sage-grouse and their habitats would be greater under the Proposed RMP than Alternative A, but no suitable habitat has been identified in the high-priority area for oil and gas.

NSO, CSU, and TL stipulations related to special status species have the potential for major, moderate, and minor impacts, respectively, on fluid minerals by affecting the location, design, and/or timing of development activities. Designation of habitat for these species as ROW exclusion areas also has the potential for major impacts on oil and gas. In general, however, the use of directional drilling and implementation of conservation measures arising from Section 7 consultation with the USFWS would be expected to result in only minor to moderate decreases in the amount of potential development for most projects, based on currently known occurrences of special status species and their habitats in relation to high-potential areas for oil and gas.

Impacts from Cultural Resource Management. Impacts on fluid minerals from management of cultural resources would be greater than under Alternative A because protection of eligible historic properties would be replaced by stipulation CRVFO-NSO-21, which would double the buffer zone width to 200 meters (656 feet). Additional management actions under stipulation CRVFO-NSO-20 would prohibit surface occupancy and surface-disturbing activities within a 0.25-mile radius of traditional cultural properties or areas of Native American concern. Mitigations for these requirements would be required at a project-specific level and consistent with federal laws and regulations and the standard lease terms. Under the Proposed RMP, mitigation would require avoidance of eligible cultural resources. Because of the availability of directional drilling and the limited size of most cultural sites, avoidance of the buffer widths would be expected to have minimal impacts on oil and gas in most cases because of the availability of directional drilling, although potentially moderate to major in some locations.

Impacts from Visual Resource Management. Impacts on oil and gas from protection of visual resources under the Proposed RMP would be greater than under Alternative A due to a greater area designated as VRM

Class II and lesser area designated as VRM Class III and Class IV. Class II designations allow less impact to the visual landscape, including the types of activities commonly associated with oil and gas developments. Among the additional protections for visual resources under the Proposed RMP is stipulation CRVFO-NSO-22 for VRM Class II areas with slopes over 30 percent and high visual sensitivity, which includes slightly more area than the Interstate-70 viewshed NSO stipulation under Alternative A. Stipulation CRVFO-CSU-9 for other VRM Class II areas would be similar to the CSU stipulation under Alternative A. Because of the larger NSO stipulation area under the Proposed RMP, impacts on oil and gas projects could be moderate or major in the area north of Interstate 70 and west of Parachute on the slopes of Mount Callahan and Mount Logan.

Impacts from Managing to Protect Wilderness Characteristics. Under this alternative, five areas identified as having wilderness character would be protected by NSO stipulation CRVFO-NSO-23. However, this would include only one area along the Grand Hogback in the high potential for oil and gas. This would represent a moderate to major constraint on future oil and gas development in that area. However, the Grand Hogback is at the margins of the Piceance Basin and may represent less development potential than areas farther into the basin (i.e., to the west). In addition, the use of directional drilling may allow some of the underlying federal minerals to be reached from well pads located outside the closed area.

Impacts from Recreation and Visitor Services Management. Under this alternative, six ERMAs would be established, of which only the Silt Mesa ERMA is within the high-potential area for oil and gas. This area would be subject to stipulation CRVFO-CSU-11, which would allow the BLM to require project relocation and special design and mitigation to avoid or minimize adverse impacts. This CSU stipulation would be expected to have minor impacts on oil and gas activity, since most of the ERMA is already leased.

Impacts from Lands and Realty Management. Management for lands and realty objectives would be similar to those described under Alternative A. Although approximately twice as much area would be included as ROW avoidance or exclusion areas compared with Alternative A, the impact on oil and gas would continue to be minor due to the location of most such areas on lands not having high potential for oil and gas and because directional drilling would allow accessing underlying federal fluid minerals from surface lands outside the avoidance or exclusion areas.

Impacts from Coal Management. Under this alternative, fluid minerals would not be affected by coal management because no lands are identified as currently having potential for coal leasing and development given geologic and economic constraints and lack of expressions of interest, or as suitable.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts on fluid minerals would be similar to those under Alternative A despite less area available for salable and non-energy leasable minerals under the Proposed RMP. This is because little if any overlap is anticipated between future development of those solid mineral resources and fluid minerals in the high-potential area for oil and gas. Impacts on fluid minerals from management of solid minerals are expected to be negligible.

Impacts from Areas of Critical Environmental Concern Management. The Proposed RMP would include designation of the Grand Hogback ACEC northeast of Rifle in the high-potential area for oil and gas. This ACEC would have an NSO stipulation to prohibit surface occupancy and surface-disturbing activities, which would have a major constraint on oil and gas development along the included portion of the Grand Hogback.

Impacts from Wild and Scenic Rivers Management. The 1.7-mile segment of Battlement Creek on BLM (2.9 miles total) found eligible for inclusion in the NWSRS under Alternative A would not be found suitable under the Proposed RMP. Therefore, management for this resource value would not affect fluid minerals under this alternative.

Alternative C

Impacts to fluid minerals from management of resources and uses under Alternative C would be the same as Alternative A from management of air quality, weeds, paleontological resources, and public health and safety. Impacts to fluid minerals would be the same as the Proposed RMP from management of soils, water, cultural resources, coal resources, other solid mineral resources. For other resources and resource uses, impacts would generally be similar to the previous alternatives except as described below. Resources and resource uses not addressed would have no or negligible impacts on oil and gas.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Management under Alternative C would be the most restrictive of the alternatives analyzed due primarily to the smallest area of high-potential lands open to oil and gas leasing (Table 4.3.6-1). Consequently, this alternative would allow the least amount of production of natural gas as an energy source for the American public. Of the open area, 30 percent would have one or more NSO stipulations, and 6 percent would have standard stipulations. The remaining 64 percent would have CSU and/or TL stipulations. Areas with NSO, CSU, and TL stipulations would have major, moderate, and minor constraints on oil and gas, respectively.

As under all alternatives, however, these impacts would be reduced somewhat by the fact that approximately 88 percent of the high-potential area is already leased and by the use of directional drilling to access some portion of the underlying fluid minerals from other surface locations. On balance, this alternative would have more impact on oil and gas development than Alternative A, with less land available for leasing.

Impacts from Vegetation Management—Riparian. Impacts under Alternative C would be the same as Alternative A but less than the Proposed RMP because stipulation CRV-NSO-6 under this alternative would apply only to riparian or wetland vegetation instead of including a 100-meter (328-foot) buffer from the vegetation. However, stipulation CRV-NSO-16 would apply a 100-meter (328-foot) buffer around perennial streams, which support most of the high-quality riparian habitat. For this reason, and because of the limited extent of riparian areas and the availability of directional drilling, this alternative would have only minor impacts on oil and gas activities.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under Alternative C would be less than under the Proposed RMP because it would not include the 0.5-mile NSO stipulation for major river corridors. However, stipulation CRV-NSO-16 would apply a 100-meter (328-foot) buffer around all perennial streams. As in the Proposed RMP, a TL stipulation would apply to prohibit in-stream projects during the spawning season for native and non-native sportfishes and native nongame fishes during the spawning season. Because of the limited extent and/or linear configuration of these resources and the availability of directional drilling, this difference would not be expected to have significantly different impacts on oil and gas activities. In general, protections under Alternative C would be greater than Alternative A, which has no analogous stipulation.

Impacts from Terrestrial Wildlife Management. Management of terrestrial wildlife under Alternative C would differ from Alternative A and the Proposed RMP by not including an NSO stipulation for the Garfield

Creek State Wildlife Area but is similar to the Proposed RMP by closing that area to oil and gas leasing. However, only 25 percent of that area is currently unleased, reducing the effectiveness of the closure. Stipulations for protection of raptor nesting and fledgling habitat (CRV-NSO-12 and CRV-TL-4) would be the same as under the Proposed RMP and slightly more restrictive than Alternative A. Stipulations CRV-TL-1 and CRV-TL-2 for big game winter range and birthing areas would be the as Alternative A. The 60-day TL stipulation prohibiting vegetation removal in migratory bird habitat under the Proposed RMP would be replaced by a COA under Alternative C.

For the reasons presented above, Alternative C would be similar to the Proposed RMP and Alternative A , with generally minor impacts on oil and gas and with major constraints in relatively small areas. The fact that 88 percent of the high-potential area is already leased and the advances in directionally drilling greatly reduce the potential for impacts on fluid minerals under this alternative.

Impacts from Special Status Species Management—Fish and Other Fisheries and Aquatic Wildlife. Impacts under Alternative C would be less than under the Proposed RMP by not including the 0.5-mile NSO stipulation for major river corridors. However, stipulation CRV-NSO-32 would apply to Designated Critical Habitat for the endangered big-river fishes, which also supports BLM sensitive big-river fishes, and stipulation CRV-NSO-33 would establish a 100-meter (328-foot) buffer around tributary streams supporting BLM sensitive big-river fishes. Stipulation CRV-NSO-16 would provide a similar buffer around all perennial streams. Stipulation CRV-TL-18 for occupied cutthroat trout waters would prohibit activities in or adjacent to the stream during the spawning season.

Because of the limited extent and/or linear configuration of these resources and the availability of directional drilling, this difference would not be expected to have significantly different impacts on oil and gas activities.

Impacts from Special Status Species Management—Plants and Terrestrial Wildlife. Management of special status plants under this alternative would be similar to Alternative A and the Proposed RMP relative to NSO stipulations for federally listed plants and BLM sensitive plants, except that stipulation CRV-NSO-19 would also include sensitive plants outside ACECs, replacing the CSU stipulation of the Proposed RMP This would be more restrictive in that it includes substantially more lands in the high-potential area for oil and gas. This makes Alternative C substantially more restrictive for oil and gas than the other alternatives. However, the use of directional drilling reduces somewhat these impacts by allowing development of underlying federal leases from lands outside the NSO stipulation boundaries. Management for special status terrestrial wildlife would also be essentially the same as the Proposed RMP, primarily because of the limited amount of habitat for special status terrestrial wildlife in the high-potential area, including a lack of habitat for greater sage-grouse. In addition, this alternative would not include the small NSO stipulation area for lynx habitat at the southern edge of the high-potential area. However, both Alternative C and the Proposed RMP would apply an 800-meter (0.5-mile) buffer around breeding sites for sensitive amphibian, compared with the 200-meter (656-foot) buffer of Alternative A. Therefore, Alternative C would be is slightly less restrictive in relation to oil and gas than the Proposed RMP but more restrictive than Alternatives A and D relative to special status wildlife.

Impacts from Visual Resource Management. Impacts on fluid minerals from management for VRM under Alternative C would be similar to those described for the Proposed RMP, although with slightly less area designated as VRM Class II and more area designated as VRM Class III, which is less restrictive. All ACECs would be managed as VRM Class II unless specified otherwise, including the Grand Hogback ACEC.

However, the Mount Logan Foothills ACEC southwest of Parachute, also in the high-potential area for oil and gas, would not be designated under this alternative. Stipulation CRV-CSU-16, allowing the BLM to require project relocation or special design or mitigation, would apply to slightly less area than the CSU stipulation under the Proposed RMP. Because the Mount Logan Foothills ACEC would not be included in this alternative, and the use of directional drilling to access fluid mineral underlying the areas with slopes over 30 percent in VRM Class II, impacts on oil and gas would be minor overall, although moderate to locally major within the Grand Hogback ACEC area.

Impacts from Managing to Protect Wilderness Characteristics. Alternative C would differ from the two previous alternatives by managing a portion of the Grand Hogback in the high-potential area for oil and gas as closed to oil and gas leasing. This area includes a substantial portion of the remaining unleased area of high-potential lands in the planning area. This would have a major adverse impact on oil and gas development in that area by making the underlying fluid minerals unavailable for leasing and development.

Impacts from Recreation and Visitor Services Management. Management of R&VS under Alternative C be similar to the Proposed RMP by designating the Silt Mesa ERMA, an area with high potential for oil and gas. As under the Proposed RMP, the ERMA would be managed under stipulation CRV-CSU-18, which would allow the BLM to require relocation by more than 200 meters and special design or mitigation. However, most of the affected area is already leased. Therefore, impacts of R&VS management on fluid minerals would be minor.

Impacts from Lands and Realty Management. Management of lands and realty objectives would be essentially the same as under the Proposed RMP in relation to oil and gas. Although Alternative C would have fewer acres managed as ROW avoidance areas and more acres managed as ROW exclusion areas, this change would not affect substantial portions of the high-potential area for oil and gas.

Impacts from Areas of Critical Environmental Concern Management. Alternative C would include designation of the Mount Logan Foothills and Grand Hogback ACECs, both located within the high-potential areas for oil and gas activity. The NSO stipulation for ACECs would be applied to these areas, representing a major constraint on oil and gas leasing, since they represent a larger portion of the currently unleased federal mineral estate with high potential for oil and gas. Although use of directional drilling would allow some portion of the underlying federal minerals to be reached from outside the NSO stipulation boundaries, the shape of these ACECs, and especially the Mount Logan Foothills ACEC, is expected to limit this amount of recovery.

Impacts from Wild and Scenic Rivers Management. Impacts on fluid minerals from management of WSRs would be greater under Alternative C than the other alternatives because the 1.7-mile segment of Battlement Creek would be closed to leasing, including a corridor extending 0.25 mile away from the ordinary high water mark on both sides of the stream. However, this area is currently leased. Within this segment, ORVs would be protected through the application of implementation-level COAs

Alternative D

Impacts to fluid minerals from management of other resources and resource uses under Alternative D would be the same as Alternative A for air quality, weeds, paleontological resources, public health and safety, and ACECs and the same as the Proposed RMP and Alternative C for coal resources and locatable, salable, and non-energy leasable resources. Impacts would differ from the previous alternatives as described below.

Resources and uses not addressed below would have no or negligible impacts on oil and gas leasing and development.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts under Alternative D would be the same as Alternative A in terms of acres open to oil and gas, but only 22 percent of open areas with high potential for oil and gas would have an NSO stipulation, and 10 percent would have standard stipulations. The remaining 68 percent would have CSU and/or TL stipulations. Alternative D would also have more lands open for fluid minerals leasing and fewer acres of NSO stipulations than the Proposed RMP and Alternative C, making it the least restrictive alternative relative to for oil and gas and therefore resulting in the greatest potential for development of natural gas for the American public.

Impacts from Water Resource Management. Impacts under Alternative D would be similar to those under the Proposed RMP but would not include the additional protection of NSO and CSU stipulations for hydrologic features. The NSO stipulation for major river corridors would apply to the Colorado River in the high-potential area, as under the three previous alternatives.

Impacts from Vegetation Management—Riparian. Impacts under Alternative D would be less than under the other alternatives analyzed because it would not include an NSO stipulation for riparian and wetland zones, hydrologic features, or perennial streams. Stipulation CRV-CSU-3 would allow the BLM to require relocation or special design and mitigation of projects within 500 feet of riparian or wetland vegetation. However, because the narrow and linear configuration of most riparian corridors, directional drilling would normally allow the underlying fluid minerals to be accessed, resulting in only a minor impact on oil and gas developments.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under Alternative D would be similar to Alternative A, but with additional protection from stipulation CRV-CSU-6. This stipulation would apply within 100 meters (328 feet) of all trout-bearing streams, which are more limited in number and extent than the NSO stipulations for hydrologic features (Proposed RMP) or perennial streams (Alternative C). Because of the limited number and linear configuration of this NSO stipulation, impacts on oil and gas would be minimal.

Impacts from Terrestrial Wildlife Management. Impacts from management of terrestrial wildlife would be less under Alternative D than the other alternatives. The NSO stipulations for priority habitat or core wildlife areas of the Proposed RMP and Alternative C, respectively, would not apply, nor would the NSO stipulation for wildlife seclusion areas under Alternative A. In addition, Alternative D would apply stipulation CRV-CSU-4 to the Garfield Creek State Wildlife Area instead of closing it to leasing (the Proposed RMP and Alternative C) or applying an NSO stipulation (Alternative A). Other wildlife-related stipulations would be same as or similar to the previous alternatives.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Impacts under Alternative D would be similar to the Proposed RMP but would include stipulation CRV-NSO-31 to prohibit surface occupancy and surface-disturbing activities within 100 meters (328 feet) of streams containing conservation and core conservation populations of native cutthroat trout. This is more protective than the 200-meter (656-foot) CSU stipulation for special status species under Alternative A and equivalent to the NSO stipulations under the Proposed RMP and Alternative C that apply to perennial streams regardless of whether native cutthroat trout are present.

Impacts from Special Status Species Management—Plants and Terrestrial Wildlife. Impacts from special status species management under this alternative would be more stringent than Alternative A in the number and scope of NSO, CSU, and TL stipulations applied. Alternative D would be generally similar to the Proposed RMP and Alternative C, especially regarding protections for federally listed or proposed species, but would be less restrictive overall. For example, Alternative D would have an NSO stipulation only for waters with core populations of native cutthroat trout instead of all perennial waters and a CSU stipulation instead of an NSO stipulation for BLM sensitive plants.

Because of limited occurrences of these species and advances in directional drilling, impacts on fluid minerals would generally be minor, although locally moderate or major.

Impacts from Cultural Resource Management. Impacts on oil and gas activities from management of cultural resources would be greater than under Alternative A due to the inclusion of stipulation CRV-NSO-37, which would prohibit surface occupancy and surface-disturbing activities within 0.25 mile of traditional cultural properties or areas of Native American concern. However, impacts would be less than under the Proposed RMP and Alternative C because the stipulation CRV-NSO-38 for historic properties would require a 100-meter (328-foot) buffer, only half as wide as in the two previous alternatives. Because of the availability of directional drilling, impacts of this alternative on oil and gas would be minor overall although potentially moderate to major in specific area.

Impacts from Visual Resource Management. Impacts on fluid mineral resources under Alternative D would be less than under the other alternatives due to the smallest amount of VRM Class II, resulting primarily from not including either the Grand Hogback or Mountain Logan Foothills ACEC. Because these ACECs would be in the high-potential area for oil and gas, not designating them under Alternative D would result in only minor impacts on fluid minerals development, mostly associated with stipulation CRV-CSU-16 for slopes over 30 percent in VRM Class II. The scattered and small sizes of these occurrences would allow much of the underlying fluid minerals to be accessed using directional drilling.

Impacts from Recreation and Visitor Services Management. Impacts on recreation management would be similar to those described under the Proposed RMP and Alternative C, establishing and ERMA on Silt Mesa in the high-potential area for oil and gas. No SRMAs would be designated in the area of high potential for oil and gas.

Impacts from Lands and Realty Management. Under this alternative, ROW avoidance areas would total 105,100 acres, a decrease in total acres compared with the Proposed RMP and Alternative C. ROW exclusion areas would be reduced to 39,100 acres, including WSAs and VRM Class I lands. Retention areas would be reduced to 319,100 acres.

Impacts from Areas of Critical Environmental Concern Management. Alternative D would not include the designation of any ACEC in the high-potential area for oil and gas and would therefore not affect fluid mineral resources.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. Consequently, this alternative would not affect fluid mineral resources.

Cumulative Impacts

The cumulative impact analysis boundary for oil and gas resources within the CRVFO is the Piceance Basin, which is in the western part of the planning area and encompasses roughly 20 percent of the CRVFO surface area. An oil and gas potential map was created for the CRVFO, defining areas as having high, medium, low, or no known potential for the occurrence of oil and gas resources. Within these defined areas, 20 percent of the land within the planning area is rated as having high potential, plus 12 percent with medium potential, 46 percent with low potential, 22 percent with no known potential. Based on industry analysis, leasing activity, prior exploration and development activity, and the probability of resource occurrence, it is estimated that 99 percent of the future wells will be drilled within the area mapped as having high potential. The remaining 1 percent of future wells is estimated to occur within the medium- and low-potential areas. The area defined as having no known potential will have no drilling activities. The total of federal mineral estate within the high-potential area, including the Roan Plateau Area and split–estate lands but not USFS lands is 200,937 acres (BLM 1999b). The area remaining available for leasing of fluid minerals is approximately 7,000 acres outside the Roan Plateau planning area. Most of the unleased federal mineral estate within the high-potential area is located along the Grand Hogback, with the remainder in small, scattered parcels.

Oil and gas development could increase over the next several years, but the level of development would depend on market fluctuations, pipeline capacity, available markets for distribution, state and federal regulatory constraints, geopolitical considerations, new technologies, and reservoir depletion. Adding multiple constraints to oil and gas development, as well as withdrawing areas from leasing altogether, would reduce the amount of natural gas that is available for market. However, since a high percentage of the high-potential areas are currently leased, closing areas to leasing and adding NSO or other lease stipulations would affect only the unleased lands and, potentially, a small amount of the existing leases that expire or are withdrawn. Consequently, natural market factors such as supply and demand would be the major constraint on future development of federal, and private, fluid minerals.

The RFD (BLM 2008g) calculated that a total of 5,318 new federal wells might be drilled during the 20-year planning period based on the extent of recoverable fluid minerals and current technologies and downhole spacing orders. This total includes both BLM surface with underlying federal minerals and split-estate lands (private surface with underlying federal minerals) but excludes NFS lands and the Roan Plateau planning area. However, assumptions of future wells used in the air quality model and other impact analyses for the RMP have used a development intensity of up to 4,198 federal wells underlying BLM or split-estate lands, excluding NFS lands and the Roan Plateau planning area. Differences between the RFD number and the number eventually assumed in an RMP analysis are not uncommon, since an RFD is necessarily prepared early in the RMP process and uses assumptions about the number and distribution of drill rigs, number of wells, and amount of natural gas produced that may not prove entirely accurate as the process evolves due to unanticipated fluctuations in gas prices, drilling costs, rig availability, and other factors. Changes caused by unanticipated factors associated with other resources, land uses, or BLM management priorities could also affect future development rates. However, the assumed total of 4,198 new federal wells used for the Proposed RMP/Final EIS (6,640 wells including the Roan Plateau and NFS lands) is believed to be a reasonable assumption for the analysis of impacts associated with development under BLM policies and management decisions.

Stipulations applied to oil and gas leases pursuant to the Proposed RMP/Final EIS would have a cumulative effect on the amount of federal oil and gas resources available or accessible for development. Applying NSO stipulations to protect special status species, lands with wilderness characteristics outside existing WSAs,

ACECs, sensitive soils, riparian areas, recreation sites, and other sensitive resources and resource uses would incrementally reduce or prevent oil and gas recovery in specific areas, either directly or through increased development and reclamation costs. These added costs may lead to lower bids on lease parcels. Adding more lease stipulations and constraints would result in direct economic losses by oil and gas companies if they are unable to fully or substantially develop their leased acres. Loss of production in areas closed to fluid minerals leasing, or large areas with NSO stipulations located such that the bulk of the underlying resources cannot be accessed from outside the NSO stipulation boundary, would mean loss of royalty payments to the federal government, the State of Colorado, and county and local governments impacted by the development. This loss of production would also mean a loss of natural gas available for distribution to domestic markets (i.e., the American public).

Since approximately 88 percent of the high-potential area for oil and gas activity is already leased, valid existing lease rights would apply. However, if any of the existing leases expire or are withdrawn by the BLM, subsequent re-leasing of those areas would be subject to the new stipulations and closure decisions presented under each alternative.

Under Alternative C, a total of 11,400 acres in the proposed Grand Hogback ACEC would be closed to fluid minerals leasing. The closed area would be unavailable for future oil and gas production, reducing somewhat the future wells compared with the total of 4,198 assumed for the purpose of analysis. It is not possible to quantify this reduction, because the Grand Hogback ACEC is located at the edge of the Piceance Basin and characterized by steeply dipping bedrock formations. This makes it likely that the amount of producible oil and gas resources underlying the hogback is relatively low; other exploratory drilling on the edge of the basin in the planning area has produce lower success rates than farther into the basin. Therefore, the exact effect of closing the Grand Hogback under Alternative C cannot be calculated at this time.

In contrast, the effect of closing unleased portions of the Garfield Creek State Wildlife Area under the Proposed RMP and Alternative C can more easily be predicted, because that area is already being developed with a reasonably high success rate. At present, a total of 2,500 acres of that area remains unleased. A proportionate reduction in well numbers would result in up to 250 fewer producing wells during the planning horizon, using the current 10-acre downhole spacing. This would represent a 6-percent decrease in new federal wells compared with the 4,198 wells assumed for analysis in the Proposed RMP/Final EIS, and a 4-percent decrease compared with the 6,450 total federal wells assumed to be in production at the end of the 20-year planning period. The reduction in new and total wells as a result of the closure of the Garfield Creek State Wildlife Area to leasing for fluid minerals under the Proposed RMP and Alternative C would be expected to result in decreased employment as well as royalty and tax payments to the federal government, tax revenues and other indirect economic benefits to the state, county, and local governments, and the supply of natural gas. The actual loss of well numbers is likely to be less under these alternatives, because some of the 250 potential bottomhole targets might be geologically unsuitable or inaccessible anyway due to NSO stipulations and rugged terrain in a portion of the area.

4.3.6.3 Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals

This section presents the impacts on locatable, salable, and non-energy leasable minerals from management actions of other resources and resource uses discussed in Chapter 2. Existing conditions concerning these mineral resources are described in Chapter 3, Section 3.3.6.

Locatable minerals are those valuable minerals authorized under the US mining laws, generally referred to as the General Mining Law of 1872. All BLM lands are open to mineral entry and development (locatable minerals) under the General Mining Law of 1872 unless already withdrawn or proposed for administrative withdrawal or wilderness designation. Locatable mineral exploration and development on BLM lands are regulated under 43 CFR 3800. Locatable minerals are subject to entry and location. Entry means the public land is subject to application for title to the land, (e.g., patenting under the mining laws). BLM does not have discretion as to entry and location of mining claims on open, unappropriated, public lands and does not have the discretion to determine mitigations for mining claims at the time of location. However, BLM does have discretion to make public lands open to entry or to close lands (e.g., withdraw certain public lands from the operations of the mining laws). The BLM also has authority through the FLPMA, the federal regulations at 43 CFR 3809, and other federal laws and regulations as applicable to regulate mining-related operations and the surface disturbances that would be incident to those operations. The BLM regulates mining-related operations on public lands to prevent unnecessary or undue degradation and to ensure the operation is reasonably incident to mining. In WSAs, BLM regulates mining-related operations under the IMP and as required by 43 CFR 3802 so as to prevent the impairment of a WSAs suitability for designation as wilderness by Congress.

Locatable mining activity currently includes the gypsum mine north of the Town of Gypsum and the Mid-Continent Limestone Quarry north of the City of Glenwood Springs. Although the prices of uranium and gold have risen in recent years, price increases have not been great enough to generate much current interest in developing any ore deposits for these minerals in the CRVFO.

Salable minerals are subject to disposal under the Materials Act of July 31, 1947. BLM's policy is to make mineral materials available unless detrimental to the public interest, to protect public land resources and the environment, and to minimize damage to public health and safety. Through land use planning, the BLM may designate public land as open or closed to disposals, and the open areas may be designated with special conditions. The designations of open, open with special conditions, and closed would follow the oil and gas leasing designations to the extent practicable. Open with special conditions would include the oil and gas open with minor constraints (timing limitations or controlled surface use stipulations) and open with major constraints (no surface occupancy). The provisions for exceptions, modifications, and waivers would also apply to salable minerals.

Most salable mineral activities involve small sales for commercial and residential uses that primarily include moss rock, flagstone, basalt boulders, and sand and gravel. On occasion free use permits are issued to government entities for road maintenance. The only significant mineral materials activity projected over the 20-year planning period is a continuation of the cinder operation near Dotsero. Demand for decorative rock and sand and gravel is anticipated to increase slightly, based on growth in residential and commercial construction during the 20-year planning period. Most decorative rock sales in the CRVFO come from Cattle Creek, which is a source of moss rock. BLM sells most sand and gravel in the CRVFO from Sheep Gulch, on the Colorado River. Table 4.6.3-2 shows the acres of BLM lands by alternative that would be open to salable minerals disposal and non-energy leasable minerals.

Table 4.6.3-2
Federal Mineral Estate Open to Salable Minerals Disposal and Non-Energy Leasable Minerals (Acres)

Alternative	CRVFO
Alternative A	470,700
Alternative B (Proposed RMP)	342,700
Alternative C	323,100
Alternative D	477,400

Sources: BLM 2008c

Non-energy leasable minerals are leased under the Mineral Leasing Act of 1920, as amended, and the federal regulations at 43 CFR Part 3500. Through land use planning, BLM may designate public land as open or closed to fluid minerals leasing, and use of open areas may be restricted by special conditions. The designations of open, open with special conditions, and closed would follow the oil and gas leasing designations to the extent practicable. The areas open with special conditions include the oil and gas open with minor constraints (timing limitations or controlled surface use) and open with major constraints (no surface occupancy). The provisions for exceptions, modifications, and waivers would also apply to non-energy solid leasable minerals. The only non-energy leasable minerals in the planning area are evaporite-bearing geologic formations in the Eagle Valley area, which could yield sylvite and halite. These resources are not expected to be developed commercially in the planning horizon of this RMP.

Methods and Assumptions

This section presents potential impacts on locatable, salable (mineral materials), and non-energy leasable minerals from management actions for other resource and resource use programs. Leasable minerals are coal, oil and gas, oil shale, potash, geothermal steam, and others. Locatable minerals are strata-bound gold, copper-gold deposits, gems, limestone, uranium, vanadium, gypsum, and others. Salable minerals are sand and gravel, limestone aggregate, building stone, moss-covered rock (moss rock), cinders (scoria), decorative rock, and others. Existing conditions for energy and minerals are described in Chapter 3, Section 3.3.6.

The analysis was based on the following assumptions:

- Increased mitigation would generally increase short-term financial cost and risk but would decrease potential short-term and long-term adverse environmental effects.
- Management of SRMAs, WSAs, and WSR segments would result in greater restrictions on mineral resource development, replacing standard lease terms or special stipulations with NSO stipulations or restrictions on leasing.
- Decisions related to oil shale leasing are being deferred to the in-progress Oil Shale and Oil Shale RMP Amendments to Address Land Use Allocations in Colorado, Utah, and Wyoming and Programmatic EIS (BLM 2007h). As such, direct and indirect impacts from these decisions are not considered in detail in this EIS.
- Demand for salable minerals such as sand, gravel, and stone is anticipated to slowly rise. Locatable mineral claims, exploration, and development would probably increase.
- BLM manages salable and locatable minerals on split-estate lands only where all federal minerals were reserved.

- The impact analysis for salable and locatable minerals focuses on BLM surface ownership, as the potential for developable minerals on private surface was considered low across the planning area.
- The analysis for impacts on locatable, salable, and non-energy leasable minerals assumes exploration and development would be regulated under all applicable laws and regulations.
- Energy and mineral decisions on USFS lands are addressed through separate USFS planning effort, and are not addressed in this RMP.
- National Park, National Recreation Area, and National Wildlife Refuges are all withdrawn from mineral entry and are not discussed in this section.
- Many stipulations under Alternative A were developed to apply to oil and gas leasing and development, but it is intended that the same or similar measures will be applied to other public land uses to maintain or achieve the same resource conditions and to assure equitable treatment to all public land users.

Environmental Consequences

Impacts on locatable, salable, and non-energy leasable minerals would result from some of the actions included under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on locatable, salable, and non-energy leasable minerals under any of the four alternatives.

Alternative A

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, the CRVFO would recommend locatable mineral withdrawal to the Secretary of the Interior of approximately 34,500 acres for locatable mineral entry or development. The extent and locations of these closures would be in areas that have low potential for development of locatable minerals and therefore are not likely to impact locatable mineral activities.

Under Alternative A, approximately 470,700 acres would be open to salable minerals and non-energy leasable minerals. The CRVFO would propose closure of approximately 34,500 acres to mineral materials and non-energy solid mineral leasing. Expansion of mineral materials activities near Dotsero would be limited by NSO, CSU, and TL stipulations. Potential decorative rock sites throughout the planning area and decorative boulder and sand and gravel deposits along the Colorado River would be limited under this alternative by stipulations included under this alternative. Overall, this alternative would have minor impacts on mineral resources and would not affect existing operations.

Impacts from Soils Management. Under Alternative A, approximately 5,900 acres would be protected by stipulation GS-NSO-14 for debris flow hazard zones that would prohibit surface occupancy and surface-disturbing activities for the protection of the Glenwood Springs debris flow. This area would have similar protection by stipulation GS-NSO-16 for ACECs. Approximately 86,100 acres would be protected by stipulation GS-NSO-15 for steep slopes greater than 50 percent for oil and gas facilities, which would prohibit surface occupancy and surface-disturbing activities for oil and gas facilities on slopes greater than 50 percent but does not apply to pipelines. In addition, approximately 172,600 acres would be further protected by stipulation GS-CSU-4 for erosive soils and slopes greater than 30 percent, which could require special design, construction, operation, and reclamation measures.

Most of the mineral potential in the planning area occurs in proximity to major river corridors such as the Colorado, Roaring Fork, and Eagle Rivers. Some of these areas are very steep and consist of erosive soils. In addition, the Debris Flow Hazard Zones NSO stipulation could limit or prevent future locatable activity in the vicinity of the City of Glenwood Springs, where there is currently an active limestone quarry and several historical quarries. Under this alternative, soil management would have a minor impact on mineral resources.

Impacts from Water Resource Management. Under Alternative A, approximately 42,300 acres would be protected by stipulation GS-NSO-3 for major river corridors that would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark of six major rivers. However, this stipulation does not apply to the Naval Oil Shale Reserves production area. Additionally, approximately 5,400 acres would be protected by stipulation GS-NSO-13 for municipal watershed areas, which would prohibit surface occupancy and surface-disturbing activities within watersheds providing domestic water for the communities of Rifle and New Castle. The NSO stipulation for major river corridors could limit or prevent future salable minerals and locatable minerals expansion and development.

Within the planning area, mineral deposits of economic value tend to be located in proximity to streams and rivers that have either exposed these deposits over time or deposited the material during depositional events. In addition, access tends to be better in these areas because of the major roads that follow river corridors. For these reasons, the potential for sand and gravel, gypsum, and limestone is relatively high in proximity to the Colorado River, Roaring Fork River, and Eagle River. It is important to note that these three activities are currently occurring at existing sites (Sheep Gulch, Gypsum, and Mid-Continent), and their operations would probably continue under this alternative. Therefore, water management under this alternative would have a minor impact on mineral resources.

Impacts from Vegetation Management—Riparian. Under Alternative A, approximately 1,700 acres would be protected by stipulation GS-NSO-2 for riparian and wetland zones that would prohibit surface occupancy and surface-disturbing activities within riparian vegetation. Additionally, a substantial acreage would be protected by stipulation GS-CSU-2, which would require special design and construction and implementation measures within 500 feet of riparian or wetland vegetation. These stipulations could affect sand and gravel activities that frequently occur in the abandoned floodplains of major rivers. While these stipulations would have a minor impact on mineral resources, it is important to note that activities would be further limited under this alternative by stipulation GS-NSO-3 for major river corridors.

Impacts from Terrestrial Wildlife Management. Under Alternative A, a substantial number of acres would be protected by applicable wildlife stipulations that would prohibit surface occupancy and surface-disturbing activities in wildlife areas. These areas could coincide with areas that have mineral development potential. In those cases, terrestrial wildlife management would limit, prevent, or relocate development activities resulting in a minor impact on mineral resources. These stipulations would not affect existing mineral operations.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. All federal actions are subject to the requirements of the ESA, as amended. A plan of operations is required for operations proposed on lands or waters known to contain federally listed, proposed, or candidate threatened or endangered species or their proposed or designated critical habitats, unless BLM allows for other actions under a land use plan or threatened or endangered species recovery plan as stated at 43 CFR 3809.11(c)(6). The operator would be required to take actions as may be needed to prevent adverse impacts on any

threatened or endangered species and its habitat that may be affected by mining-related operations. Before any mining action potentially affecting any listed threatened or endangered species would be approved, BLM must consult with USFWS under Section 7 of the ESA.

As necessary and appropriate with the claimant's rights, mitigation (such as timing and avoidance) may be required to avoid or reduce potential impacts on listed species, species proposed for listing, and designated critical habitat. This mitigation could result in delays in approval of proposals. Some mitigation, such as timing and avoidance, could reduce the success of or preclude some operations. Under Alternative A, special status fish and other aquatic wildlife management would have a minor impact on mineral resources.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Under Alternative A, a significant acreage would be protected by stipulations for special status plants and terrestrial wildlife that would prohibit surface occupancy and surface-disturbing activities. Where these areas occur in conjunction with potential mineral development, they would probably limit, prevent, or relocate mineral development activities. Therefore, special status plants and terrestrial wildlife management could have a moderate impact on mineral resources under Alternative A. However, these stipulations would not likely affect existing mineral operations.

Impacts from Cultural Resource Management. Managing cultural resources requires BLM to make a reasonable and good-faith effort to identify the potential effects of federal undertakings. All federal undertakings that have the potential to adversely affect cultural resources must include mitigation measures designed to avoid the impact, as covered by the NHPA and its implementing regulations found at 36 CFR Part 800. Operations under the mining laws would be regulated to avoid unnecessary or undue degradation of the public land and cannot knowingly disturb, alter, injure, or destroy any historic or archaeological site, structure, building, or object listed or eligible for listing on the NRHP. These requirements could result in the need for avoidance or modification of proposed operations. The federal government bears any costs of investigations and salvage of cultural resources. Exploration for locatable minerals under a Notice is not a federal action, as it is not approved by BLM. However, BLM would review the Notice and advise the operator of proposed activity that could impact cultural resources.

Exploration or development under a Plan of Operations is a federal action and requires approval by the BLM. Before approval is granted, the proposed activity for locatable minerals would be reviewed as required under NEPA and all applicable laws, including NHPA. Mitigations, as consistent with the claimant's rights under the mining laws, would be imposed on proposed operations. Thus, managing cultural resources would require mining operators under the mining laws to not knowingly impact historic or archaeological sites and to immediately bring to the attention of the BLM any cultural resources that would be altered or destroyed by the mining operation. Modification or mitigation requirements would have adverse impacts by delaying the time required for approval of proposed operations.

Under Alternative A, cultural resources would be protected by a general stipulation (CRV-NSO-38) for historic properties that would prohibit surface occupancy and surface-disturbing activities within 100 meters (328 feet) of historic properties. In addition, stipulation GS-NSO-16 would prohibit surface occupancy and surface-disturbing activities in the Bull Gulch ACEC. The stipulations above could prevent, limit, or relocate mineral development activities, thereby having a minor impact on mineral resources.

Impacts from Visual Resource Management. VRM class designations would limit or allow surface-disturbing activities in specific areas. VRM Classes I and II would be aimed at greater retention of existing landscape character than would Classes III or IV. Managing areas as VRM Class I and Class II would reduce surface disturbance whereas VRM Class III or IV would be subject to actions that allow for greater landscape modification. Notices would be reviewed and the claimant would be advised of the steps necessary to be in conformance with the VRM class, as consistent with the claimant's rights under the mining laws. Drilling or other exploration sites and facilities could be relocated in VRM Class II areas to the extent practicable and to preserve the claimant's rights. Plans of operations would be reviewed under NEPA and approved in accordance with the VRM class and the claimant's rights. As consistent with 43 CFR 3809.5, operations would be designed to minimize and reduce adverse visual impacts and avoid or eliminate such impacts, as practical. Thus, operations may need to be relocated to utilize screening within the natural topography, and may be modified in color, shape, and size, as consistent with a claimant's rights. This action would result in delays in authorizing proposed operations and additional costs.

Under Alternative A, approximately 17,100 acres would be classified as VRM Class I and 230,100 acres as VRM Class II. Stipulation GS-NSO-16 for VRM Class I areas within ACECs would prohibit surface occupancy and surface-disturbing activities within ACECs, which account for approximately 23,200 acres under this alternative. Approximately 9,500 acres would be further protected by stipulation GS-NSO-18 for Interstate-70 Viewshed that would prohibit surface occupancy and surface-disturbing activities on slopes over 30 percent with high visual sensitivity in the Interstate-70 viewshed. In addition, stipulation GS-CSU-5 for VRM Class II would apply CSU stipulations to areas in VRM Class II, which account for approximately 264,800 acres under this alternative. Relocation of operations by more than 200 meters (656 feet) may be required to protect visual values. These stipulations would have a moderate impact on mineral resources by limiting or preventing development activities in areas where potential exists.

Impacts from Lands and Realty Management. The ROW authorization process under Alternative A could adversely affect development of mineral resources. Responding to specific proposals for mineral development on a case-by-case basis under the ROW authorization process would not encourage mineral development on BLM land, nor would it encourage the development in specific high-potential areas. Mineral development would be constrained by existing management policies and prohibitions involving lands with specific resource values and management directions.

Under Alternative A, review of mineral proposals through a case-by-case permitting process could create adverse impacts on mineral resources by increasing administrative costs as a result of the increased time associated with environmental data gathering for each proposal. Additional impacts could also include increases in the complexity of infrastructure to support more dispersed mineral development. Lands and realty management under this alternative would have a minor impact on mineral resources.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under Alternative A, fluid mineral management would have a negligible impact on mineral resources. High-potential oil and gas areas do not occur in conjunction with locatable and salable mineral potential areas or existing areas. If development conflicts occur, oil and gas wells could be practically and feasibly directionally drilled from a well pad that is not located vertically above the subsurface reserves.

Under this alternative, approximately 672,500 acres the federal mineral estate would be managed as open to oil and gas leasing and development. This alternative accounts for development of approximately 2,662

federal wells on 333 multi-well pads with an estimated 3,347 acres of surface disturbance and includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 2,181 acres on interim reclamation of well pads. The CRVFO would manage approximately 27,800 acres of the federal mineral estate as closed to fluid minerals leasing. Major constraints (NSO stipulations) would be applied to approximately 239,600 acres that are open to oil and gas leasing. In addition, moderate constraints (CSU stipulations and site-specific relocation) would apply to approximately 424,800 acres that are open to oil and gas leasing.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, approximately 27,000 acres would be managed as ACECs. Management actions included in ACECs are often more restrictive with regard to surface occupancy and surface-disturbing activities. There is potential for mineral resources to occur in ACECs under this alternative. The Deep Creek area contains outcrops of limestone that could be of marketable quality. However, access to these areas is limited; thus, the economic feasibility of development is low. The Glenwood Springs Debris Flow Hazard Zones ACEC could limit or prevent new development of locatable mining activities in the Glenwood Springs area but would not likely impact the existing operations. ACECs management under this alternative would have minor impacts on mineral resources.

Impacts from Wild and Scenic Rivers Management. Mineral development in stream segments identified for potential addition to the NWSRS, which includes eligible rivers, would require a plan of operations as stated at 43 CFR 3809.11(c)(2). As the plan of operations is reviewed and approved under the applicable federal laws and regulations and as consistent with a claimant's right, mitigations may be required to protect the ORVs of the eligible rivers. Requiring a plan of operations and mitigation would have adverse impacts by delaying the processing time and possibly reducing the feasibility of the proposal. Most of the eligible river segments are within areas that have potential for salable and locatable mineral development (e.g., sand and gravel, limestone, and gypsum).

Under Alternative A, all stream segments determined to be eligible would be managed under interim protections to preserve the free-flowing condition, water quality, ORVs, and tentative classification. The interim protections would apply to lands within 0.25 mile of either side of the stream. Protecting the ORVs of the eligible WSRs would essentially prevent surface occupancy and surface-disturbing activities within the river corridors being designated. The potential for mineral development in these areas is moderate, especially within the vicinity of the Colorado River and Deep Creek, where there are outcrops of gypsum, limestone, and sand and gravel deposits. Under this alternative, WSR management would have a moderate impact on mineral resources but would not affect existing operations.

Impacts from Wilderness Study Area Management. Managing WSAs under the federal regulations at 43 CFR 3802 and BLM Manual 6330—*Management of Wilderness Study Areas* would impact mineral resources. WSAs are not withdrawn from mineral entry. However, all mining-related operations are subject to the IMP such that actions may not impair the suitability of the WSA for inclusion in the Wilderness Preservation System, thus precluding exploration and development of mineral resources unless the activity is nonimpairing, a grandfathered use, or a valid existing right. Where WSAs and mineral potential occur simultaneously, the result could be adverse impacts on mineral resources and the loss of associated economic benefits.

Under Alternative A, four WSAs totaling approximately 27,700 acres would be managed under BLM Manual 6330—*Management of Wilderness Study Areas* that would prevent most ground-disturbing activities. While these

stipulations would prevent or limit mineral development in those areas, the potential is low and the overall impact on mineral resources from WSAs would be negligible. In addition, new leasing of non-energy minerals would not be allowed in WSAs.

Alternative B (Proposed RMP)

Impacts to locatable, salable (mineral materials), and non-energy leasable minerals from management of resources and uses under the Proposed RMP would be the same as or similar to Alternative A, except as described below.

Impacts from Locatable, Salable, and Non-Energy Leasable Minerals Management. Under the Proposed RMP, the CRVFO would recommend locatable mineral withdrawal to the Secretary of the Interior of approximately 162,900 acres for locatable mineral entry or development. None of the proposed withdrawals would affect the area just north of Gypsum, where a wallboard plant is operating on patented mining claims. Future gypsum exploration and development could be limited under the Proposed RMP along the Colorado River and Deep Creek. Withdrawals related to NWSRS designations under the Proposed RMP could close areas with limestone potential along Deep Creek and the Colorado River. Segments of these water bodies would be designated as suitable for inclusion in the NWSRS under this alternative, closing them to the mining laws for locatable exploration or development.

If prices for uranium and gold continue to increase, the proposed withdrawals could impact areas where these exploration and development activities could occur. Areas favorable for uranium and vanadium mining have been mapped along the Colorado River, including the segment that would be designated as suitable for inclusion in the NWSRS under the Proposed RMP. Recreational gold panning and dredging along the Colorado River could be impacted by the proposed withdrawals along the Colorado River.

Under the Proposed RMP, approximately 342,700 acres would be open to salable minerals and non-energy leasable minerals. The CRVFO would propose the closure of approximately 162,500 acres to mineral materials and non-energy solid mineral leasing. Expansion of mineral materials activities near Dotsero would be limited by NSO, CSU, and TL stipulations. Potential decorative rock sites throughout the planning area and decorative boulder and sand and gravel deposits along the Colorado River would be limited by stipulations under this alternative. The proposed designation of portions of the Colorado River as suitable for the NWSRS under the Proposed RMP would limit sand and gravel extraction within 0.5 mile of the river, where most of the viable geologic material occurs in the CRVFO. Overall, this alternative would have a minor impact on mineral resources throughout the planning area but moderate impacts in areas where mineral development potential exists. Furthermore, this alternative would have impacts on existing operations by limiting or preventing expansion.

Impacts from Soils Management. Impacts under the Proposed RMP would be greater and more restrictive to mineral resources than under Alternative A. Under this alternative, stipulation GS-NSO-15 would be replaced by stipulation CRVFO-NSO-2 for steep slopes greater than 50 percent and apply to pipelines as well. In addition, stipulation GS-CSU-4 would be replaced by stipulation CRVFO-CSU-1 for slopes greater than 30 percent or fragile and saline soils. In addition, these stipulations would apply to all surface occupancy and all surface-disturbing activities. While these stipulations would limit or prevent future activities in areas where these stipulations apply, they would have minor impacts on existing operations. Under the Proposed RMP, soils management would have overall minor impacts on mineral resources but could have moderate impacts in specific areas by restricting or relocating development activities.

Impacts from Water Resource Management. Compared with Alternative A, the Proposed RMP offers more protective stipulations for major river corridors, municipal watershed areas, and streams and riparian areas.

Within the planning area, mineral deposits of economic value tend to be located in proximity to streams and rivers that have either exposed these deposits over time or deposited the material during depositional events. In addition, access tends to be better in these areas due to major roads that follow river corridors. For these reasons, the potential for sand and gravel, gypsum, and limestone is relatively high in proximity to the Colorado, Roaring Fork, and Eagle Rivers. It is important to note that these three activities are currently occurring at existing sites (Sheep Gulch, Gypsum, and Mid-Continent), and their operations are likely to continue under this alternative. Therefore, water management under this alternative has the potential to have moderate impacts on mineral resources by restricting or relocating mineral development activities.

Impacts from Vegetation Management—Riparian. Under the Proposed RMP, a substantial acreage would be protected by stipulation CRVFO-NSO-5, which would protect riparian and wetland vegetation with a buffer of 328 feet. This NSO stipulation for riparian zones is slightly more conservative than Alternative A. No surface occupancy or disturbance in riparian areas would have minor to moderate impacts on mineral resources by restricting or relocating development activities.

Impacts from Terrestrial Wildlife Management. Impacts under the Proposed RMP would be similar to those under Alternative A. However, more acreage would be protected by applicable wildlife stipulations (e.g., CRVFO-NSO-7) that would prohibit surface occupancy and surface-disturbing activities in high value wildlife habitats. This alternative could have a moderate impact on mineral resources by constraining or relocating development activities. These stipulations would not affect existing mineral operations.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Impacts under the Proposed RMP would be similar to those under Alternative A, but additional stipulations for special status plants and terrestrial wildlife would constrain surface occupancy and surface-disturbing activities. Similar to Alternative A, this alternative would constrain mineral development, thereby having a moderate impact on mineral resources. These stipulations, however, would not affect existing operations.

Impacts from Cultural Resource Management. Under the Proposed RMP, approximately 14,100 acres would be closed to oil and gas leasing for the Blue Hill and Bull Gulch ACECs. This designation would prohibit oil and gas leasing within the 3,700-acre Blue Hill ACEC and the 10,400-acre Bull Gulch ACEC. In addition, stipulation CRV-NSO-49 would prohibit surface occupancy and surface-disturbing activities in the Bull Gulch ACEC. Further protection of cultural resources would be provided by stipulation CRV-NSO-37 for heritage areas that would prohibit surface occupancy and surface-disturbing activities within 0.25 mile of heritage areas. Additionally, stipulation CRV-NSO-21 for eligible historic properties would prohibit surface occupancy and surface-disturbing activities within 100 meters (656 feet) of eligible historic properties. As a result of these stipulations, impacts from Cultural Resource Management would be similar to those under Alternative A, having a minor impact on mineral resources by potentially limiting, preventing, or relocating surface-disturbing activities.

Impacts from Visual Resource Management. Impacts under the Proposed RMP would be the same as or similar to Alternative A, except that more acres would be managed as VRM Class I and Class II, and slightly different stipulations would apply. Under this alternative, approximately 35,600 acres would be managed as

VRM Class I and approximately 268,900 acres as VRM Class II. Stipulation CRVFO-NSO-22 for VRM Class II areas with slopes over 30 percent and high visual sensitivity would prohibit surface occupancy and surface-disturbing activities in VRM Class II areas with slopes over 30 percent and high visual sensitivity to preserve the visual setting and integrity. In addition, stipulation CRVFO-CSU-9 for VRM Class II would ensure surface-disturbing activities within VRM Class II areas comply with BLM Handbook 8431-1 to retain the existing character of the landscape. VRM Classes I and II are the most restrictive of the four classes, thereby having a moderate impact on mineral development potential under this alternative by restricting or relocating development activities.

Impacts from Lands and Realty Management. Under the Proposed RMP, approximately 191,200 acres would be managed as ROW avoidance areas. In addition, approximately 39,400 acres would be managed as ROW Exclusion Areas. All ACECs, eligible WSR segments, areas closed to oil and gas leasing, and areas open to oil and gas leasing with no surface occupancy would be managed as ROW avoidance areas (with exceptions granted only if the proposed authorization would not create substantial surface disturbance or would create only temporary impacts). Lands and realty management under this alternative would be more restrictive than under Alternative A. However, with valid locatable mineral claims, proponents are not required to hold ROWs if the action is directly related to reasonable access for development of the locatable minerals. Therefore, lands and realty management actions should have a minor impact on mineral resource development.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts under the Proposed RMP would be similar to those under Alternative A, but with more development and stipulations for resource protections. Under the Proposed RMP, approximately 4,198 federal wells would be developed on 525 multi-well pads with an estimated 5,276 acres of surface disturbance that includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 3,439 acres on interim reclamation of well pads.

The CRVFO RFD (BLM 2008e) estimated that 99 percent of new gas development would occur in high-potential areas and 1 percent in moderate-to low-potential areas. High-potential oil and gas areas typically do not occur in conjunction with locatable and salable mineral potential areas or existing areas. If development conflicts occur, oil and gas wells could be practically and feasibly directionally drilled from a well pad that is not located vertically above the subsurface reserves. Thus, fluid mineral management should have minor impacts on locatable, salable, or non-energy leasable mineral development.

Impacts from Areas of Critical Environmental Concern Management. Impacts under the Proposed RMP would be similar to those under Alternative A, but would include designation of approximately 46,400 acres as ACECs. However, under the Proposed RMP, the Dotsero Crater is not being brought forward for ACEC protection, which may allow for expansion of the cinder operations in the future. ACEC management under this alternative would have minor impacts on mineral resources.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, BLM would determine that Deep Creek Segments 2 (wild) and 3 (recreational) are suitable for inclusion into the NWSRS. All other segments but the Colorado River segments would be determined not suitable and would be released from further protection under the Wild and Scenic River Act. Under this alternative, the Deep Creek stream segments would be protected by stipulation CRVFO-NSO-30 for suitable stream segments classified as wild. This NSO stipulation would prohibit surface occupancy and surface-disturbing activities within 0.25 mile of

either side of the active stream channel. In addition, stipulation CRVFO-CSU-14 on suitable stream segments classified as scenic and recreational would apply under this alternative, which includes CSU stipulations within 0.25 mile on both sides of the active river channel. The potential for mineral development in these areas is moderate within the vicinity of Deep Creek where there are outcrops of gypsum, limestone, and sand and gravel deposits. Under the Proposed RMP, WSR management could have a moderate impact on mineral resources but would not affect existing operations.

Impacts from Wilderness Study Area Management. Impacts under the Proposed RMP would be similar to impacts described under other alternatives due to the application of: BLM Manual 6330-Management of WSAs, policy to manage WSAs to a nonimpairment standard and the occurrence of the same WSAs in all alternatives. WSAs would be protected by a specific stipulation CRVFO-NSO-29 for WSAs in the Proposed RMP, which would prohibit surface occupancy and surface-disturbing activities in WSAs. In addition, stipulation CRVFO-CSU-13 would apply CSU stipulations to these WSAs, if Congress releases them from wilderness consideration. Where WSAs and mineral potential simultaneously occur, the result could be adverse impacts on mineral resource development and the loss of associated economic benefits. However, while these stipulations would prevent or limit mineral development in those areas, the potential is low and the overall impact on mineral resources from WSAs is expected to be minor.

Alternative C

Under Alternative C, impacts to locatable, salable, and non-energy leasable minerals from management of soils, water resources, riparian vegetation, special status plants and terrestrial wildlife, WSAs, and cultural resources would be the same as or similar to the Proposed RMP. Impacts from management of all other resources and uses would be similar to those under Alternative A, except as described below.

Impacts from Locatable, Salable, and Non-Energy Leasable Minerals Management. Under Alternative C, the CRVFO would recommend for withdrawal to the Secretary of the Interior approximately 175,000 acres for locatable mineral entry or development. As described under the Proposed RMP, the overall extent of the closed areas, combined with the proposed withdrawals related to NWSRS designations under Alternative C, could result in a reduction in locatable mineral activities to a greater extent under Alternative C than under Alternatives A, D, or the Proposed RMP, because of the greater area covered by closures. None of the proposed withdrawals would affect the area just north of Gypsum, where a wallboard plant is operating on patented mining claims. Future gypsum exploration and development could be limited under Alternative C along the Colorado River and Deep Creek. Withdrawals related to NWSRS designations under Alternative C could close areas with limestone potential along Deep Creek and the Colorado River. Segments of these water bodies would be designated as suitable for inclusion in the NWSRS under this alternative, closing them to the mining laws for locatable exploration or development.

If prices for uranium and gold continue to increase, the proposed withdrawals could impact areas where these exploration and development activities could occur. Areas favorable for uranium and vanadium mining have been mapped along the Colorado River, including the segment that would be designated as suitable for inclusion in the NWSRS under Alternative C. Recreational gold panning and dredging along the Colorado River could be impacted by the proposed withdrawals along the Colorado River.

Under Alternative C, approximately 317,500 acres would be open to salable minerals and non-energy leasable minerals. The CRVFO would propose the closure of approximately 187,700 acres to mineral materials and non-energy solid mineral leasing. Expansion of mineral materials activities near Dotsero would be limited by

NSO, CSU, and TL stipulations. Potential decorative rock sites throughout the planning area and decorative boulder and sand and gravel deposits along the Colorado River would be limited by stipulations under this alternative. The proposed designation of portions of the Colorado River as suitable for the NWSRS under Alternative C would limit sand and gravel extraction within 0.5 mile of the river, where most of the viable geologic material occurs in the CRVFO. In addition to the impacts from stipulations under Alternative C (described under Alternative A), mineral materials closures along West Rifle Creek and in the Cattle Creek watershed could impact future decorative rock disposal sites, including those for moss rock.

Overall, Alternative C would have moderate impacts on mineral resources throughout the planning area. Furthermore, this alternative could have impacts on existing operations by limiting or preventing expansion.

Impacts from Terrestrial Wildlife Management. Impacts under Alternative C would be the same as or similar to Alternative A. However, a slightly greater number of acres (fewer than under the Proposed RMP) would be protected by applicable wildlife stipulations that would prohibit surface occupancy and surface-disturbing activities in wildlife areas. Therefore, this alternative would probably have a minor impact on mineral resources and would not affect existing operations.

Impacts from Visual Resource Management. Impacts under Alternative C would be similar to those under the Proposed RMP, except that slightly more acres would be managed as VRM Class III. Under this alternative, approximately 96,200 acres would be managed as VRM Class III. Additionally, Alternative C would apply protective stipulations: CRV-NSO-42 for VRM Class I areas would protect Class I VRM values, to prohibit surface occupancy and surface-disturbing activities within areas designated VRM Class I,and CRV-NSO-41 for VRM Class II areas with slopes over 30 percent and high visual sensitivity would prohibit surface occupancy and surface-disturbing activities in VRM Class II areas with slopes over 30 percent and high visual sensitivity to preserve the visual setting and integrity. In addition, stipulation CRV-CSU-16 for VRM Class II would ensure surface-disturbing activities within VRM Class II areas comply with BLM Handbook 8431-1 to retain the existing character of the landscape. VRM Classes I and II are the most restrictive of the four classes, thereby having a moderate impact on mineral resources under this alternative by restricting or relocating development activities.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, approximately 45,900 acres would be protected by stipulation CRV-NSO-43 for lands with wilderness characteristics, thus prohibiting surface occupancy and surface-disturbing activities. Management of these areas would have a minor impact on mineral resources because the potential for mineral development in these areas is low.

Impacts from Lands and Realty Management. Impacts under Alternative C are similar to those under the Proposed RMP, but would include the designation of 39,900 acres of ROW exclusion areas and 196,800 acres (BLM surface lands) of ROW avoidance areas. This alternative reflects a slight increase in ROW avoidance areas, thereby being more restrictive than under Alternative A or the Proposed RMP. Lands and realty management under this alternative would have a moderate impact on mineral resources by preventing, limiting, or relocating development activities.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts under Alternative C would be similar to those under the Proposed RMP, except that more acres would be closed to oil and gas leasing and slightly more acres protected by NSO and CSU stipulations. Under this alternative, approximately 521,500 acres of the federal mineral estate would be managed as open to oil

and gas leasing and development. This alternative accounts for development of approximately 2,206 federal wells on 276 multi-well pads with an estimated 2,774 acres of surface disturbance and includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 1,814 acres on interim reclamation of well pads.

Under this alternative, the CRVFO would manage approximately 179,700 acres of the federal mineral estate as closed to fluid minerals leasing. In general, the high-potential oil and gas areas typically do not occur in conjunction with locatable and salable mineral potential areas or existing areas. Thus, fluid mineral management should have minor impacts on locatable, salable, or non-energy-leasable mineral development.

Impacts from Areas of Critical Environmental Concern Management. Impacts under Alternative C would be similar to those under the Proposed RMP, but would include the designation of approximately 179,700 acres as ACECs, including the Dotsero Crater ACEC. The increased protections would limit or prevent surface-disturbing activities in more of the planning area. Designation of the Dotsero Crater ACEC would limit or prevent cinder operations from expanding into the crater rim, protecting the integrity of the crater and geologic values. Existing operations and proposed expansion would be away from the crater; therefore, this designation would have a minor impact. ACEC management under this alternative would have minor impacts on mineral resources.

While ACEC management under this alternative would have minor impacts on existing mineral development, it could have moderate impacts on mineral resources throughout the planning area by imposing more restrictions on exploration and development activities.

Impacts from Wild and Scenic Rivers Management. Under Alternative C, all eligible stream segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The interim protections would apply to lands within 0.25 mile of either side of the stream segment. The NSO and CSU stipulations that apply under the Proposed RMP would apply in this alternative as well. Alternative C could have similar impacts as Alternative A. Alternative C would be expected to result in moderate impacts to mineral resource development but would not affect existing operations.

Impacts from Wilderness Study Area Management. Impacts under the Alternative C would be similar to impacts described under other alternatives due to the application of: BLM Manual 6330-Management of WSAs, policy to manage WSAs to a nonimpairment standard and the occurrence of the same WSAs in all alternatives.

Alternative D

Impacts to locatable, salable, and non-energy leasable minerals under Alternative D would be the same as or similar to Alternative A, except as described below. Impacts from soils, water, riparian vegetation management, and WSA management are expected to be the same as the Proposed RMP.

Impacts from Locatable, Salable, and Non-Energy Leasable Minerals Management. Under Alternative D, approximately 372,500 acres would be open to locatable mineral development. However, the CRVFO would recommend for withdrawal to the Secretary of the Interior of approximately 132,700 acres for locatable mineral entry or development. None of the proposed withdrawals would affect the area just north of

Gypsum, where a wallboard plant is operating on patented mining claims. Future gypsum exploration and development could be limited under Alternative D along the Colorado River and Deep Creek.

Under Alternative D, approximately 477,400 acres would be open to salable minerals and non-energy leasable minerals. The CRVFO would propose the closure of approximately 27,700 acres to mineral materials and non-energy solid mineral leasing. Overall, this alternative would have a minor impact on mineral resources throughout the planning area and on existing operations based on the low potential for mineral development where theses closures would occur.

Impacts from Terrestrial Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A. However, fewer acres would be protected by applicable wildlife stipulations that would constrain surface occupancy and surface-disturbing activities in wildlife areas. This alternative would probably have a negligible impact on mineral resources.

Impacts from Special Status Species—Plants and Terrestrial Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A, but would provide less protection by stipulations for special status plants and terrestrial wildlife that would prohibit surface occupancy and surface-disturbing activities. Under this alternative, management of special status plants and terrestrial wildlife would have a minor impact on mineral resources by limiting, preventing, or relocating development activities.

Impacts from Cultural Resource Management. Impacts under Alternative D would be similar to those under the Proposed RMP, but would exclude stipulation CRV-NSO-38 for eligible historic properties. Impacts to mineral resources would be negligible.

Impacts from Visual Resource Management. Impacts under Alternative D would be similar to those under Alternative A, except that fewer acres would be managed as VRM Class II. Under this alternative, approximately 217,900 acres would be managed as VRM Class II. While this alternative designates the least amount of VRM Class II, it has the same amount of VRM Class I as the Proposed RMP and Alternative C and more than under Alternative A. Similar stipulations to the alternatives above would apply under this alternative, thereby limiting or preventing mineral development in those areas.

Impacts from Lands and Realty Management. Impacts under Alternative D would be similar to those under the Proposed RMP, but would include fewer acres as ROW avoidance areas (105,100 acres) and ROW exclusion areas (39,100 acres), resulting in fewer restrictions for mineral development. Land and realty management will have minor impact on mineral resources.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts under Alternative D would be similar to those under the Proposed RMP, but slightly less protective measures. Under this alternative, a high percentage of the planning area would be open to oil and gas leasing. This development scenario accounts for a substantial increase in infrastructure and disturbed acres. This alternative would be the least restrictive with regard to fluid minerals development. Approximately 701,200 acres of the federal mineral estate would be managed as open to oil and gas leasing and development. This alternative accounts for the development of approximately 4,198 federal wells on 525 multi-well pads with an estimated 5,276 acres of surface disturbance and includes the pads, access roads, pipelines, and a *pro rata* share of offsite facilities. The total area would be reduced to 3,439 acres on interim reclamation of well pads.

In general, the high-potential oil and gas areas typically do not occur in conjunction with locatable and salable mineral potential areas or existing areas. Thus, fluid minerals management should have minor impacts on locatable, salable, or non-energy-leasable mineral development.

Impacts from Areas of Critical Environmental Concern Management. Impacts under Alternative D would be the same as or similar to Alternative A, but would include the designation of approximately 20,200 acres as ACECs. This alternative would be the least restrictive with regard to mineral resources. Impacts under this alternative to mineral resources would be minor.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, there would be no wild and scenic segments river segments found to be suitable and none of the NSO and CSU stipulations for WSRs would apply. This alternative would allow for surface occupancy and surface-disturbing activities in areas that were constrained in other alternatives. This alternative is the least restrictive and would have a negligible impact on mineral resources.

Impacts from Wilderness Study Area Management. Impacts under the Alternative D would be similar to impacts described under other alternatives due to the application of BLM Manual 6330--*Management of Wilderness Study Areas* policy to manage WSAs to a nonimpairment standard and the occurrence of the same WSAs in all alternatives.

Cumulative Impacts

The geographic extent of the cumulative impacts analysis as it pertains to locatable minerals, salable minerals, and non-energy leasable minerals would be the CRVFO boundary and would include all federal, state, private, and other lands within this boundary. Impacts on mineral resources that are individually minor may cumulatively reduce exploration and production of commodities from public lands. Factors that affect mineral extraction and prospecting include, but are not limited to, such things as permitting and permitting delays, regulatory policy, public perception and concerns, travel management, transportation, mitigation measures, proximity to sensitive areas, low commodity prices, taxes, and housing and other necessities for workers. BLM has no control over many of these issues. Issues within the control of BLM are discussed earlier in this chapter. Most of these issues result in additional costs or permitting delays that can individually or cumulatively add costs to projects.

Public land that currently has no public access could reduce the amount of mineral exploration and development that may occur. Permission from landowners to cross private land to access public land is sometimes denied and could mean that mineralization is not discovered and developed. Mineral resources in other ownerships may not be developed if the adjacent public lands are withdrawn from mineral entry, because the deposit may not be economically feasible to develop if it crosses ownership and only a portion is available for development. The withdrawal of areas from mineral entry would cause an irretrievable loss of mineral extraction during the life of the plan. Some of the proposed withdrawals fall in high and moderate mineral potential areas. A mineral withdrawal that lies within or adjacent to a larger ore body could also prohibit mining of the larger ore body. For example, a withdrawn area may lie within an economic open pit perimeter. All or portions of the ore body may not be mined because the mineral withdrawal restricts opening or expanding the pit.

Proposed land exchanges could also result in an irreversible and irretrievable loss of minerals for extraction by the public. Public lands transferred to other ownership would no longer be available for mineral extraction by the public unless the federal government retains the mineral rights. BLM many times acquires lands in land exchanges; however, these lands are sometimes acquired with stipulations that prohibit mineral extraction. Throughout all alternatives, mineral development and exploration would continue to occur. However, acres open to exploration and development would vary by alternative. Overall, Alternative C would be the most restrictive to mineral developments and could result in the greatest amount of cumulative impacts. It proposes the most acres for withdrawal from mineral entry, the most areas closed to motorized travel, the most road restrictions, and the highest protection to other resources. Alternative C would be followed by the Proposed RMP. Alternatives A and C contain both ACEC designations and WSR segments. Alternative D would be the least restrictive regarding mineral development.

4.3.7 Renewable Energy

The Affected Environment (baseline) for Renewable Energy has been described in Chapter 3, Section 3.3.7. Please see the following sections for the Chapter 4, Renewable Energy topics:

- For biomass, see the discussions of the four alternatives' Impact from Renewable Energy Management—Biomass in Section 4.3.1 Forestry.
- For wind and solar, see Section 4.3.5 Lands and Realty.
- For geothermal, see the discussions of the four alternatives' Impact from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources) in Section 4.3.6 Energy and Minerals.

4.4 IMPACTS ON SPECIAL DESIGNATIONS

4.4.1 Areas of Critical Environmental Concern

An ACEC is an administrative designation assigned by BLM for "areas within the public lands where special management attention is required." FLPMA defines an ACEC as an area:

> "…within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and 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" (FLPMA Section 103[a]).

This analysis identifies effects of management and implementation-level decisions on BLM's ability to protect against and prevent irreparable damage to the relevant and important values associated with each proposed ACEC across the alternatives. Protection of relevant and important values can occur as a result of management associated with designating ACECs, management associated with other special designations (e.g., WSAs and WSRs), general management of public lands (VRM class designations, restrictions on wildlife habitat, special status species management, SRMAs), or through geographic or topographic characteristics. The most restrictive management that protects an area with relevant and important values will be the focus of the analysis. Analysis of less restrictive management or implementation-level action that would not provide additional protection to a relevant and important value will not be addressed. For example, in Alternative C, most ACECs would be covered by an NSO stipulation for the entire ACEC. If an ACEC with scenic and cultural relevant and important values is covered by an NSO stipulation for the entire ACEC, then a smaller buffer NSO stipulation around the cultural features would not provide additional protection for the relevant and important values. Therefore, the analysis would not address the impacts of cultural resource management for that alternative. On the other hand, in Alternative D, most ACECs would not be designated, and the same NSO stipulation for cultural resources would provide substantial protection for the relevant and important values, so the analysis would address cultural resource management in that alternative.

Methods and Assumptions

This analysis was based on the following assumptions:

- Although management decisions for most resources and resource uses have field office-wide application, ACEC management prescriptions apply only to those lands within each specific ACEC. Some areas within the CRVFO may have two or more special designations. Any proposed ACEC that falls within a WSA would be managed under the prescriptions provided in BLM Manual 6330. Although the WSAs are not automatically closed to mineral leasing and development and other surface-disturbing activities, the nonimpairment standard would preclude or strictly regulate most surface disturbances. Because of the WSA restrictions on surface-disturbing activities, the following analysis assumed that WSAs would generally protect the relevant and important values of proposed ACECs and would have a beneficial impact on lands considered for ACEC designation. However, WSAs are designated for different purposes and different values than ACECs. If Congress were to release a WSA from further consideration, the ACEC management prescriptions are designed to protect and enhance the relevant and important values.
- Under all alternatives, all public lands within the CRVFO not withdrawn from mineral entry would be open to mining claim location. Mining claims could be located in ACECs if the area is not

withdrawn. Locatable mineral exploration (less than a 5-acre disturbance) would not be subject to NSO or CSU stipulations.

- Many of the resources and uses have NSO or CSU stipulations (or both) that extend beyond or overlap the stipulations that would be applied to the relevant and important values within each ACEC. Although NSO or CSU stipulations for other resources and uses may offer additional benefits (e.g., reduced erosion/sedimentation/weed invasion) and indirectly support the relevant and important values, in most cases, these benefits would be negligible or redundant to the protections provided by the ACEC management prescriptions. For these reasons, impacts on the relevant and important values within ACECs from NSO and/or CSU stipulations associated with other resources will not be addressed, unless they provide a more restrictive stipulation or cover a broader area than those stipulations attached to the relevant and important values.
- Land uses would be managed to maintain or move towards meeting the Colorado Public Land Health Standards on a landscape basis.

Table 4.4.1-1 lists the existing and proposed ACECs and their relevant and important values, by alternative.

Environmental Consequences

The impact analysis is different for each ACEC because the relevant and important values vary by ACEC. ACECs are analyzed in alphabetical order as they appear in Table 2-2 in Chapter 2.

Impacts on ACECs would result from some of the management and implementation-level actions and activities proposed under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on ACECs under any of the four alternatives.

Environmental Consequences - Abrams Creek Proposed ACEC

The Abrams Creek proposed ACEC would designate 190 acres of public land along Abrams Creek, near Eagle, Colorado. The relevant and important value is wildlife resources. Wildlife values consist of a genetically pure population of Colorado River cutthroat trout that is identified as a core conservation population.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. The Abrams Creek proposed ACEC would not be designated under Alternative A. No special management would be applied and no benefits would accrue to the relevant and important values. Potential impacts to Colorado River cutthroat trout habitat from surface-disturbing activities could occur under this alternative.

The following management actions would apply to the Abrams Creek area:

- Stipulation GS-NSO-15 (for oil and gas facilities) on steep slopes on a portion of the proposed ACEC.
- Stipulation GS-NSO-2 for riparian and wetland vegetation.
- VRM Class II designation.

Table 4.4.1-1
Existing and Proposed ACECs (acres)

ACEC	Relevant and Important Values	Alternative A (Existing)	Alternative B (Proposed RMP)	Alternative C	Alternative D	Area Leased
Existing ACECs						
Blue Hill	Historic and cultural values and natural hazards	3,700	3,700	3,700	3,700	0
Bull Gulch	Scenic qualities, Harrington's penstemon, natural landscape adjacent to the Colorado River	10,400	10,400	10,400	10,400	0
Deep Creek	Scenic and geologic values	2,400	4,300	2,400	0	0
Glenwood Springs Debris Flow Hazard Zone	Natural hazards, Colorado River cutthroat trout	6,100	6,100	6,100	6,100	0
Lower Colorado River	Riparian and wildlife habitat	130	0	0	0	0
Thompson Creek	Scenic, geologic, historic, and ecological value	4,300	3,600	3,400	0	0
Proposed ACECs						
Abrams Creek	Colorado River cutthroat trout	0	0	190	0	0
Colorado River Seeps	Significant plant communities	0	0	470	0	0
Dotsero Crater	Geologic values	0	0	100	0	0
Grand Hogback	Scenic, geologic, cultural values	0	4,300	14,000	0	7,080
Greater Sage-Grouse Habitat	Greater-sage-grouse	0	0	24,600	0	0
Hardscrabble- East Eagle	Harrington's penstemon	0	4,200	4,200	0	0
McCoy Fan Delta	Paleontological and geologic values	0	1,500	220	0	0
Mount Logan Foothills	Colorado hookless cactus, DeBeque phacelia, Parachute penstemon, Naturita milkvetch	0	4,000	4,000	0	3,050
Sheep Creek Uplands	Harrington's penstemon	0	3,900	4,500	0	0
The Crown Ridge	Harrington's penstemon	0	0	1,000	0	0
Total acres		**27,000**	**46,400**	**79,800**	**20,200**	**10,130**

Acronyms and Abbreviations:
ACEC Area of Critical Environmental Concern

- Open to motorized travel.
- Available for ROWs.
- WSR eligible stream segment.

Impacts from Soils Management. Approximately one-third of the Abrams Creek proposed ACEC consists of steep slopes greater than 50 percent. Under the current management plan, these slopes would be protected from surface disturbances associated with oil and gas facilities with an NSO stipulation. The NSO stipulation would not apply to pipelines or other non-energy-related disturbances. Surface disturbances on steep slopes adjacent to the creek would probably result in erosion and sedimentation within the stream, degrading trout habitat. Under the Proposed RMP and Alternatives C and D, the steep slope stipulation CRV-NSO-2 would restrict all surface-disturbing activities; therefore, soils management would provide the least benefits under Alternative A.

Impacts from Vegetation—Riparian Management. Under current management, the riparian vegetation along Abrams Creek would be protected with an NSO stipulation which would also provide direct protection for the cutthroat trout habitat. This stipulation covers the riparian vegetation itself but would not include any buffer zone.

Impacts from Visual Resource Management. Abrams Creek proposed ACEC would be managed as VRM Class II in all alternatives. This would restrict most surface-disturbing activities with the potential to modify the visual landscape. The VRM Class II designation would benefit the Colorado River cutthroat trout habitat within the ACEC. Impacts would be the same in all alternatives.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under Alternative A, a CSU stipulation for BLM sensitive species would allow relocation of surface-disturbing activities or special design criteria to protect the Colorado River cutthroat trout habitat. This stipulation would protect the Abrams Creek watershed from surface disturbances and would have beneficial effects on the relevant and important fish resources.

Impacts from Comprehensive Trails and Travel Management. Current travel management for the Abrams Creek proposed ACEC is open to OHV use on and off roads. A route paralleling the creek is open to full-sized vehicles. A second route through the ACEC is open to mechanized travel. Cross-country travel in open travel areas would continue to result in the creation of new unplanned routes. Roads and other routes in proximity to aquatic habitat can cause potential erosion and offsite sediment transport that can adversely affect fish feeding and spawning. Alternative A would result in the most adverse impacts from travel management.

Impacts from Lands and Realty Management. The Abrams Creek proposed ACEC would be available for ROW applications under Alternative A, subject to the steep slope NSO stipulation on a portion of the ACEC, and VRM Class II constraints. Activities that result in ground disturbance and the removal of native vegetation for construction of ROWs have the potential to allow for the offsite movement of soils and increase sediment loading and turbidity into nearby water bodies. Alternative A would result in the greatest risk of impacts from lands and realty on the relevant and important values of the proposed ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Lands within the Abrams Creek area would not be withdrawn from mineral entry. Locatable mineral exploration and development would be allowed under the General Mining Law and would not be subject to NSO or CSU stipulations. Plans of operations would not be required for locatable mineral activities that would cause surface disturbances of 5 acres or less. Because activities of less than 5 acres or bulk samples of less than 1,000 tons only require a notice to be filed with the BLM, adverse impacts would be anticipated to the relevant and important values of the proposed ACEC. Surface-disturbing activities associated with mineral development may impact Colorado River cutthroat trout habitat through loss of vegetation cover, sedimentation in the stream channel, or degradation of water quality.

Mineral material sales and non-energy leasable minerals would be subject to the management constraints on steep slopes and riparian vegetation. These activities are also discretionary and would not be allowed in areas of high-value resources. Impacts on the relevant and important values would be greatest under Alternative A.

Impacts from Wild and Scenic Rivers Management. The Abrams Creek stream segment was determined to be eligible for inclusion in the NWSRS. Interim management to protect the ORVs and the free-flowing condition of the stream would apply to a 0.25-mile buffer on both sides of the stream. Interim management would preclude most surface-disturbing activities that would adversely affect the stream corridor. Protecting the eligible WSR segment would have beneficial impacts on the Abrams Creek proposed ACEC.

Alternative B (Proposed RMP)

Impacts on ACECs from soils management and from locatable, salable, and non-energy leasable minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Abrams Creek proposed ACEC would not be designated under the Proposed RMP. Abrams Creek would be managed as described below.

- NSO stipulation within 100 meters of all perennial streams, water bodies, and riparian areas (CRVFO-NSO-5).
- VRM Class II.
- NSO stipulation for steep slopes greater than 50 percent on a portion of the proposed ACEC (CRVFO-NSO-2) and NSO for VRM Class II with slopes over 30 percent and high visual sensitivity on south side of proposed ACEC (CRVFO-NSO-22).
- Travel limited to designated routes; nonmotorized use only.
- ROW avoidance for special status species occupied habitat.
- Open for mineral entry, mineral materials sales, and non-energy leasable minerals.

Approximately, one-half of the proposed ACEC would be covered by an NSO stipulation protecting perennial streams. This, as well as the other management actions under the Proposed RMP, would provide greater protection for the Colorado River cutthroat trout habitat than in Alternative A.

Impacts from Visual Resource Management. The Abrams Creek proposed ACEC would continue to be managed as VRM Class II. Under the Proposed RMP, an NSO stipulation would be applied to slopes greater than 30 percent with high visual sensitivity. The addition of an NSO stipulation for a portion of the proposed ACEC would result in more protection from surface disturbances that would impact the Colorado River cutthroat trout habitat. VRM under the Proposed RMP would have more beneficial impact than under Alternative A.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under the Proposed RMP, Colorado River cutthroat trout would benefit from an NSO stipulation within 100 meters of all perennial streams, water bodies, and riparian areas (CRVFO-NSO-5). This stipulation would result in greater protection for the relevant and important values than under Alternative A as it would protect Colorado River cutthroat trout habitat from most indirect, as well as direct, impacts of surface-disturbing activities. This alternative would provide substantial protection for trout habitat, but would not cover the entire ACEC with an NSO stipulation as in Alternative C.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, all travel would be limited to designated routes, and all existing routes within the proposed ACEC would be limited to nonmotorized use (Appendices A and O). Eliminating motorized vehicles from within the ACEC would reduce erosion and sedimentation into the stream, particularly on the routes closest to the stream. The Proposed RMP would result in fewer impacts than Alternative A.

Impacts from Lands and Realty Management. Under the Proposed RMP, special status species occupied habitat would be considered a ROW avoidance area. This would limit ROW activities within proximity of the creek, although some surface disturbances may be allowed elsewhere within the proposed ACEC. The Proposed RMP would result in fewer impacts from lands and realty on the relevant and important values of the proposed ACEC than under Alternative A, more than under Alternative C, and the same as Alternative D.

Impacts from Wild and Scenic Rivers Management. The Abrams Creek stream segment would not be determined suitable for inclusion in the NWSRS under the Proposed RMP. The segment would be released from interim management protections afforded eligible or suitable stream segments. The Proposed RMP would have more risk of impacts to relevant and important values than under Alternatives A or C, and the same as Alternative D.

Alternative C

Impacts on ACECs from soils management and VRM would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Abrams Creek area would be designated as an ACEC to protect Colorado River cutthroat trout habitat under this alternative. Designating the Abrams Creek as an ACEC and including an NSO stipulation on the entire ACEC would provide the most protection for cutthroat trout habitat. Alternative C would have the most benefit to the relevant and important values.

Special management prescriptions for the Abrams Creek proposed ACEC would be as follows:

- Apply NSO stipulation on all acres (CRV-NSO-49).

- Designate as ROW exclusion area.
- Recommend for withdrawal from mineral entry, close to mineral materials sales, and close to leasing of non-energy solid minerals.
- Close to unauthorized motorized vehicle travel, including over-the-snow travel.

Impacts from Comprehensive Trails and Travel Management. The Abrams Creek proposed ACEC would be closed to unauthorized motorized travel, including over-the-snow travel. The route paralleling the creek would be closed (above the headgate) and the other route crossing the creek would be limited to pedestrian and equestrian use only. Closing the road which parallels the stream would reduce the potential for erosion and offsite sedimentation into the creek. Of all alternatives, Alternative C would result in the most protection for the Colorado River cutthroat trout habitat.

Impacts from Lands and Realty Management. The Abrams Creek proposed ACEC would be designated as a ROW exclusion area under Alternative C, which would prohibit ROW actions that might impair the values of the ACEC. Realty actions would result in no surface disturbances that would impact the relevant and important values associated with the ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative C, the ACEC would also be recommended for withdrawal from mineral location, closed to mineral materials disposal and non-energy solid mineral leasing. There would be no impacts from mineral development under this alternative. Of all alternatives, Alternative C would result in the least adverse impacts on Colorado River cutthroat trout habitat within the proposed ACEC.

Impacts from Wild and Scenic Rivers Management. The Abrams Creek stream segment would be determined to be suitable for inclusion in the NWSRS. Interim management to protect the ORVs and the free-flowing condition of the stream would apply to a 0.25-mile buffer on both sides of the stream. Management to protect the ORVs and tentative classification would complement management prescriptions to protect the relevant and important values within the ACEC.

Alternative D

Impacts on ACECs from soils management, VRM, comprehensive trails and travel management, lands and realty management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Abrams Creek proposed ACEC would not be designated under Alternative D. The area would be managed under the following actions:

- NSO stipulation within 100 meters for streams that support core conservation populations of Colorado River cutthroat trout (CRV-NSO-31).
- VRM Class II.
- NSO stipulation for VRM Class II with slopes over 30 percent and high visual sensitivity on south side.

- Travel limited to designated routes; nonmotorized use only.
- ROW avoidance for special status species occupied habitat.
- Open for mineral entry, mineral materials sales, and non-energy leasable minerals.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. Under Alternative D, the NSO stipulation with 100-meter buffer on all perennial streams would be replaced by an NSO stipulation with 100-meter buffer on streams supporting core conservation populations of Colorado River cutthroat trout. Impacts would be the same as the Proposed RMP and Alternative C.

Impacts from Wild and Scenic Rivers Management. The Abrams Creek stream segment would not be determined suitable for inclusion in the NWSRS under Alternative D. There would be no protections for the relevant and important values from management of eligible or suitable WSR segments. Alternative D would have more risk of impacts than under Alternatives A or C, and the same as the Proposed RMP.

Summary

Alternative D would provide less protection for the Colorado River cutthroat trout habitat than in Alternative C, more protection than Alternative A, and similar protection as in the Proposed RMP.

Environmental Consequences - Blue Hill ACEC

The Blue Hill ACEC encompasses 3,700 acres. This ACEC is located along the Colorado River east of Burns, Colorado. The relevant and important values are historic and cultural resources and natural hazards associated with severe erosion hazard of area soils.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. The Blue Hill area is designated as an ACEC under the current management plan to protect its relevant and important cultural resources and erosive soils. Several management prescriptions specific to the ACEC include designating the area as VRM Class II, identifying the area as sensitive for placement of utilities and communication sites, and limiting travel to designated routes. Although these management prescriptions would provide some protection from surface-disturbing activities, the entire ACEC would not be covered with an NSO stipulation, fluid minerals leasing would be allowed, and some ROW development could occur within the ACEC. The potential would remain for some surface disturbances to impact the relevant and important values. Alternative A would provide less protection for the relevant and important values than the other alternatives, which would include additional management restrictions to protect the Blue Hill ACEC.

The Blue Hill ACEC would have the following management stipulations:

- Protective buffer of 100 meters for historic properties.
- VRM Class II.
- Travel limited to designated routes, except over-the-snow travel.
- Sensitive for utility and communication site facilities development (ROW avoidance area).

Impacts from Soils Management. The Blue Hill area contains soils with severe erosion hazard. Under Alternative A, small portions of the ACEC have a CSU stipulation attached for management of erosive soils

and slopes over 30 percent. This stipulation would provide some protection for cultural resources from erosion resulting from surface disturbances, although generally, cultural resources are more likely to occur on slopes less than 30 percent.

Impacts from Cultural Resource Management. Management actions associated with cultural resources would provide direct protection to the Blue Hill area from surface-disturbing activities. These protective measures are required by laws and regulations before approving any surface occupancy or surface-disturbing activities and include measures such as a cultural resource inventory, evaluation of NRHP eligibility, and mitigation of potential effects, generally through avoidance. Under Alternative A, management of the Blue Hill ACEC would include a 100-meter protective buffer around historic properties. This would provide a moderate degree of protection for cultural resources, similar to the Proposed RMP and Alternative D, but less than Alternative C which would provide an NSO stipulation buffer of 200 meters for historic properties. Alternative C would provide greater protection from potential indirect impacts such as erosion and risk of vandalism due to increased human presence in the vicinity of cultural resources.

Impacts from Lands and Realty Management. Currently, the Blue Hill ACEC is managed as a sensitive zone for placement of utilities and communication sites. Sensitive zones are areas where existing resource values must be mitigated before location of utilities or communication facilities. This may restrict some activities within the ACEC or may require some ROW actions to be located in areas where they would have less adverse impacts on cultural resources. The Blue Hill ACEC would not be recommended for withdrawal from mineral entry under Alternative A, which would not prohibit mining activity within the ACEC.

Impacts on the relevant and important values would be greatest under Alternative A, because in other alternatives, the Blue Hill ACEC would be designated as a ROW exclusion area and withdrawn from mineral entry.

Because Alternative A would have fewer protective restrictions for the relevant and important values, Alternative A would have greater risk of impacts than the other alternatives.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The Blue Hill ACEC would be open to fluid minerals leasing under Alternative A. The Blue Hill area has been identified as an area of moderate potential for oil and gas development, although no leases currently exist in the ACEC. If leases were issued in the future, they would be subject to the 100-meter protective buffer for cultural resources and any other pertinent laws, regulations and stipulations that apply to the area. A CSU stipulation protecting erosive soils on slopes greater than 30 percent would help limit erosion that might indirectly impact cultural resources. Direct impacts from fluid minerals to cultural resources and erosive soils would probably be minimal; indirect impacts such as vandalism may be minor.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, the ACEC would be open for locatable mineral exploration and development. Within a designated ACEC, federal regulations (43 CFR 3809.11[c][3]) require that a plan of operations be submitted for any operations causing surface disturbances greater than casual use. This regulation would help mitigate the impacts of mining exploration and development on the relevant and important values with the Blue Hill ACEC, but may not completely avoid all impacts associated with the activities.

Under Alternative A, the effects of mineral materials sales on relevant and important values would be evaluated on a case-by-case basis. Since mineral materials sales are discretionary activities, any potential action deemed incompatible with protection of the relevant and important values would be denied.

Impacts from Wild and Scenic Rivers Management. The Blue Hill ACEC lies adjacent to the Colorado River, which is an eligible stream for inclusion in the NWSRS under Alternative A. Interim management to protect the free-flowing condition, water quality, ORVs, and the tentative classification would apply to a 0.25-mile buffer on both sides of the stream centerline. Management to protect the ORVs and tentative classification would provide indirect protection for the relevant and important values within the ACEC.

Alternative B (Proposed RMP), Alternative C, and Alternative D

Impacts to ACECs from soils management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP and Alternatives C and D, the Blue Hill area would continue to be managed as an ACEC to protect its relevant and important cultural resources and erosive soils. The Proposed RMP and Alternatives C and D would provide several additional management prescriptions not provided under Alternative A:

- Close to fluid minerals leasing (oil and gas, oil shale, geothermal).
- NSO stipulation on all acres to protect cultural resources.
- Manage as ROW exclusion area.
- Recommend for withdrawal from mineral location, close to mineral material sales, and make unavailable for coal leasing.
- Prohibit net increase in motorized/mechanized routes.
- Allow vegetation treatments only if they would maintain or enhance the relevant and important values.

These management prescriptions would provide more comprehensive protection than Alternative A, allowing no uses that would cause irreparable damage to the relevant and important values.

Impacts from Cultural Resource Management. In addition to the management specific to cultural resources, all acres within the Blue Hill ACEC would be covered by an NSO stipulation to prohibit surface-disturbing activities that would adversely affect the relevant and important values. This stipulation, combined with the other management prescriptions that would be applied under the Proposed RMP and Alternatives C and D, would substantially protect the cultural resources from surface-disturbing activities.

Impacts from Lands and Realty Management. The Blue Hill ACEC would be designated as a ROW exclusion area that would prohibit ROW actions that might impair the values of the ACEC. In addition, the ACEC would be recommended for withdrawal from mineral location under this alternative and would be protected from surface disturbances associated with mineral and renewal energy development.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). In the Proposed RMP and Alternatives C and D, the Blue Hill ACEC would be closed to all fluid minerals

leasing (oil and gas, oil shale and geothermal resources). There would be no impacts from development of these resources within the ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location under these alternatives and would be protected from impacts associated with locatable mineral development.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP the BLM would defer a suitability determination on Colorado River segments and would rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM/USFS land management authorities, to protect the free-flowing condition, ORVs, classification, and water quality of Colorado River segments. The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* would protect the ORVs through a cooperative water delivery mechanism. If monitoring indicated a decline in the condition of the ORVs, BLM would start the formal suitability process to designate the Colorado River segments for inclusion into the NWSRS.

Under Alternative C, the Colorado River segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The suitability determination would not include a cooperative agreement with the Upper Colorado River stakeholder group. With no *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, water flows in the Colorado River would be subject to the water rights system.

Under the Proposed RMP and Alternative C, management to protect the ORVs and tentative WSR classifications would be consistent with cultural resource management and other management prescriptions to protect the relevant and important values within the ACEC.

Under Alternative D, all streams would be determined not suitable for inclusion in the NWSRS and would be released from interim protection afforded to eligible sections. Although there would be no specific WSR management to protect the Colorado River corridor, the river corridor would be managed as a SRMA and would be protected with an NSO stipulation for major river corridors, which would restrict most surface-disturbing activities. Combined with the NSO stipulation on all acres within the ACEC, the management of WSR corridors would have negligible impact on the relevant and important values of the Blue Hill ACEC.

Summary

The Proposed RMP and Alternatives C and D would provide greater protection for the relevant and important values of cultural resources and erosive soils than under Alternative A.

Environmental Consequences - Bull Gulch ACEC

The Bull Gulch ACEC is located on public lands east of the Colorado River and north of Interstate 70 near Derby Junction. The ACEC totals 10,400 acres. The Bull Gulch ACEC falls entirely within the larger Bull Gulch WSA. The designations overlap because the ACEC is designed to protect different values than the WSA. The relevant and important values within the ACEC are the scenic quality of the area tied to the diverse topography, unique geologic forms and sharp contrasting colors, and several sub-occurrences of Harrington's penstemon.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. Bull Gulch ACEC is designated as an ACEC under the current management plan to protect the relevant and important scenic values of the area and to maintain high quality habitat for special status plants. Special management for the relevant and important values includes the following management stipulations:

- NSO stipulation on all acres for ACEC values.
- VRM Class I.
- ROW exclusion area.
- Close to unauthorized motorized vehicle travel (including over-the-snow travel).
- Recommend for withdrawal from locatable mineral exploration and development.

The NSO stipulation on the entire ACEC would prohibit surface-disturbing activities that would impair the scenery or would adversely affect Harrington's penstemon populations or habitat within the ACEC. In addition, withdrawing the area from locatable mineral exploration and development would protect the resources from these activities.

Impacts from Visual Resource Management. High scenic quality is the primary relevant and important value for which the Bull Gulch ACEC was designated. The Bull Gulch ACEC would be managed under VRM Class I to preserve the existing high scenic character of the landscape by restricting surface-disturbing activities.

Impacts from Special Status Species Management—Plants. Under Alternative A, the Harrington's penstemon occurrences within the Bull Gulch ACEC would be covered with a CSU stipulation. This would allow relocation of activities to mitigate impacts on the occupied habitat for this special status plant; however, the NSO stipulation that covers the entire ACEC to protect the relevant and important values would provide greater protection that would include suitable, but unoccupied habitat.

Impacts from Comprehensive Trails and Travel Management. The ACEC is closed to unauthorized motorized vehicle travel under this alternative, which would provide protection to the relevant and important values by preventing the visual scarring and the potential destruction of special status plants due to OHV travel.

Impacts from Lands and Realty Management. The Bull Gulch ACEC is designated as a ROW exclusion area that would prohibit ROW actions that might impair the values of the ACEC. Lands within the Bull Gulch ACEC would be recommended for withdrawal from locatable mineral exploration and development as part of the WSA but would remain open for coal leasing, mineral materials disposal and non-energy solid mineral leasing. The NSO stipulation on all acres within the ACEC would preclude actions that would impair the relevant and important values.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The ACEC is currently closed to fluid minerals leasing due to its location within the Bull Gulch WSA. If the Bull Gulch WSA were released by Congress from consideration as wilderness, the ACEC would be open to fluid

minerals leasing. However, the existing NSO stipulation that encompasses the entire ACEC would prevent impacts from surface-disturbing activities on the relevant and important values.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location under this alternative and would be protected from surface disturbances associated with locatable mineral development. The NSO stipulation on all acres within the ACEC would preclude actions associated with coal leasing, mineral materials disposal or non-energy solid mineral leasing that would impair the relevant and important values.

Impacts from Wilderness Study Area Management. All acres of the Bull Gulch ACEC are within the Bull Gulch WSA. As such, the area would be protected from surface-disturbing activities by management prescriptions under BLM Manual 6330, unless Congress releases the area from wilderness consideration. The Bull Gulch WSA would be recommended for withdrawal from locatable mineral exploration and development and would be protected from surface disturbances associated with locatable mineral development. The Bull Gulch WSA would remain open to mineral materials disposal and non-energy solid mineral leasing as long as nonimpairment criteria are met. Although the actions must adhere to nonimpairment criteria, there is still a minor possibility of surface disturbance that would cause erosion and have an indirect, long-term adverse impact on the scenic quality and special status plant populations and their habitat within the ACEC.

Impacts from Wild and Scenic Rivers Management. Bull Gulch ACEC lies adjacent to the Colorado River, which is an eligible stream for inclusion in the NWSRS under Alternative A. Interim management to protect the free-flowing condition, water quality, ORVs, and the tentative classification would apply to a 0.25-mile buffer on both sides of the stream centerline. Management to protect the ORVs and tentative WSR classifications would complement management prescriptions to protect the relevant and important values within the ACEC.

Alternatives B (Proposed RMP), C, and D

Impacts to ACECs from VRM, special status plant species management, comprehensive trails and travel management, lands and realty management, fluid minerals management, and WSAs management would be the same as or similar to those under Alternative A.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, and Alternatives C and D, designation and special management would continue for the Bull Gulch ACEC to provide protection for the relevant and important values. Management would be similar to Alternative A, with the following additional management prescriptions:

- Close to fluid minerals leasing (oil and gas, oil shale, geothermal).
- Recommend as unavailable for coal leasing.
- Close to mineral materials sales and solid minerals leasing (Proposed RMP, Alternative C).

If the Bull Gulch WSA were to be released by Congress, the closure to fluid minerals leasing would still apply to the ACEC. In addition, the ACEC would be closed to mineral materials disposal and non-energy solid minerals leasing in the Proposed RMP and Alternative C. These management actions would ensure that the

relevant and important values of the Bull Gulch ACEC would be protected from any surface-disturbing activities in the absence of the WSA status.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts would be the same as Alternative A, except that closing the area to mineral materials disposal and non-energy mineral leasing would afford some additional protection from these actions in the Proposed RMP and Alternative C.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, the BLM would defer suitability determinations on the Colorado River segments and would apply management action and allowable use decisions proposed under the Proposed RMP along with the adoption of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to protect the free-flowing condition, water quality, ORVs, and tentative classifications.

Under Alternative C, the Colorado River segments would be determined to be suitable for inclusion into the NWSRS. This alternative would provide similar protections to the stream segments as Alternative A, except that a suitability determination would include specific allowable use and management actions to ensure the ORVs are protected. The suitability determination would not include a cooperative agreement with the Upper Colorado River stakeholder group. With no *Upper Colorado River Stakeholder Wild and Scenic Group Management Plan*, water flows in the Colorado River would be subject to the water rights system.

Under the Proposed RMP and Alternative C, management to protect the ORVs and tentative WSR classifications would be consistent with management prescriptions to protect the relevant and important values within the Bull Gulch ACEC.

Under Alternative D, all streams would be determined not suitable for inclusion in the NWSRS and would be released from interim protection afforded to eligible sections. Although there would be no specific WSR management to protect the Colorado River corridor, the river corridor would be managed as a SRMA and would be protected with an NSO stipulation for major river corridors, which would restrict most surface-disturbing activities. Combined with the NSO stipulation on all acres within the ACEC, the management of WSR corridors would have negligible impact on the relevant and important values of the Bull Gulch ACEC.

Summary

The Proposed RMP and Alternatives C and D would have similar impacts as Alternative A, unless Congress were to release the Bull Gulch WSA from consideration as wilderness, in which case Alternative A would have a greater risk of impacts on the relevant and important values than the other alternatives.

Environmental Consequences - Colorado River Seeps Proposed ACEC

The Colorado River Seeps proposed ACEC is located on a steep slope across the Colorado River from the Bull Gulch ACEC. The ACEC encompasses 470 acres. The hydrologic seep supports natural processes that meet the relevant and importance criteria. Two significant plant communities (River birch/mesic grasses and basin big sagebrush/basin wildrye) occur here.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, the Colorado River Seeps proposed ACEC would not be designated. The following management actions would apply to the area:

- NSO stipulation for steep slopes greater than 50 percent for oil and gas facilities (GS-NSO-15).
- CSU stipulation for significant plant communities (GS-CSU-3).
- NSO stipulation for riparian vegetation (GS-NSO-2).
- VRM Class II (lower slopes), VRM Class III (upper slopes).
- Available for ROW actions.
- Open to locatable mineral exploration and development, mineral materials sales, and non-energy solid leasable minerals.

Impacts from Soils Management. An NSO stipulation to protect soils on steep slopes greater than 50 percent would protect a small portion of the proposed ACEC from surface disturbances associated with oil and gas development. Under the current management plan, this stipulation would not apply to pipelines or non-oil and gas surface disturbances. This would provide limited benefits to the relevant and important values but would not protect the plant communities from pipelines or disturbances unrelated to oil and gas, and would allow fragmentation where the soil stipulation does not apply. Soils management would have a minimal beneficial effect on the significant plant communities.

Impacts from Vegetation Management—Riparian. Under Alternative A, an NSO stipulation for riparian vegetation would provide protection for the river birch riparian community from direct impacts but would not benefit the sagebrush/basin wildrye community. All significant plant communities are covered by a CSU stipulation in all alternatives. This would protect the resource values from most surface disturbances by allowing relocation of surface-disturbing activities, but may not protect the communities from offsite disturbances that would create soil erosion or weed invasion that would adversely affect the communities. Impacts from vegetation management—riparian under Alternatives A and C would provide more protection for the relevant and important values than Alternative D, but much less protection than under the Proposed RMP.

Impacts from Visual Resource Management. The lower slopes of the Colorado River Seeps proposed ACEC would be included in VRM Class II, providing some protection from surface-disturbing activities. The upper slopes would be classified as VRM Class III, which would allow for moderate modification of the landscape from surface-disturbing activities. The significant plant communities would benefit slightly from the VRM classifications. Impacts from VRM would be the same under the Proposed RMP and Alternative D, but more than under Alternative C.

Impacts from Recreation and Visitor Services Management. The Colorado River Seeps proposed ACEC would not be included in any SRMAs. Recreation management would be custodial with no specific management emphasis or management controls applied. Little recreational activity occurs within the Colorado River Seeps proposed ACEC (except perhaps some hunting use), and little activity is expected in the future due to the lack of roads and the moderately steep slopes. There would be no impact from recreation management on the relevant and important values under Alternative A.

Impacts from Lands and Realty Management. Lands within the Colorado River Seeps proposed ACEC would be available for ROW applications under Alternative A, subject to the NSO stipulations on a portion of the ACEC, and VRM Class II constraints on the lower slopes. Surface-disturbing activities associated with ROW construction and operation would result in the loss of vegetation that may reduce the extent of significant plant communities, fragment the habitat, or change the species composition within the communities. These actions may degrade the ecological condition of the significant plant communities. Alternative A would result in the greatest risk of impacts from lands and realty on the relevant and important values of the proposed ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Colorado River Seeps area would remain open to locatable mineral entry, disposal of mineral materials, and leasing of non-energy solid minerals. Disposal of mineral materials and leasing of non-energy minerals would be subject to the management constraints in the RMP. These are also discretionary actions that would not be allowed in areas of high resource value. Locatable mineral development would not be subject to NSO or CSU stipulations. Locatable mineral development could result in surface occupancy and surface-disturbing activities causing direct loss of significant plant communities or changes in vegetation cover and composition resulting in reduction of the ecological condition of the significant plant communities. Potential adverse impacts would be the same in the Proposed RMP and Alternatives A and D, and less in Alternative C.

Impacts from Wild and Scenic Rivers Management. The Colorado River stream segment adjacent to the Colorado River Seeps was determined to be eligible for inclusion in the NWSRS. Interim management to protect the ORVs and the free-flowing condition of the stream would apply to a 0.25-mile buffer on both sides of the stream. Interim management would preclude most surface-disturbing activities that would adversely affect the stream corridor. Protecting the eligible WSR segment would have beneficial impacts on the Colorado River Seeps proposed ACEC.

Alternative B (Proposed RMP)

Impacts to ACECs from VRM and locatable, salable, and non-energy leasable minerals management, would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Colorado River Seeps proposed ACEC would not be designated under the Proposed RMP. Management would be similar to Alternative A, except that the lower half of the area would be encompassed within the Upper Colorado River SRMA and managed according to the SRMA objectives.

Impacts from Soils Management. Impacts would be similar to Alternative A, except that the NSO stipulation for steep slopes would apply to all surface-disturbing activities including pipelines (CRVFO-NSO-2). The broader application of the NSO stipulation would protect the steep slopes within the proposed ACEC from surface disturbances. This would provide indirect benefits to the significant plant communities by protecting them from upslope soil erosion and sedimentation.

Impacts from Vegetation Management—Riparian. Under the Proposed RMP, an NSO stipulation with a 100-meter buffer for the protection of all perennial streams, water bodies and riparian resources would cover approximately 30 percent of the proposed ACEC. Although the stipulation would fully protect the significant

riparian plant community, the 100-meter riparian buffer may not completely encompass the sagebrush-basin wildrye significant plant community. The riparian stipulation would provide more benefit than in the other alternatives.

Impacts from Recreation & Visitor Services Management. The Upper Colorado River would be designated as an SRMA under the Proposed RMP and Alternative C and D. The SRMA would overlap the lower slopes of the Colorado River Seeps proposed ACEC. An NSO stipulation (CRV-NSO-46) to protect the recreation setting would indirectly benefit the significant plant communities in the Colorado River Seeps by preventing surface disturbances within the lower part of the proposed ACEC. The SRMA is focused primarily on the protection and enhancement of river-related recreation opportunities. Any new boat ramps or parking lots would be proposed on the side of the county road adjacent to the river, not within the proposed ACEC. Recreation management would have a beneficial effect on the relevant and important values of the ACEC under the Proposed RMP.

Impacts from Lands and Realty Management. The Upper Colorado River SRMA would be considered a ROW avoidance area. This would restrict ROW actions within the lower part of the proposed ACEC and protect the significant plant communities there but would not provide any protection for the upper slopes of the Colorado River Seeps proposed ACEC.

Impacts from Wild and Scenic Rivers Management. The Colorado River stream segment is adjacent to the Colorado River Seeps proposed ACEC. Under the Proposed RMP the BLM would defer suitability determinations on the Colorado River segments and would apply management action and allowable use decisions proposed under the Proposed RMP along with the adoption of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to protect the free-flowing condition, water quality, ORVs, and tentative classifications. Management to protect the ORVs and the free-flowing condition of the stream would apply to a 0.25-mile buffer on both sides of the stream which would complement management prescriptions to protect the relevant and important values within the proposed ACEC.

Alternative C

Impacts to ACECs from soils management, vegetation management and recreation management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Colorado River Seeps proposed ACEC would be designated under Alternative C to protect two significant plant communities. Alternative C would provide the most benefit for protection of the relevant and important values.

Special management prescriptions for the ACEC would include the following:

- Apply NSO stipulation on all acres (CRV-NSO-49).
- Manage as VRM Class II on all acres.
- Designate as ROW avoidance area.
- Recommend for withdrawal from mineral entry, close to mineral materials disposal, and close to leasing of non-energy solid minerals.

- Prohibit net increase in motorized/mechanized routes.

Impacts from Visual Resource Management. All acres within the Colorado River Seeps proposed ACEC would be managed as VRM Class II. This would limit the potential for surface disturbances within the ACEC compared with the other alternatives. VRM under Alternative C would have the most beneficial impact on significant plant communities of all alternatives.

Impacts from Lands and Realty Management. All acres within the Colorado River Seeps proposed ACEC would be designated as a ROW avoidance area under Alternative C, which would restrict most ROW actions that might impair the values of the ACEC. Impacts from lands and realty actions would be the least under Alternative C.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals under this alternative. No surface disturbances associated with mineral development would occur. Alternative C would have the least adverse impact on significant plant communities of all alternatives.

Impacts from Wild and Scenic Rivers Management. The Colorado River stream segment adjacent to the lower slopes of the Colorado River Seeps proposed ACEC would be determined to be suitable for inclusion in the NWSRS in this alternative. Interim management to protect the ORVs and the free-flowing condition of the stream would apply to a 0.25-mile buffer on both sides of the stream. Management to protect the ORVs and tentative WSR classifications would complement management prescriptions to protect the relevant and important values within the ACEC.

Alternative D

Impacts to ACECs from VRM would be the same as or similar to the Proposed RMP and Alternative A. Impacts to ACECs from soils management, recreation management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Colorado River Seeps would not be designated under Alternative D. Management of the area would be very similar to the Proposed RMP.

Impacts from Vegetation Management--Riparian. Under Alternative D, there would be no NSO stipulation for riparian resources. In this alternative, riparian resources within 500 feet of the outer edge of the riparian zone would be protected with a CSU stipulation. This would protect the riparian significant plant community from most surface disturbances by allowing relocation of surface-disturbing activities, but may not protect the communities from offsite disturbances that would create soil erosion or weed invasion that would adversely affect the communities and would provide no protection for the upland significant plant community. Alternative D would afford less protection for the relevant and important values than any of the other alternatives.

Impacts from Lands and Realty Management. Impacts would be the same as or similar to Alternative A. In Alternative D, SRMAs would not be considered an avoidance area for ROW actions. Ground disturbance

associated with ROW construction and operation may negatively impact the significant plant communities within the Colorado River Seeps proposed ACEC.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, none of the eligible stream segments would be determined as suitable for inclusion into the NWSRS. All segments would be released from interim management protections afforded eligible or suitable stream segments. There would be no protection for the relevant and important values within the Colorado River Seeps area from managing eligible or suitable WSR stream segments.

Summary

Alternative C would provide the most benefit to the relevant and important values by designating the proposed ACEC, followed by the Proposed RMP and Alternatives D and A.

Environmental Consequences - Deep Creek ACEC

The Deep Creek ACEC encompasses 2,400 acres of public lands in Alternatives A and C and 4,300 acres in the Proposed RMP within Deep Creek canyon west of the Colorado River. Relevant and important values include outstanding scenic qualities related to the cliffs and canyon, water features, and riparian vegetation. In addition to the scenic values, significant geologic values are present in the prominent geologic faults and high concentration of caves and karst resources found along the cliffs.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. Deep Creek ACEC is designated as an ACEC under the current management plan to protect the relevant and important scenic quality and geologic values of the area. The area has the following management stipulations:

- Apply NSO stipulation on all acres (surface).
- Apply NSO stipulation on all acres to 5,000 feet below the surface for cave resources.
- Manage as VRM Class I.
- Designate as ROW exclusion area.
- Close to unauthorized motorized vehicle travel (including over-the-snow travel).
- Recommend for withdrawal from locatable mineral exploration and development, close to mineral materials sales, and close to leasing of non-energy solid minerals.

Impacts from Visual Resource Management. High scenic quality is one of the relevant and important value for which the Deep Creek ACEC was designated. The Deep Creek ACEC would be managed under VRM Class I to preserve the existing high scenic character of the landscape by restricting surface-disturbing activities.

Impacts from Cave and Karst Resource Management. Under Alternative A, the significant cave and karst resources within the Deep Creek ACEC would be protected with an NSO stipulation that includes the Deep Creek cave area and some adjacent BLM lands (5,100 acres total). The NSO stipulation applies to surface and subsurface-disturbing activities down to 5,000 feet below the surface to protect the entrances, subsurface features, and overlying ground surface of numerous distinct caves within the Deep Creek ACEC. This coverage protects upgradient hydrology, important for the continued health of the cave system. The NSO

stipulation precludes the potential for inadvertent damage to the cave and karst system by directional drilling from outside the NSO stipulation boundaries to access underlying federal mineral estate.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, the ACEC is closed to motorized vehicle travel (except for administrative purposes), which would provide protection to the relevant and important values by avoiding visual scars associated with roads and trails, eliminating the loss of vegetation and damage to the stream due to vehicle traffic.

Impacts from Lands and Realty Management. The Deep Creek ACEC is designated as a ROW exclusion area that would prohibit ROW actions that might impair the values of the ACEC.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The Deep Creek ACEC is open to fluid minerals leasing under Alternative A. The Deep Creek area has been identified as an area of low potential for oil and gas development, so the risk of future development is very low. If leases were issued in the future, they would be subject to the NSO stipulation that applies to the entire surface acres of the ACEC, as well as to the NSO stipulation for cave and karst features that extends to 5,000 feet below the surface. Impacts from fluid minerals would be minimal.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative A, there would be no management for wilderness characteristics.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location under this alternative and would be protected from surface disturbances associated with locatable mineral development. The Deep Creek area would also be closed for mineral materials disposal and non-energy solid mineral leasing, preventing any surface-disturbing activities associated with these actions.

Impacts from Wild and Scenic Rivers Management. Deep Creek is an eligible stream for inclusion in the NWSRS under Alternative A. Interim management to protect the free-flowing condition, water quality, ORVs and the tentative classification would apply to a 0.25-mile buffer on both sides of the stream centerline. Management to protect the ORVs and tentative classification would complement management prescriptions to protect the relevant and important values within the ACEC.

Alternative B (Proposed RMP)

Impacts to the ACEC from VRM, lands and realty and locatable, salable, and non-energy leasable minerals management would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, Deep Creek ACEC would continue to be designated as an ACEC; the management boundary would increase to 4,300 acres to include all cave resources, the watershed for geologic and scenic resources, and to match the management boundaries for WSR and lands managed for wilderness characteristics. The Proposed RMP would be managed similar to Alternative A, with the following additional management prescriptions:

- Close to fluid minerals leasing (oil and gas, oil shale, geothermal resources).
- Recommend as unavailable for coal leasing.

- Close to mineral materials sales.
- Close to mechanized travel.
- Allow fire and other vegetation treatments only if they maintain or enhance the relevant and important values.

The management restrictions applied under the Proposed RMP would improve protection from surface-disturbing activities within the ACEC boundary. The Proposed RMP would increase protection on cave hydrology and cave resources by the boundary expansion.

Impacts from Cave and Karst Resources. The Proposed RMP would provide similar protections to Alternative A. This NSO stipulation would include 5,100 acres of BLM surface and extend to a depth of 5,000 feet, which would essentially preclude surface or subsurface impacts on all caves within the Deep Creek ACEC, including protection of upgradient hydrology. In addition, if a new cave were found outside of the Deep Creek Cave Area, it would be protected under an NSO stipulation within 40 acres around the cave. These management prescriptions would provide the most comprehensive protection of any alternative, allowing no uses that would cause irreparable damage to the relevant and important values.

Impacts from Comprehensive Trails and Travel Management. In addition to classifying the Deep Creek ACEC as closed to unauthorized motorized travel, under the Proposed RMP, the ACEC would be closed to mechanized travel as well. This would provide additional protection for the relevant and important values, particularly the scenery and riparian vegetation.

Impacts from Managing to Protect Wilderness Characteristics. The Proposed RMP would protect the Deep Creek Unit with an NSO stipulation, which would benefit the scenic values of Deep Creek ACEC. The ACEC boundary and the Deep Creek Unit match so that management of the area correlates and reduces potential public confusion. Indirectly, the cave and karst values of the ACEC would be protected by the additional NSO stipulation as well.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The Deep Creek ACEC would be closed to fluid minerals leasing under the Proposed RMP. This would protect the area from any surface-disturbing actions related to oil and gas, oil shale or geothermal development. In addition, closing the ACEC to leasing would prohibit directional drilling under the ACEC, which would protect any cave resources within the ACEC boundary from inadvertent impacts from directional drilling. However, the more extensive protection in the Deep Creek cave area under the Proposed RMP associated with the NSO stipulation would also protect against fluid minerals leasing.

Impacts from Wild and Scenic Rivers Management. Under the Proposed RMP, Deep Creek Segments 2 (wild) and 3 (recreational) would be determined as suitable for inclusion in the NWSRS. The WSR management boundary corresponds with the ACEC boundary instead of a 0.25-mile corridor along the creek. Interim management to protect the free-flowing condition, water quality, ORVs and tentative classification would complement management prescriptions to protect the relevant and important values within the ACEC.

Alternative C

Impacts to ACECs from VRM, comprehensive trails and travel management, lands and realty management, fluid minerals management, locatable minerals management, and WSRs management would be the same as or

similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, the Deep Creek ACEC would continue to be designated as an ACEC, and would be managed as under the Proposed RMP, except that the ACEC boundary would be the same as Alternative A and the NSO stipulation for the Deep Creek cave area would not include the additional 40 acres around each cave identified in the Proposed RMP.

Impacts from Cave and Karst Resources. New stipulation CRV-NSO-54 would be applied to an area of approximately 5,100 acres to protect cave and karst hydrology and underground features of the Deep Creek cave area. This NSO stipulation would include 5,100 acres of BLM surface and extend to a depth of 5,000 feet, which would essentially preclude surface or subsurface impacts on all caves within the Deep Creek ACEC, including protection of upgradient hydrology. This is the same protection as provided by GS-NSO-16 under Alternative A and the same protections as in the Proposed RMP.

Impacts from Fluid Minerals Management. As in the Proposed RMP, the Deep Creek ACEC would be closed to fluid minerals leasing. This closure, combined with the NSO stipulation for cave and karst resources under Alternative C, would protect the caves and other relevant and important values within the Deep Creek ACEC from any surface or subsurface-disturbing actions related to oil and gas development.

Impacts from Managing to Protect Wilderness Characteristics. Alternative C would protect the Deep Creek Unit with an NSO stipulation, which would benefit the scenic values of Deep Creek ACEC. The ACEC is smaller than the Deep Creek Unit boundary, but is wholly contained within the Deep Creek Unit. Indirectly, the cave and karst values of the ACEC would be protected by the additional NSO stipulation as well.

Alternative D

Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in the Deep Creek area under Alternative D and no special management prescriptions would be applied to the ACEC. Although management decisions for visual resources, riparian areas, trout-bearing streams, cave and karst resources, and special status species would provide moderate protections for the relevant and important values, Alternative D would have more adverse impacts than the other alternatives.

Management for the resources in the area would include the following:

- VRM Class I on entire area.
- CSU stipulation for riparian/wetland vegetation within 500 feet of outer edge.
- CSU stipulation for trout-bearing streams for 100 meters on both sides of stream.
- NSO stipulation for cave and karst resources (including subsurface features and watershed).
- CSU stipulation on special status plant occupied habitat with 100-meter buffer.
- ROW avoidance on special status plant occupied habitat.

- Travel limited to designated routes.
- Open to fluid minerals leasing (oil and gas, oil shale, geothermal resources).
- Open for mineral location, mineral materials sales, non-energy solid mineral leasing.

Impacts from Vegetation Management—Riparian. Under Alternative D, riparian vegetation and habitat qualities would be maintained with a CSU stipulation within 500 feet (152 meters) of the outer edge of the vegetation. This would provide moderate protection for the relevant and important riparian resources, but may not protect scenic values. Riparian vegetation management under Alternative D would be less beneficial to the relevant and important values than the other alternatives.

Impacts from Fish and Other Aquatic Wildlife Management. Trout-bearing streams such as Deep Creek would be covered with a CSU stipulation for 100 meters on both sides of the stream. This stipulation would provide management flexibility to relocate activities away from the stream corridor where impacts of surface disturbances to the riparian area would be minimal.

Impacts from Special Status Species Management—Plants. Application of the CSU stipulation with 100-meter buffer around occupied special status plant habitat may protect occupied Harrington's penstemon habitat from direct impacts, but would not provide protection for potential habitat or from indirect impacts of surface-disturbing activities. Alternatives A and D would provide the least protection for the relevant and important values of the proposed ACEC.

Impacts from Visual Resource Management. The Deep Creek landscape would continue to be managed as VRM Class I to protect the high quality scenic values in the drainage. VRM Class I designation would preclude most surface-disturbing activities within the Deep Creek proposed ACEC area. Impacts from Visual Resource Management would be the same as or similar to Alternative A.

Impacts from Cave and Karst Resource Management. Impacts would only include individual 40-acre NSO stipulations around individual known cave resources, which would include only about 400 acres in the Deep Creek cave area, rather than the over 5000 acres protected under the Proposed RMP or Alternatives A and C.

Impacts from Comprehensive Trails and Travel Management. Under Alternative D, travel within the Deep Creek area would be managed as limited to designated routes. Existing routes would be designated as open to full-sized vehicles. However, these routes have no public access and use of these routes would be available only to adjacent private landowners. The area would also be open to mechanized travel, which may have some adverse impacts on the relevant and important values. Alternative D would have the same impact as Alternative A, but would have slightly more impact than under the Proposed RMP and Alternative C.

Impacts from Lands and Realty Management. Deep Creek would not be considered a ROW exclusion area under Alternative D. ROWs could be located within the Deep Creek area subject to the other stipulations, which would apply. Surface disturbances from ROW development could adversely affect the relevant and important values of the area. Impacts from lands and realty under Alternative D would be greater than the other alternatives.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The Deep Creek area would be open for fluid minerals leasing under Alternative D. The Deep Creek area has been identified as an area of low potential for oil and gas, oil shale and geothermal resources, so the risk of future development is low. If leases were issued in the future, the cave and karst resources would only be protected with an NSO stipulation on surface occupancy or subsurface-disturbing activities within a 40-acre area around each of the caves within the Deep Creek area. This alternative would reduce the protection of the Deep Creek area compared with the other alternatives. The new restriction would not protect the entire subsurface features or upgradient hydrology of some of the caves that extend beyond the 40-acre parcel. Other relevant and important values could also be adversely affected by surface-disturbing activities associated with oil and gas development.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative D, there would be no lands managed for wilderness characteristics.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative D, the lands within the Deep Creek area would not be recommended for withdrawal from mineral location. Exploration and development of locatable minerals may create surface disturbances that would adversely affect the relevant and important values of the Deep Creek area. Plans of operations would not be required for locatable mineral activities that would cause surface disturbances of 5 acres or less (43 CFR 3809.21[a]). Because activities of 5 acres or less only require a notice to be filed with the BLM, adverse impacts would be anticipated to the scenic and geologic resources in the area. Potential adverse impacts from locatable mineral entry would be greatest in this alternative.

The Deep Creek area would not be closed to mineral materials disposal or leasing of non-energy solid minerals. The Deep Creek area has moderate potential for sand and gravel material and limestone. However, these activities are discretionary actions and would not be allowed in areas of significant resource values.

Impacts from Wild and Scenic Rivers Management. Under Alternative D, all streams would be determined not suitable for inclusion in the NWSRS and would be released from interim protection afforded to eligible sections. There would be no protection for the relevant and important values within the Deep Creek area from managing eligible or suitable WSR stream segments.

Summary

Beneficial impacts on the relevant and important values of the Deep Creek ACEC would be greatest under the Proposed RMP, followed by Alternatives C, A, and D.

Environmental Consequences - Dotsero Crater Proposed ACEC

The Dotsero Crater proposed ACEC encompasses the volcanic crater just north of Dotsero, Colorado. The ACEC totals 100 acres. The relevant and important value is the geologic feature associated with the most recent known volcanic event in Colorado.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated for the Dotsero Crater proposed ACEC under Alternative A. There would be no special management prescriptions applied to protect the relevant and important values of the ACEC. Alternative A would offer the least protection for the geologic values of the Dotsero Crater proposed ACEC of all alternatives.

The area would be managed under the following actions and restrictions:

- NSO stipulation on steep slopes greater than 50 percent (for oil and gas facilities). Does not apply to pipelines.
- CSU stipulation on slopes greater than 30 percent.
- VRM Class IV on most of the acres; VRM Class II on small portion.
- Open to ROW development.
- Open for locatable mineral entry, mineral materials disposal, and non-energy solid minerals leasing.

Impacts from Soils Management. Under the current management plan, an NSO stipulation to prohibit surface-disturbing activities on steep slopes greater than 50 percent would protect the slopes of the crater from oil and gas activities; however, the NSO stipulation does not apply to pipelines or non-oil and gas surface-disturbing activities. In each of the other alternatives, this NSO stipulation for steep slopes over 50 percent applies to all surface-disturbing activities. In addition, a CSU stipulation would be applied in all alternatives for protection of slopes greater than 30 percent. Under Alternative A, soils management would be less beneficial for protection of the relevant and important values within the Dotsero Crater proposed ACEC than the other alternatives.

Impacts from Visual Resource Management. Under the current management plan, the majority of the Dotsero Crater and surrounding lands are managed as VRM Class IV and a small portion in the southern part is VRM Class II. This management class would allow management activities that require major modification of the existing visual character of the landscape. VRM under Alternative A would not contribute to the protection of the relevant and important values associated with the proposed ACEC.

Impacts from Lands and Realty Management. The Dotsero Crater proposed ACEC would be available for ROW applications under Alternative A, subject to the NSO stipulations on the steep sideslopes. Surface-disturbing activities associated with ROW construction and operation could degrade the integrity of the geologic formation and impair the values of the proposed ACEC. Alternative A would result in the greatest risk of impacts from lands and realty on the relevant and important values of the proposed ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Dotsero Crater proposed ACEC would be open to locatable mineral entry, mineral materials disposal, and leasing of non-energy solid minerals. Mineral material sales and leasing of non-energy solid minerals would be subject to management constraints on steep slopes. These activities are discretionary actions and would not be allowed where they could cause irreparable harm to the relevant and important values. Exploration of locatable minerals would not be subject to existing stipulations. The geologic values of the crater could be diminished or lost due to surface disturbances associated with locatable mineral entry. Impacts would be greater than under the Proposed RMP and C, but similar to Alternative D.

Alternative B (Proposed RMP)

In the Proposed RMP, the Dotsero Crater would not be designated as an ACEC. Management actions that apply to the area would be the same as under Alternative A, except that the NSO stipulation for steep slopes would apply to all surface disturbances and the VRM Class would change from predominantly Class IV to Class II to protect the scenic and geologic features of the crater.

Impacts from Soils Management. Impacts would be similar to Alternative A, except that the NSO stipulation for steep slopes would apply to all surface-disturbing activities including pipelines (CRVFO-NSO-2), not just oil and gas. The broader application of the NSO stipulation would protect the steep slopes within the proposed ACEC from surface disturbances.

Impacts from Visual Resource Management. To protect the scenic and geologic resources associated within the Dotsero Crater the VRM Class would change from Class IV under Alternatives A and D to Class II under Alternative C and the Proposed RMP. VRM Class II would result in protections from most surface-disturbing activities that would modify the visual landscape. The VRM Class II designation would benefit the visual integrity of the crater. Alternative C and the Proposed RMP would provide more protection than under Alternatives A and D.

Alternative C

Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Dotsero Crater proposed ACEC would be designated as an ACEC under Alternative C. Alternative C would provide more protection for the geologic values of the Dotsero Crater proposed ACEC than under any of the other alternatives. ACEC management would include an NSO stipulation that would apply to the entire ACEC providing more protection for the relevant and important values than the other alternatives.

Management prescriptions that would apply to the area to protect the relevant and important values include the following:

- Apply NSO stipulation on all acres within the ACEC.
- Manage as VRM Class II.
- Close to unauthorized motorized travel.
- Classify as ROW exclusion area.
- Withdraw from mineral location, close to mineral materials sales, and close to non-energy solid mineral leasing.

Impacts from Visual Resource Management. To protect the relevant and important values associated with the ACEC, the VRM Class would change from Class IV under Alternatives A and D to Class II under Alternative C and the Proposed RMP. VRM Class II would result in protections from most surface-disturbing activities that would modify the visual landscape. The VRM Class II designation would benefit the visual integrity of the crater. Alternative C and the Proposed RMP would provide more protection than under Alternatives A and D.

Impacts from Lands and Realty Management. The Dotsero Crater proposed ACEC would be managed as a ROW exclusion area under Alternative C, which would prohibit ROW actions that might impair the values of the ACEC. Under Alternative C, lands and realty management would not have adverse impacts on the geologic values of the Dotsero Crater proposed ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The proposed ACEC would be recommended for withdrawal from mineral location, closed to mineral materials sales, and closed to leasing of non-energy solid minerals in Alternative C. These management actions would serve to protect the relevant and important values within the proposed ACEC from adverse impacts associated with mineral development. Impacts would be the same as described above for lands and realty actions.

Alternative D

Under Alternative D, the Dotsero Crater would not be designated as an ACEC. Management actions that would apply to the area are the same as Alternative A, except that the NSO stipulation for steep slopes would apply to all surface disturbances and all travel would be limited to designated routes. Impacts would be similar to Alternative A.

Summary

Alternative D and the Proposed RMP would provide slightly more protection for the relevant and important values of the Dotsero Crater proposed ACEC than under Alternative A because of the VRM classification and steep slopes NSO stipulation, but less than under Alternative C.

Environmental Consequences - Glenwood Springs Debris Flow Hazard Zones ACEC

The Glenwood Springs Debris Flow Hazard Zone encompasses 6,100 acres of public land north and south of Glenwood Springs, Colorado. The relevant and important values are the natural hazards and wildlife resources. Natural hazards are associated with steep, erosive slopes that are subject to mass wasting, debris flows, and rock fall that pose threats to human lives and safety or to property in the area. Wildlife values consist of a genetically pure population of Colorado River cutthroat trout that is identified as a Core Conservation Population.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. The Glenwood Springs Debris Flow Hazard Zone is designated as an ACEC under the current management plan to protect the relevant and important values of the area, which include public hazards associated with steep, erosive soils subject to mass wasting and a Core Conservation Population of the Colorado River cutthroat trout. Special management prescriptions that apply to the area are as follows:

- Apply NSO stipulation on all acres.
- Manage as VRM Class II.
- Designate as ROW avoidance area.
- Limit to designated routes, except over-the-snow travel.
- Prohibit net increase in motorized/mechanized routes.
- Allow prescribed fire and other vegetation treatments only if they maintain or enhance the relevant and important values.

These management prescriptions would provide protection for the relevant and important values from irreparable damage.

Impacts from Special Status Species Management—Fish and Other Aquatic Wildlife. The Glenwood Springs Fish Hatchery lies within the Glenwood Springs Debris Flow Hazard Zone ACEC. An NSO stipulation within a 2-mile radius of the Glenwood Springs Fish Hatchery would provide substantial protection for the quality and quantity of surface water and underground aquifers supplying the fish hatchery. Under Alternative A, special status fish and other aquatic wildlife management would benefit the cutthroat trout habitat and would also provide protection for the debris flow hazard zone from surface-disturbing activities.

Impacts from Visual Resource Management. The Glenwood Springs Debris Flow Hazard Zone would be managed as VRM Class II to preserve or retain the existing character of the landscape. A CSU stipulation on VRM Class II lands would provide protection from most surface disturbances that would benefit the relevant and important values within the area. Impacts from VRM would be the same throughout all alternatives.

Impacts from Comprehensive Trails and Travel Management. Travel management for the Glenwood Springs Debris Flow Hazard Zones ACEC would limit motorized travel to designated routes, except for over-the-snow travel. Travel management also prohibits a net increase in motorized or mechanized routes within the ACEC. Travel management under Alternative A protects the erosive soils within the ACEC from unregulated OHV use and from surface disturbances associated with construction of new travel routes.

Impacts from Lands and Realty Management. The lands within the Debris Flow Hazard Zone ACEC would be considered a ROW avoidance area. This would limit most activities within the ACEC or may require some ROW actions to be located in areas where adverse impacts on the relevant and important values could be mitigated.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Glenwood Springs Debris Flow Hazard Zone ACEC would not be recommended for mineral withdrawal or closed to mineral materials disposal. Locatable mineral exploration and development would be allowed under the General Mining Law. Within a designated ACEC, federal regulations (43 CFR 3809.11 [c][3]) require that a plan of operations be submitted for any operations causing surface disturbances greater than casual use. This regulation would help mitigate the impacts of mining exploration and development on the relevant and important values with the Debris Flow Hazard Zone ACEC, but may not completely avoid all impacts associated with the activities. Potential impacts from locatable mineral entry would be greatest under Alternative A.

Under Alternative A, the effects of mineral materials sales on relevant and important values would be evaluated on a case-by-case basis. Since mineral materials sales are discretionary activities, any potential action deemed incompatible with protection of the relevant and important values would be denied.

Impacts from Wild and Scenic Rivers Management. Mitchell Creek is one of the stream segments determined to be eligible for inclusion in the NWSRS under Alternative A. Interim management to protect the stream's ORVs and free-flowing condition would apply to a 0.25-mile buffer on both sides of the stream segment. Management to protect the ORVs and tentative classification would complement other management prescriptions to protect the Colorado River cutthroat trout habitat and erosive soils within the ACEC.

Alternative B (Proposed RMP)

Impacts to ACECs from soils management, riparian vegetation management, VRM, and lands and realty management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, the Glenwood Springs Debris Flow Hazard Zone ACEC would continue to be designated as an ACEC and would be managed as under Alternative A, with the following additional management prescriptions:

- Limit over-the-snow travel to designated routes. Miles of routes within ACEC would not increase beyond baseline of designated routes.
- Recommend for withdrawal from mineral location, close to mineral materials sales, make unavailable for coal leasing, and close to leasing for non-energy solid minerals.

Management prescriptions provided under the Proposed RMP and Alternatives C and D would result in slightly less risk of adverse impacts on the relevant and important values than under Alternative A.

Impacts from Special Status Species—Fish and Aquatic Wildlife. Under the Proposed RMP, in addition to the NSO stipulation to protect the watershed for fish hatcheries, an NSO stipulation with a 100-meter buffer would be applied to all perennial streams, water bodies, fisheries and riparian areas. This would not provide more protection for the cutthroat trout than the fish hatcheries NSO stipulation. Management for special status fish would be similar in all alternatives.

Impacts from Comprehensive Trails and Travel Management. Over-the-snow travel would be limited to designated routes under the Proposed RMP. This would create minor benefits to the relevant and important values by restricting snowmobile travel. In addition, the miles of routes within ACECs would not increase beyond the baseline of designated routes. This helps to clarify how no net gain could be interpreted in the other alternatives.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Glenwood Springs Debris Flow Hazard Zone ACEC would be recommended for withdrawal from locatable mineral exploration and development, as well as closed to mineral materials disposal and leasing of non-energy solid minerals. There would be no impacts from these actions to the relevant and important values under the Proposed RMP or Alternatives C or D.

Impacts from Wild and Scenic Rivers Management. Mitchell Creek would not be found suitable for inclusion in the Wild and Scenic Rivers System under the Proposed RMP. In either case, the NSO stipulation covering the entire ACEC would protect the relevant and important values. Impacts from determining the Mitchell Creek as suitable or not suitable would have negligible impacts on the Debris Flow Hazard Zone ACEC.

Alternatives C and D

Impacts to ACECs from special status fish and other aquatic wildlife management, riparian vegetation management, VRM, and lands and realty management would be the same as or similar to those under Alternative A. Impacts from soils management and locatable minerals, salable minerals, and non-energy

leasable minerals management would be the same as the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under Alternatives C and D, the Glenwood Springs Debris Flow Hazard Zone ACEC would continue to be designated as an ACEC and would be managed as under Alternative A, with the following additional management prescriptions:

- Limit over-the-snow travel to designated routes.

Management prescriptions provided under the Proposed RMP, Alternative C, and Alternative D would result in slightly less risk of adverse impacts on the relevant and important values than under Alternative A.

Impacts from Comprehensive Trails and Travel Management. Over-the-snow travel would be limited to designated routes under the Proposed RMP, Alternative C, and Alternative D. This would create minor benefits to the relevant and important values by restricting snowmobile travel.

Impacts from Wild and Scenic Rivers Management. Mitchell Creek would be considered suitable for inclusion in the NWSRS under Alternative C, but not under Alternative D. In either case, the NSO stipulation covering the entire ACEC would protect the relevant and important values. Determination of the Mitchell Creek as suitable or not suitable would have negligible impact on the Debris Flow Hazard Zone ACEC.

Summary

Impacts on the Glenwood Springs Debris Flow Hazard Zone relevant and important values would be slightly more beneficial under the Proposed RMP, Alternative C, and Alternative D than under Alternative A.

Environmental Consequences - Grand Hogback Proposed ACEC

The Grand Hogback proposed ACEC encompasses a portion of the prominent Grand Hogback feature northeast of the Town of Rifle, Colorado. This ACEC would include 4,300 acres under the Proposed RMP and 14,000 acres under Alternative C. The relevant and important values of the area include scenic, geologic, historic, and cultural resources. The area represents a portion of public land on the Grand Hogback which includes outstanding scenic and geologic features. Historic and cultural values include features related to abandoned coal mines and Ute habitation sites.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated for the Grand Hogback area under Alternative A. There would be no special management prescriptions applied to protect and enhance the relevant and important values of the proposed ACEC. Management actions that would apply to the area include the following:

- NSO stipulation on steep slopes greater than 50 percent (for oil and gas facilities). Does not apply to pipelines.
- Protective buffer of 100 meters for historic properties.
- VRM Class II on steeper slopes, VRM Class III and IV on flatter slopes on south side.
- Open to motorized travel on and off roads.

- Available for ROW development.
- Available for development of locatable, salable, and leasable minerals.
- Open for coal leasing.
- Open for fluid minerals leasing (50 percent of the area currently leased).

Alternative A would result in greater adverse impacts on the relevant and important values of the Grand Hogback proposed ACEC than the other alternatives.

Impacts from Soils Management. Approximately one-third of the Grand Hogback proposed ACEC consists of steep slopes greater than 50 percent. Under the current management plan, these slopes would be protected from surface disturbances associated with oil and gas facilities with an NSO stipulation. The NSO stipulation would not apply to pipelines or other non-oil and gas related disturbances. Surface disturbances may result in erosion and sedimentation within cultural or historical resource sites or visual scars within geologic formations. Under the Proposed RMP and Alternatives C and D, the steep slope stipulation would restrict all surface-disturbing activities; therefore, impacts of soil resource management would be greatest under Alternative A.

Impacts from Cultural Resource Management. Management actions associated with cultural resources would provide direct protection to the NRHP eligible properties within the Grand Hogback area. These protective measures are required by law before approving any surface occupancy or surface-disturbing activities and include measures such as a cultural resource inventory, evaluation of NRHP eligibility, and mitigation of potential effects, generally through avoidance. Under Alternative A, management of the cultural resources within the Grand Hogback proposed ACEC would implement a 100-meter protective buffer around historic properties. This would provide a moderate degree of protection for cultural resources, similar to the Proposed RMP and Alternative D, but less than Alternative C which would provide an NSO stipulation buffer of 200 meters for historic properties. Alternative C would provide greater protection from potential indirect impacts such as erosion and risk of vandalism due to increased human presence in the vicinity of cultural resources.

Impacts from Visual Resource Management. Most of The Grand Hogback proposed ACEC would be managed as VRM Class II in all alternatives. A small portion on the southern side would be managed as VRM Class III or IV. The Class II designation would benefit the relevant and important values by limiting potential surface disturbances within the ACEC but would not necessarily preclude all surface disturbances, especially in areas less visible to the public. VRM would provide some protection for the relevant and important values in all alternatives.

Impacts from Comprehensive Trails and Travel Management. Travel management for the Grand Hogback proposed ACEC is currently open to OHV use on and off roads. Several routes within the ACEC area are open to full-sized vehicles. Cross-country travel in open travel areas would continue to result in the creation of new unplanned routes. Roads and other routes create visual scarring that degrades the scenic quality of the proposed ACEC. Unregulated OHV use may result in damage to, or complete destruction of, cultural resources. Roads can also cause erosion and offsite sediment transport that may adversely affect the integrity of cultural resource sites. Alternative A would result in the most adverse impacts from travel management.

Impacts from Lands and Realty Management. Under Alternative A, the Grand Hogback proposed ACEC would be available for ROW applications, subject to the NSO stipulations on steep slopes for oil and gas related facilities and the protective buffer for cultural resources. Surface-disturbing activities associated with ROW construction and operation could destroy or displace cultural resources, degrade the integrity of the geologic formation, and impair the scenic values of the proposed ACEC. Impacts on the relevant and important values from realty actions would be greatest in Alternative A.

Impacts from Coal Management. There are currently no leases or development activities for coal within the CRVFO, but the Grand Hogback is considered the area with the highest potential for coal development within the CRVFO. Under Alternative A, the Grand Hogback is open for consideration for coal leasing. Management actions related to coal mining could impact the relevant and important values in several ways. Coal mining can result in surface disturbances that would have the potential to directly impact the scenic quality of the Grand Hogback proposed ACEC and can disrupt or destroy cultural or historical resources. However, based on historical activity and the nature of the deposit within the Grand Hogback, commercial development is not expected to occur over the next 20 years and risk of impacts would be negligible. Site-specific planning would help to mitigate and reduce negative impacts on the relevant and important values.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The lower slopes of the Grand Hogback proposed ACEC lie within a region of high potential for oil and gas development. The upper slopes are considered moderate potential for oil and gas development. Approximately one-half of the proposed ACEC has already been leased for oil and gas, although no development has occurred in the area yet.

Application of the 100-meter protective buffer may protect cultural resources from direct impacts but would not fully eliminate indirect impacts. Construction and use of roads for oil and gas facilities would increase both traffic and visitation to otherwise remote areas. Increased human presence in the vicinity of cultural sites would increase the risk of vandalism or looting of sites.

Construction of well pads, pipelines, roads, and associated facilities may cause visual scarring and alteration of geologic formations that would impact the scenic and geologic values in the area. The relevant and important values within the proposed ACEC would be adversely affected by fluid mineral development.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Grand Hogback proposed ACEC would be open to locatable mineral entry, mineral materials disposal, and leasing of non-energy solid minerals. Mineral material disposals and leasing of non-energy solid minerals would be subject to the cultural resource protective buffer stipulations that would provide some protection. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would not be approved in areas of high resource value.

Impacts on the relevant and important values could occur from locatable mineral development within the proposed ACEC. Locatable mineral exploration and development would not be subject to existing stipulations or site-specific analysis. Plans of operations would not be required for locatable mineral activities that would cause surface disturbances of 5 acres or less. Because activities of 5 acres or less require only a notice to be filed with the BLM, adverse impacts would be anticipated to the relevant and important values. Alternative A would result in the greatest risk of impacts from lands and realty on the relevant and important values of the Grand Hogback proposed ACEC.

Alternative B (Proposed RMP)

Impacts to ACECs from VRM and fluid minerals management would be the same as or similar to those under Alternative A. Impacts from ACEC management and management of other resources and uses are described below.

Impacts from Areas of Critical Environmental Concern Management. The Grand Hogback proposed ACEC would be designated under the Proposed RMP; however the boundary would be modified, making the proposed ACEC 4,300 acres. This boundary modification was based on cooperating agency comments and Tribal consultation. An NSO stipulation would be applied to all acres in the modified ACEC but would not apply to the larger acreage in the proposed ACEC in Alternative C. The Proposed RMP would provide more protection for the relevant and important values than in Alternatives A and D, but much less than Alternative C.

The proposed ACEC under the Proposed RMP (4,300 acres) would have the following management applied:

- NSO stipulation applied to the entire proposed ACEC (CRVFO-NSO-28).
- An NSO stipulation would be applied within 100 meters of historic properties (CRV-NSO-21).
- Travel would be limited to designated routes. All routes currently open for full-sized vehicles would be changed to pedestrian and equestrian only or ATV.
- Designate as ROW avoidance area.
- Designate as unavailable for coal leasing.
- Recommend for withdrawal from mineral entry, close to mineral materials disposal, and close to leasing of non-energy solid minerals.
- Close to commercial timber harvest.

The NSO stipulation on all acres within the ACEC would provide greater protection for the relevant and important values than in Alternatives A and D, but less than Alternative C which would protect a much larger acreage.

Impacts from Soils Management. The NSO stipulation for steep slopes in the current management plan would be expanded to apply to all surface-disturbing activities under the Proposed RMP and Alternatives C and D. Less surface disturbances would be likely to occur than under Alternative A, resulting in better protection for the relevant and important values within the Grand Hogback proposed ACEC.

Impacts from Cultural Resource Management. The protective buffer around historic properties would change to a 100-meter NSO stipulation under the Proposed RMP and Alternative D. In Alternative C, this buffer would expand to 200 meters. Additionally, the cultural resource heritage areas 0.25-mile NSO stipulation would also be applied under the Proposed RMP and Alternatives C and D. This would provide better protection for the relevant and important cultural resources within the proposed ACEC and would reduce the potential for indirect impacts to the resource. Cultural resource management under the Proposed RMP and Alternatives C and D would be more beneficial for protection of the relevant and important values than under Alternative A.

Impacts from Comprehensive Trails and Travel Management. In the Proposed RMP and Alternatives C and D, all travel would be limited to designated routes. In the Proposed RMP, one route currently open for full-sized vehicles would remain open; all other routes previously open for full-sized vehicles would be open to administrative access only. This would benefit the relevant and important values by eliminating cross-country travel and the creation of new unplanned routes. Closing most existing routes within the proposed ACEC to motorized and mechanized vehicles would minimize surface disturbances.

Impacts from Lands and Realty Management. The Grand Hogback proposed ACEC would be designated as a ROW avoidance area. This would restrict most ROW activities within the proposed ACEC, although some ROW actions may be allowed in areas that would have little or no impact on relevant and important values. Under the Proposed RMP, lands and realty actions would have less impact on the relevant and important values than under Alternatives A and D, but more impact than Alternative C.

Impacts from Coal Management. As part of the special management prescriptions for the Grand Hogback proposed ACEC, the area would be designated unavailable for coal leasing. This would eliminate any potential impacts of coal development. Coal management actions under the Proposed RMP would have the least adverse impact of any alternative on the relevant and important values within the designated portion of the proposed ACEC.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The designated portion of the ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals under this alternative. No surface disturbances associated with mineral development would occur. Alternative C would have less impact on the relevant and important values than under Alternatives A and D, but more impact than Alternative C.

Alternative C

Impacts to ACECs from soils management, cultural resources, lands and realty, coal, and locatable minerals, salable minerals and non-energy leasable minerals management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The potential Grand Hogback area would be designated as an ACEC under Alternative C comprising 14,000 acres. Special management prescriptions would be the same as the Proposed RMP but would apply to all 14,000 acres. The following additional protections would also be applied in Alternative C:

- Apply NSO stipulation with 200-meter buffer for historic properties (CRV-NSO-39).
- Manage the western Grand Hogback Unit for wilderness characteristics.

Management of the Grand Hogback proposed ACEC in Alternative C would provide the most protection for the relevant and important values of any alternative.

Impacts from Visual Resource Management. Under Alternative C, the entire Grand Hogback proposed ACEC (14,000 acres) would be classified as VRM Class II which would change approximately 400 acres from Class III or IV to Class II. This would provide a small incremental benefit by reducing surface disturbing

activities that could impact the relevant and important values. Alternative C would provide the most beneficial impact of all alternatives.

Impacts from Managing to Protect Wilderness Characteristics. Under this alternative, the western parcel of the Grand Hogback proposed ACEC would be managed for wilderness characteristics. Management actions for these lands would include closing the area to leasing and an NSO stipulation to exclude fluid minerals development and other surface-disturbing activities and limiting motorized and mechanized travel to existing routes. Portions of the Grand Hogback unit have already been leased, but there have been no wells drilled as of yet. Closing the area to leasing for wilderness characteristics would limit fluid minerals development to those areas already leased, preventing additional leasing and development. In the event these leases expire, no future leases would be issued within lands managed for wilderness characteristics. These management actions would provide additional protection for the relevant and important values within the western parcel of the Grand Hogback proposed ACEC, except in areas that are currently leased.

Impacts from Comprehensive Trails and Travel Management. In the Proposed RMP and Alternatives C and D, all travel would be limited to designated routes. In Alternative C , all routes currently open for full-sized vehicles would be changed to administrative use or pedestrian and equestrian use. This would benefit the relevant and important values by eliminating cross-country travel and the creation of new unplanned routes. Closing all existing routes within the proposed ACEC to motorized and mechanized vehicles would minimize surface disturbances. On the other hand, under Alternative C proposed ACEC, some routes would continue to be open to foot/horse and ATV use. Alternative C would result in the least adverse impact on the relevant and important values from travel management actions of all alternatives.

Alternative D

Impacts to ACECs from VRM, lands and realty, coal, fluid minerals management and locatable, salable and non-energy leasable minerals management would be the same as Alternative A. Soils and cultural resource management would be the same as the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts to ACEC Management. The Grand Hogback proposed ACEC would not be designated under Alternative D. The area would be managed under the following actions:

- NSO stipulation for all surface-disturbing activities for steep slopes greater than 50 percent.
- VRM Classes II, III, and IV.
- NSO stipulation for VRM Class II with slopes over 30 percent and high visual sensitivity on south side.
- NSO stipulation with 100-meter buffer for cultural properties.
- Travel limited to designated routes; most routes with public access open to full-sized vehicles.
- Available for ROW development.
- Available for development of locatable, salable, and leasable minerals.
- Open for coal leasing.
- Open for fluid minerals leasing (50 percent of the area currently leased).

Impacts from Comprehensive Trails and Travel Management. Management actions for the area would be very similar to the Proposed RMP. All travel would be limited to designated routes, but more routes would be designated open to full-sized vehicles under Alternative D. Alternative D would have less impact than under Alternative A, but more than under the Proposed RMP and Alternative C.

Summary

Alternatives A and D would provide the least protection for the relevant and important values of the Grand Hogback proposed ACEC. Alternative C would provide the most protection, followed by the Proposed RMP.

Environmental Consequences - Greater Sage-Grouse Habitat Proposed ACEC

The Greater Sage-Grouse Habitat proposed ACEC includes 24,600 acres of public land along the northern and eastern flanks of the Castle Peak area between Burns, State Bridge, and Wolcott, Colorado. The relevant and important values associated with this area are that it includes most of the habitat for the CRVFO's remaining sage-grouse population, as well as connecting corridors to adjacent habitat. The proposed ACEC also includes several populations of Harrington's penstemon and overlaps with a small portion of the Blue Hill ACEC.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. The Greater Sage-Grouse Habitat proposed ACEC would not be designated under Alternative A. Alternative A would have the least beneficial impact on the relevant and important values within the proposed ACEC. Current management actions that would impact the area include the following:

- VRM Class II on Pisgah Mountain and northern and western portion of proposed ACEC, VRM Class III adjacent to private lands, Class IV on southern portion.
- NSO stipulation within 0.25 mile of known sage-grouse leks (CRV-NSO-6).
- CSU stipulation for sensitive wildlife species (CRV-CSU-3).
- TL stipulation in winter for sage-grouse crucial winter habitat, TL stipulation in spring within 2 miles of a lek (CRV-TL-3).
- Travel limited to designated routes, closed to travel in winter (including over-the-snow travel).
- Open for ROW applications.
- Open for mineral entry (locatable, salable, non-energy leasable).

Impacts from Visual Resource Management. Pisgah Mountain and the northern portion of the Greater Sage-Grouse Habitat proposed ACEC would be managed as VRM Class II. The southern portion of the proposed ACEC would be managed as VRM Class IV. Some areas adjacent to private lands and ranches would be managed as VRM Class III. VRM Class II designation would provide protections from most surface-disturbing activities that would result in loss or fragmentation of sage-grouse habitat or disruption of sage-grouse behavior. VRM Class IV would allow surface disturbances that would substantially modify the visual landscape, and consequently, the sage-grouse habitat. VRM under Alternative A would provide only partial protection of the relevant and important values associated with the proposed ACEC.

Impacts from Special Status Species Management—Terrestrial Wildlife. Under the current management plan, the active greater sage-grouse leks in the proposed ACEC would be covered with an NSO

stipulation that prohibits surface-disturbing activities within a 0.25-mile radius of the lek. In addition, a timing limitation would prohibit surface-disturbing activities within a 2-mile radius of an active lek from December 16 to March 15 on sage-grouse crucial winter habitat and from March 1 to June 30 on nesting habitat. These stipulations are based on outdated guidance for sage-grouse management that may not provide adequate protection for sage-grouse populations (Walker et al. 2007). New guidance would be applied to the Proposed RMP and Alternatives C and D, resulting in greater protections.

Under Alternative A, a CSU stipulation (CRV-CSU-3) for sensitive species would apply to the occupied sage-grouse habitat within the Greater Sage-Grouse Habitat proposed ACEC. The CSU stipulation may guide where surface-disturbing activities would occur but would not likely protect the overall habitat from fragmentation.

Impacts from Comprehensive Trails and Travel Management. Under the current management plan, all travel within the Greater Sage-Grouse Habitat proposed ACEC would be limited to designated routes. The southwest portion of the proposed ACEC is open to pedestrian and equestrian travel only (closed to motorized and mechanized travel) as part of the Castle Peak Travel Management Plan. Pisgah Mountain is open to mechanized travel. Seasonal road closures during the winter and breeding period are in place that would help minimize disruption to sage-grouse. The current travel plan would be beneficial for protecting sage-grouse habitat. Travel management designations for the Greater Sage-Grouse Habitat proposed ACEC would remain the same throughout all alternatives, so impacts would be the same across all alternatives.

Impacts from Lands and Realty Management. The Greater Sage-Grouse Habitat proposed ACEC would be available for ROW applications under Alternative A, subject to the resource management constraints for special status wildlife described above. ROW actions that include above-ground structures would permanently remove native vegetation and fragment sage-grouse habitat. Temporary disturbances would alter the vegetation structure and composition in reclaimed areas. Overhead power lines may create raptor perches that would increase predation on sage-grouse. Lands and realty management under Alternative A may result in adverse impacts on the relevant and important values within the proposed ACEC.

Impacts from Locatable Minerals, Mineral Material Disposals, and Non-Energy Leasable Minerals Management. Under Alternative A, the Greater Sage-Grouse Habitat proposed ACEC would be open to locatable mineral entry, mineral materials disposal, and leasing of non-energy solid minerals. Mineral material disposals and leasing of non-energy solid minerals would be subject to the NSO stipulations that would provide some protection for sage-grouse populations and their habitat. Mineral material sales and non-energy leasable minerals are also discretionary. Any such request would be evaluated on a site-specific basis and potential actions deemed incompatible with management objectives for the area would be denied. Locatable mineral exploration would not be subject to existing stipulations or site-specific analysis. The risk of impacts from locatable minerals on the relevant and important values of the proposed ACEC is greatest under Alternative A.

Alternative B (Proposed RMP)

Impacts to the Greater Sage-Grouse Habitat proposed ACEC from VRM, comprehensive trails and travel management, and locatable minerals, mineral material disposals, and non-energy leasable minerals would be the same as or similar to Alternative A.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated for the Greater Sage-Grouse Habitat area under the Proposed RMP. All of the management actions and stipulations from Alternative A would apply to the area, including the following additional restrictions:

- NSO stipulation in greater sage-grouse priority habitat (CRVFO-NSO-15)
- TL stipulation from December 1 to March 15 in sage-grouse crucial winter habitat; TL stipulation from March 1 to June 30 within a 4-mile radius of an active lek (CRVFO-TL-11).
- CSU stipulation in mapped general greater sage-grouse habitat within the Northern Eagle/Southern Routt County greater sage-grouse population (CRVFO-CSU-7).
- LN would be implemented in areas that may in part, or in total, contain important greater or Gunnison sage-grouse habitats. The operator may be required to implement specific measures through a condition of approval to protect sage-grouse (CRVFO-LN-5).
- ROW avoidance area for priority habitat.
- Close the east Castle Peak area to over-the-snow travel.
- Manage the Pisgah Mountain Unit for wilderness characteristics.

Impacts from Special Status Species Management—Terrestrial Wildlife. Under the Proposed RMP, additional protections would be applied to sagebrush habitat that has been identified as suitable habitat for greater sage-grouse. Under the Proposed RMP, 24,700 acres of "priority habitat" would be protected with an NSO stipulation, 16,500 acres of "general habitat" would be protected with a CSU stipulation, and 28,800 acres would be managed under a TL stipulation. Special status wildlife management under the proposed alternative would be more effective in protecting suitable greater sage-grouse habitat during all life stages than the other alternatives.

Impacts from Lands and Realty Management. Priority habitat for greater sage-grouse would be managed as a ROW avoidance area under the Proposed RMP. ROW avoidance around priority habitat would limit surface disturbances to this habitat but may not preclude all ROW actions in general habitat. ROW development would potentially increase traffic and surface disturbance. Increased traffic and surface disturbance may disrupt sage-grouse behavior and reduce connectivity between sage-grouse habitats and populations. Impacts on greater sage-grouse would be less than under Alternatives A and D, but more than under Alternative C.

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP, the lands north of BLM Route #8530 (Pisgah Mountain) would be managed for wilderness characteristics. Management actions for these lands would include closing the area to fluid minerals leasing and an NSO stipulation (CRV-NSO-43) to exclude other surface-disturbing activities. The Greater Sage-Grouse Habitat area is considered low potential for fluid minerals leasing; therefore, closing the area to leasing would provide minimal or negligible additional protection. The NSO stipulation for wilderness characteristics would overlap the NSO stipulation for priority sage-grouse habitat. Therefore, managing for wilderness characteristics would complement management for sage-grouse but would provide little additional protection. In addition, the NSO stipulation for wilderness characteristics may be more restrictive in terms of types of actions that would be allowed. The type and extent of vegetation treatments may be restricted in these areas, which may limit the ability to meet vegetation objectives for greater sage-grouse habitat.

Alternative C

Impacts from comprehensive trails and travel management and management for wilderness characteristics would be the same as the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, 24,600 acres mapped as Greater Sage-Grouse Habitat would be designated as an ACEC to protect currently available sage-grouse habitat within the CRVFO and lands considered necessary for maintaining range-wide connectivity and genetic diversity. The following special management prescriptions would apply:

- Close to fluid minerals leasing (oil and gas, oil shale, geothermal resources).
- Apply NSO stipulation on all acres.
- Manage as VRM Class II designation on all acres.
- Designate as a ROW avoidance area.
- Allow prescribed fire and other vegetation treatments only if they maintain or enhance sage-grouse habitat.
- Limit all travel to designated routes; closed to travel in winter (including over-the-snow travel).
- Prohibit net increase in motorized/mechanized routes.
- Recommend for withdrawal from mineral entry (locatable, salable, non-energy leasable).
- Manage the Pisgah Mountain Unit for wilderness characteristics.

Closing the area to fluid minerals leasing and an NSO stipulation on the entire ACEC would prohibit surface-disturbing activities that would have adverse impacts on the sage-grouse habitat while allowing flexibility to implement vegetation treatments or other actions that would enhance habitat. Alternative C would provide the most protection for the Greater Sage-Grouse Habitat proposed ACEC of any of alternatives, however, the Proposed RMP utilizes refined mapping of sage-grouse habitat that omits some non-suitable habitat (e.g., pinyon-juniper, spruce-fir) and incorporates additional acreage of suitable habitat that would be protected with an NSO stipulation.

Impacts from Visual Resource Management. All lands within the Greater Sage-Grouse Habitat proposed ACEC would be designated as VRM Class II in this alternative. The VRM Class II designation would result in protections from most surface-disturbing activities that would modify the landscape and impact sage-grouse habitat. The VRM Class II designation would benefit the relevant and important values within the proposed ACEC.

Impacts from Lands and Realty Management. The entire ACEC would be managed as a ROW avoidance area under Alternative C. This would restrict most new ROW actions within the proposed ACEC, but may allow some ROW actions to be located in areas where they would have less adverse impacts on greater sage-grouse habitat. Potential adverse impacts from lands and realty actions on the relevant and important values would be the least under Alternative C, followed by the Proposed RMP, and Alternatives A and D.

Impacts from Locatable Minerals, Mineral Material Disposals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral

materials disposal, and closed to leasing of non-energy solid minerals under this alternative. No surface disturbances associated with mineral development would occur. Alternative C would have the least adverse impact on the greater sage-grouse populations and habitat values within the Greater Sage-Grouse Habitat proposed ACEC.

Alternative D

Impacts to ACECs from VRM and from locatable, salable, and non-energy leasable mineral management would be the same as or similar to the Proposed RMP and Alternative A. Impacts to ACECs from lands and realty management would be the same as or similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated for the Greater Sage-Grouse Habitat area under Alternative D and no special management would be applied to the proposed ACEC.

Impacts from Special Status Species Management – Wildlife. Under Alternative D, new guidance for the protection of sage-grouse populations and habitat would be incorporated. The NSO stipulation that prohibits surface-disturbing activities around active leks would increase from a 0.25-mile radius (as in Alternative A) to a 0.6-mile radius. The timing limitation to protect greater sage-grouse nesting habitat would expand to encompass nesting habitat within a 4-mile radius of an active lek, instead of the 2-mile buffer as in Alternative A. These stipulations are designed to provide more protection for sage-grouse than current management. Special status wildlife management in Alternative D would have more benefits to sage-grouse than under Alternative A, but substantially less than the Proposed RMP or Alternative C.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as or similar to the Proposed RMP and Alternatives A and C.

Summary

Alternative A would provide the least protection for the relevant and important values in the Greater Sage-Grouse Habitat proposed ACEC. This alternative would present the greatest risk of physical loss or degradation of sage-grouse habitat. Alternative D provides a moderate degree of protection and reduced risk of impacts. The Proposed RMP and Alternative C offer the most protection for greater sage-grouse populations and habitat, and have the most beneficial impacts on maintenance and enhancement of habitat and range-wide connectivity.

Environmental Consequences - Hardscrabble-East Eagle Proposed ACEC

The Hardscrabble-East Eagle proposed ACEC includes 3,400 acres of public lands south and east of the Town of Eagle, Colorado. The ACEC would protect relevant and important special status plant habitat. The Hardscrabble-Mayer Gulch area supports one of the highest known concentrations of Harrington's penstemon occurrences and is considered a core population of this species.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated for the Hardscrabble-East Eagle area under Alternative A. The area would be managed under the following management actions:

- VRM Class II designation for East Eagle; VRM Class III designation for Hardscrabble portion.
- CSU stipulation for sensitive species.
- Open to OHV use on and off roads.
- Available for ROW applications.
- Open for mineral entry (locatable, salable, non-energy leasable).

Alternative A would provide the fewest protective management actions and may result in the greatest adverse impacts on Harrington's penstemon populations and habitat of all alternatives.

Impacts from Visual Resource Management. Under all alternatives, the East Eagle area would be managed with a VRM Class II designation. The Class II designation would provide protection from most surface-disturbing activities that would modify the visual character of the area. This would indirectly protect Harrington's penstemon habitat from loss or fragmentation. VRM designations would provide moderate protection of the relevant and important values within the proposed ACEC.

Under Alternative A, the Hardscrabble area would be designated as VRM Class III. This management class would allow surface disturbances that would create a moderate level of change to the visual character of the landscape. VRM designations under Alternative A would not contribute to the protection of the relevant and important values within the proposed ACEC.

Impacts from Special Status Species Management—Plants. A CSU stipulation for sensitive species would apply to the occupied habitat for Harrington's penstemon under Alternative A. The CSU stipulation may guide where surface-disturbing activities could occur but would be unlikely to prevent disturbance and fragmentation of unoccupied, but potential, habitat. Management of special status plant species under Alternative A would have the greatest risk of adverse impacts on populations and habitat for Harrington's penstemon.

Impacts from Recreation and Visitor Services Management. The Hardscrabble-East Eagle area would not be designated as an SRMA or an ERMA under Alternative A. No focused management would be applied to the area to enhance recreation opportunities or control recreation impacts on other resources.

Current recreational use in the Hardscrabble-Mayer Gulch area is quite high, partially due to the proximity of the area to local communities, and partially because BLM management has promoted mountain biking and OHV opportunities within this landscape. Impacts on Harrington's penstemon could result from a variety of recreation, such as construction of campgrounds and parking lots, camping outside designated areas, hiking, horseback riding, mountain biking, dirt biking, and ATV and OHV use. Impacts include direct mortality from crushing or trampling of plants, direct loss of habitat, soil compaction, and introduction of invasive plant species resulting in degradation of suitable habitat. Any new proposed recreation infrastructure would be subject to site-specific analysis and the CSU stipulation protecting occupied sensitive species habitat. Surface-disturbing activities would be designed to avoid occupied habitat as much as possible, but complete avoidance of occupied habitat may be difficult where populations of Harrington's penstemon are extensive and unoccupied, but potential habitat would not be protected with this stipulation. Surface disturbance and increased traffic associated with the activity would potentially escalate the spread of weeds into occupied habitat and reduce habitat capable of supporting expansion of plant populations.

Recreational use is expected to increase within the East Eagle area, thus exacerbating the impacts on the relevant and important values within the proposed ACEC. The Hardscrabble/East Eagle area would not be designated as an SRMA or an ERMA under Alternative A. No focused management would be applied to the area to enhance recreation opportunities or control recreation impacts on other resources. Impacts from Recreation and Visitor Services Management under Alternative A would be greater than the other alternatives.

Impacts from Comprehensive Trails and Travel Management. Current travel management for the Hardscrabble-East Eagle area is open to OHV use on and off roads. Both motorized and mechanized travel on existing routes and motorized or mechanized travel off of existing routes can impact populations of special status plants. Unregulated off-road use would probably have the greatest impact on populations of Harrington's penstemon, because these activities occur over widespread areas and have not undergone site-specific environmental review and mitigation.

Impacts can include direct mortality through crushing or trampling, dust deposition on plants that may inhibit pollination success or photosynthetic activity, and changes in habitat quality through soil compaction, reduced total vegetation cover, changes in vegetation structure and species composition. The increasing use of OHVs and mountain bikes within the area could also transport noxious weeds and invasive weed seeds from infested areas to uninfested areas. Alternative A would result in the greatest risk of impacts from travel management.

Impacts from Lands and Realty Management. The Hardscrabble-East Eagle area would be available for ROW applications under Alternative A. Lands and realty actions could allow surface disturbances such as pipelines, power lines, roads, and communication site facilities within the area, subject to the CSU stipulation for sensitive plant species. The CSU stipulation may require relocation of the activity outside known populations, but may allow such activities within unoccupied, but potential habitat for Harrington's penstemon. Surface disturbance and increased traffic associated with the activity would potentially escalate the spread of weeds into occupied habitat and limit the potential expansion of Harrington's penstemon. Alternative A would result in the greatest risk of adverse impacts of all the alternatives because the stipulations regulating ROW actions are the least restrictive in this alternative.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, the Hardscrabble-East Eagle area would be open to locatable mineral entry, mineral materials disposal, and leasing of non-energy solid minerals. Mineral material disposals and leasing of non-energy solid minerals would be subject to a CSU stipulation that would provide some protection for Harrington's penstemon populations and their habitat. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would be evaluated on a site-specific basis. A potential action deemed incompatible with management objectives for the area would be denied. Locatable mineral exploration (less than 5 acres of disturbance) would not be subject to existing stipulations or site-specific analysis. The risk of impacts from locatable minerals on the relevant and important values of the Hardscrabble-East Eagle proposed ACEC would be greatest under Alternative A.

Alternative B (Proposed RMP)

VRM designations would remain the same as under current management, and impacts from VRM designations would be the same. Management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, 4,200 acres within the Hardscrabble-East Eagle area would be designated as an ACEC and provided special management attention to protect and enhance Harrington's penstemon populations and habitat. Special management actions and restrictions that would be applied to the ACEC:

- Apply NSO stipulation within 200 meters of occupied habitat for BLM sensitive plants within ACECs (CRVFO-NSO-10).
- Travel limited to designated routes. Routes may be closed or rerouted to protect ACEC values.
- Miles of routes will not increase beyond the baseline of designated routes.
- Designate as a ROW avoidance area.
- Allow prescribed fire and other vegetation treatments if they would maintain or enhance Harrington's penstemon populations and habitat.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials sales, and close to leasing of non-energy solid minerals.

The Proposed RMP and Alternative C would both designate the Hardscrabble-East Eagle proposed ACEC and would apply special management to protect the relevant and important values. Impacts would be virtually the same in both alternatives and would be more beneficial than Alternatives A or D.

Impacts from Special Status Species Management—Plants. Under the Proposed RMP, an NSO stipulation would be applied prohibiting surface-disturbing activities within 200 meters of occupied Harrington's penstemon habitat within ACECs. This would provide substantial protection for Harrington's penstemon from direct impacts as well as from potential indirect impacts, such as loss of potential habitat for population expansion, erosion, and introduction of noxious weeds in the vicinity of occupied habitat. Special status plant species management under the Proposed RMP and Alternative C would be the most beneficial for the relevant and important values. Alternative D would have less benefit by providing a CSU stipulation with a 100-meter buffer, and Alternative A would be the least beneficial of all alternatives.

Impacts from Recreation and Visitor Services Management. The Proposed RMP would designate a Hardscrabble-East Eagle SRMA to manage primarily for mountain biking activities in the eastern half and motorized recreation in the western half. Although the boundary of the SRMA touches both the Hardscrabble and East Eagle portions of the ACEC, none of the SRMA overlaps with the ACEC. Since SRMAs give priority to recreation and associated developments, this would not be considered compatible with ACEC management. Reroutes of unsustainable routes or routes that are impacting Harrington's penstemon may occur, but no additional route mileage would be anticipated within the ACEC. Recreation management under the Proposed RMP would have the fewest adverse impacts on the relevant and important values.

Impacts from Comprehensive Trails and Travel Management. All travel would be limited to designated routes under the Proposed RMP and Alternatives C and D. In the Proposed RMP, several routes impacting habitat for Harrington's penstemon would be closed or rerouted. These actions would benefit populations and habitat for Harrington's penstemon by eliminating cross-country travel, and reducing direct disturbances to populations.

Within the ACEC, miles of routes would not increase beyond the baseline of designated routes limiting further surface disturbances and loss of habitat due to construction of new routes. The Proposed RMP and Alternative C would result in less total disturbance and less impact than Alternatives A or D.

Impacts from Lands and Realty Management. The Hardscrabble-East Eagle ACEC would be managed as a ROW avoidance area. This would limit some surface-disturbing activities, but may not restrict all ROW actions within the ACEC. The NSO stipulation to prohibit surface disturbances within 200 meters of occupied Harrington's penstemon habitat in ACECs would prevent ROW actions within occupied habitat but may not protect unoccupied, but potential habitat. ROW authorizations in potential habitat may limit the ability of Harrington's penstemon populations to expand into new or previously occupied areas. The Proposed RMP would have less adverse impact on the relevant and important values of the Hardscrabble-East Eagle proposed ACEC than under Alternative A.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals under this alternative. No surface disturbances associated with mineral development would occur. The Proposed RMP would have similar impacts to Alternative C, and less adverse impact than under Alternatives A and D.

Alternative C

The Hardscrabble-East Eagle area would be designated as an ACEC in Alternative C, as well as the Proposed RMP. Management prescriptions would be the same as in the Proposed RMP except as described below.

Impacts from Areas of Critical Environmental Concern Management. The Hardscrabble-East Eagle ACEC would be designated under this alternative. Impacts from management of other resources, uses, and special designations would be as follows:

- VRM Class II designation on all acres.
- NSO stipulation for 200 meters around habitat for threatened, endangered, proposed, candidate and BLM sensitive plants (CRV-NSO-19).
- NSO stipulation for core wildlife areas (CRV-NSO-8).
- Designate Hardscrabble/East Eagle ERMA which partially overlaps the ACEC.
- Travel limited to designated routes: all routes designated for mechanized use, except routes closed for resource protection.
- Prohibit net increase in motorized/mechanized routes, with the exception of new administrative routes.
- Designate as ROW avoidance area.

Impacts from Visual Resource Management. The entire ACEC would be designated as VRM Class II to preserve or retain the existing character of the landscape. A CSU stipulation on VRM Class II lands would provide protection from most surface disturbances which would benefit the relevant and important values within the area. Under this alternative, VRM designations would provide the most beneficial impacts on the relevant and important values of the Hardscrabble-East Eagle proposed ACEC.

Impacts from Special Status Species Management—Plants. An NSO stipulation would prohibit surface-disturbing activities within 200 meters of habitat for threatened, endangered, proposed, candidate and BLM sensitive plants species (CRV-NSO-19). This would provide the same protection for both occupied and potential habitat as the Proposed RMP and more than Alternatives A and D. Special status plants management under Alternative C and the Proposed RMP would have the greatest beneficial effect on the relevant and important values within the Hardscrabble-East Eagle ACEC.

Impacts from Terrestrial Wildlife Management. In Alternative C, the East Eagle area and the northern half of the Hardscrabble area would be included in an NSO stipulation prohibiting surface-disturbing activities within big game core wildlife habitat. The NSO stipulation for terrestrial wildlife management may offer additional benefits for Harrington's penstemon by protecting areas of unoccupied, but potential habitat from surface disturbances. This would maintain more connectivity between populations of Harrington's penstemon and protect potential habitat for future population growth. In Alternative C, terrestrial wildlife management would provide the most benefit to the relevant and important values of the ACEC of all alternatives.

Impacts from Recreation and Visitor Services Management. Alternative C would designate a Hardscrabble/East Eagle ERMA, which would overlap the western half of the Hardscrabble and East Eagle portions of the proposed ACEC. ERMAs are managed to support the principal recreational activities and associated qualities and conditions of the ERMA, but management is balanced with the needs of other resources and resource uses. ERMA management decisions would be compatible with other resource objectives. Under ERMA management, fewer new routes or other recreation infrastructure would be constructed (as opposed to SRMAs), and impacts on Harrington's penstemon habitat could be avoided or mitigated during project design. Alternative C would have more impact on the Hardscrabble-East Eagle ACEC than the Proposed RMP, but fewer impacts than Alternatives A or D.

Impacts from Comprehensive Trails and Travel Management. Impacts of travel management in Alternative C would be very similar to the Proposed RMP, except that more motorized routes would be converted to mechanized use. Changing from motorized to mechanized use would limit the total disturbance width of routes and would minimize potential dust deposition impacts on Harrington's penstemon plants. Impacts would be greater than under the Proposed RMP, but less than Alternatives A or D.

Within the ACEC, no net increase in motorized or mechanized routes would be allowed, with the exception of adding new administrative routes or for making routes sustainable, limiting further surface disturbances and loss of habitat due to construction of new routes. The Proposed RMP and Alternative C would result in less total disturbance and less impact than under Alternatives A or D.

Alternative D

Impacts to ACECs from VRM, terrestrial wildlife management, special status plants management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in the Hardscrabble-East Eagle area under Alternative D. The western two-thirds of the proposed ACEC area would be encompassed within the Hardscrabble/East Eagle SRMA RMZ 1. RMZ 1 would focus on

improving mountain biking opportunities and experiences for both local and destination visitors. Management actions that may impact the area include the following:

- CSU stipulation for sensitive species with 100-meter buffer around occupied habitat.
- NSO stipulation on Hardscrabble/East Eagle SRMA.
- Travel limited to designated routes; more mountain biking routes anticipated.
- ROW avoidance on occupied special status species habitat.
- Open for mineral entry.

Impacts of Alternative D would be similar to Alternative A, except that limiting travel to designated routes would result in less adverse impacts on the relevant and important values of the proposed ACEC than in Alternative A.

Impacts from Special Status Species Management—Plants. As under Alternative A, a CSU stipulation would apply to occupied habitat for special status plants. In this alternative, the CSU stipulation would include a 100-meter buffer around occupied habitat. This wider buffer may protect more habitat and allow greater flexibility in locating projects. Impacts would be slightly more beneficial than Alternative A.

Impacts from Recreation and Visitor Services Management. The Hardscrabble/East Eagle SRMA would be designated under Alternative D. The portion of the SRMA that overlaps with the proposed ACEC would be managed as RMZ 1. Recreation activities in RMZ 1 would focus on improving mountain biking opportunities and experiences for both local and destination visitors. Management of the area as an SRMA for destination visitors would probably attract more visitors to the Hardscrabble area. A system of designated single-track mountain biking and hiking trails has been created, but 12 to 14 more miles of trails would probably be constructed to eliminate trespass concerns and create additional riding opportunities for a variety of ability levels. New trail alignments would be determined during a site-specific analysis and would be subject to the CSU stipulation on occupied Harrington's penstemon habitat. Trails would be designed to avoid occupied habitat as much as possible, but complete avoidance of occupied habitat may be difficult where populations of Harrington's penstemon are extensive. Construction of new trails may result in direct mortality of individuals, loss of potential habitat, habitat fragmentation, and degradation of habitat through noxious weed invasion. Recreation management activities under Alternative D would have a greater risk of adverse impacts on the relevant and important values within the ACEC than under the other alternatives.

Impacts from Comprehensive Trails and Travel Management. As under the Proposed RMP and Alternative C, travel within the Hardscrabble-Mayer Gulch proposed ACEC would be limited to designated routes. The routes that were converted from full-sized vehicles to mechanized routes in the Proposed RMP would retain the same designation under Alternative D. As mentioned above, the total number of trails is likely to increase in this alternative. Potential adverse impacts on Harrington's penstemon habitat would be less than under Alternative A, but greater than under Alternatives C and B.

Impacts from Lands and Realty Management. Occupied special status species habitat would be managed as a ROW avoidance area. This would limit some surface-disturbing activities, but may not restrict all ROW actions. A CSU stipulation for sensitive plant species may require relocation of the activity outside occupied Harrington's penstemon habitat, but may allow such activities within unoccupied, but potential habitat.

Surface disturbance and increased traffic associated with the activity would potentially escalate the spread of weeds into occupied habitat, contribute to habitat fragmentation and reduce habitat capable of supporting expansion of plant populations. Alternative D would have less adverse impacts than under Alternative A, but more than under the Proposed RMP and Alternative C.

Summary

The Proposed RMP would provide the most beneficial effects on the relevant and important values of the proposed ACEC, followed in order by Alternatives C and D. Alternative A would result in the greatest risk of impacts to the resource values.

Environmental Consequences - Lower Colorado River ACEC

The Lower Colorado River ACEC encompasses lands along the Colorado River between Rifle and DeBeque, Colorado. The public lands along this segment of the river are small, isolated tracts totaling only 130 acres. The relevant and important values are the area's riparian habitat, which supports a variety of wildlife including bald eagles, great blue herons, waterfowl, and two endangered fish species (the Colorado pikeminnow and razorback sucker).

Alternative A

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, the Lower Colorado River would continue to be designated as an ACEC. The ACEC, as originally proposed, includes over 9,000 acres along the river from New Castle to DeBeque, but only 130 acres of this area is public land. The ACEC would be managed under the following prescriptions:

- VRM Class II designations.
- Designated as sensitive for utility and communication facilities.

The VRM designations and realty management would allow few surface-disturbing activities within the ACEC. However, given that this ACEC is composed mostly of small, isolated tracts of public land along the Colorado River, BLM management cannot effectively protect the riparian habitat from surface-disturbing activities and other actions with the potential to reduce the quality, quantity, or connectivity of the habitat.

Impacts from Water Resources Management. Management actions for water resources management under all alternatives include an NSO stipulation prohibiting surface-disturbing activities within 0.5 mile on both sides of major river corridors (including the Colorado River). This stipulation provides protection for riparian values and wildlife habitat along the river corridor and would include all the public land within this ACEC. Impacts from water resources management would benefit the relevant and important values and would be the same throughout all alternatives.

Impacts from Visual Resource Management. Management for the Lower Colorado River ACEC includes designating the area as VRM Class II to preserve or retain the existing character of the landscape. VRM Class II areas are protected with a CSU stipulation that would allow relocation of surface-disturbing activities beyond 200 meters to protect visual values. The VRM class designation would remain the same throughout all alternatives, even in the absence of the ACEC designation. Impacts would be beneficial to the relevant and important values and would be the same throughout all alternatives.

Impacts from Lands and Realty Management. The Lower Colorado River ACEC would be managed as a sensitive zone for utility and communication facilities. Facilities would not be placed within the ACEC unless no feasible alternatives could be found and mitigation could be applied that would minimize impacts on the relevant and important values. The NSO stipulation to protect major river corridors would preclude most realty actions, except perhaps temporary disturbances such as pipelines. Due to the NSO stipulation on major river corridors in all alternatives, few realty actions would be allowed and impacts would be the same across all alternatives.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). All public land parcels adjacent to the Colorado River from New Castle to DeBeque have already been leased for oil and gas. Most of these leases were issued before the current stipulation for major river corridors was developed. Although the NSO stipulation for major river corridors would not apply to these leases, COAs may be attached to APDs that could minimize impacts on the relevant and important values by avoiding riparian vegetation or screening activities to reduce disturbance to wildlife. Fluid minerals leasing would potentially have adverse impacts on the relevant and important values and would be the same across all alternatives.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Lower Colorado River ACEC would not be recommended for withdrawal from mineral location, closed to mineral materials disposal, or made unavailable for leasing of non-energy solid minerals. Surface disturbances associated with these actions could result in degradation of riparian habitat and human activity in the area may disrupt and displace wildlife. Locatable mineral exploration and development would be allowed under the General Mining Law. Within a designated ACEC, federal regulations require that a plan of operations be submitted for any operations causing surface disturbances greater than casual use. This regulation would help mitigate the impacts of mining exploration and development on the relevant and important values with the ACEC, but may not completely avoid all impacts associated with the activities. Potential adverse impacts would be the same in all alternatives.

Mineral material disposals and leasing of non-energy solid minerals are discretionary actions. Any potential action deemed incompatible with protection of the relevant and important values would be denied.

Alternatives B (Proposed RMP), C, and D

Impacts to ACECs from VRM, lands and realty management, fluid minerals management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP and Alternatives C and D, no ACEC would be designated. Public lands along the Lower Colorado River would continue to be covered by an NSO stipulation to prohibit surface-disturbing activities within 0.5 mile of either side of major rivers.

Impacts from Water Resources Management. Under all alternatives, management for water resources would include an NSO stipulation to prohibit surface-disturbing activities within 0.5 mile of either side of the Colorado River. Although protections for riparian vegetation, fisheries, and wildlife habitat would also apply

to the area, the management of water resources would provide the largest area of protection for the relevant and important values.

Summary

Impacts on the relevant and important values within the Lower Colorado River corridor would be the same or similar across all alternatives.

Environmental Consequences - Lyons Gulch Proposed ACEC

The Lyons Gulch proposed ACEC is located north of Deep Creek and west of the Colorado River. This proposed ACEC encompasses over 400 acres along a ridge at the head of Lyons Gulch. The ACEC would protect relevant and important special status plant habitat. The Lyons Gulch area includes a high quality, undisturbed occurrence of Harrington's penstemon and is considered a core population of this species.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated within the Lyons Gulch area under Alternative A. Lands within the proposed ACEC area would be managed under the current management plan, which includes the following:

- Designate as VRM Classes II and IV.
- CSU stipulation for sensitive plant species (GS-CSU-3).
- Open to motorized travel on and off roads; all existing roads open to full-sized vehicles.
- Available for ROW applications.
- Open for mineral entry (locatable, salable, non-energy leasable).

Management under Alternative A would provide minimal protection for the relevant and important values of the proposed ACEC, and would have greater risk of adverse impacts than the other alternatives.

Impacts from Visual Resource Management. Approximately 30 percent of the Lyons Gulch area would be designated as VRM Class II and the remaining 70 percent would be designated as VRM Class IV in all alternatives. This management class would allow surface disturbances that result in major modification of the visual character of the landscape within most of the proposed ACEC. Surface disturbances could lead to direct mortality of Harrington's penstemon plants, or loss, degradation, or fragmentation of habitat. VRM designations under Alternative A would not contribute to the protection of the relevant and important values associated with the proposed ACEC.

Impacts from Special Status Species Management—Plants. A CSU stipulation for sensitive species would apply to the occupied habitat for Harrington's penstemon. The CSU stipulation would guide where surface-disturbing activities could occur, so direct impacts to occupied habitat generally would be avoidable. However, the CSU stipulation would be unlikely to prevent disturbance and fragmentation of unoccupied, but potential habitat. Management of special status plant species under Alternative A would have the greatest risk of adverse impacts on populations and habitat for Harrington's penstemon.

Impacts from Comprehensive Trails and Travel Management. Travel management within the Lyons Gulch proposed ACEC would be open to OHV use on and off roads under Alternative A. All existing roads

within the proposed ACEC would continue to be open to full-sized vehicles although the lack of public access would limit the amount of use on these routes. Cross-country travel in open areas can result in the creation of new unplanned routes. Impacts from roads and other routes in proximity to Harrington's penstemon habitat can include direct mortality through crushing or trampling, dust deposition on plants that may inhibit pollination success or photosynthetic activity, and changes in habitat quality through soil compaction, reduced total vegetation cover, changes in vegetation structure and species composition. Vehicle, horse, and foot traffic can escalate the spread of noxious weeds, thereby increasing competition for nutrients and water, and limiting potential expansion of Harrington's penstemon. The routes within the Lyons Gulch proposed ACEC have no public access, which would limit the amount of use and minimize the potential impacts of the current travel management designations. Alternative A would potentially result in the greatest impacts on relevant and important values of all alternatives.

Impacts from Lands and Realty Management. The Lyons Gulch area would be available for ROW applications under Alternative A. Lands and realty actions could allow surface disturbances such as pipelines, power lines, roads, and communication site facilities within the Lyons Gulch proposed ACEC, subject to the CSU stipulation for sensitive plant species. The CSU stipulation may require relocation of the activity outside known populations, but may allow such activities within unoccupied, but potential habitat for Harrington's penstemon. Surface disturbance and increased traffic associated with the ROW activity would potentially spread weeds into occupied habitat and limit the potential expansion of Harrington's penstemon. Alternative A would result in greater risk of adverse impacts than under the other alternatives because the stipulations regulating ROW actions are the least restrictive in this alternative.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternatives A and D, the Lyons Gulch area would be open to locatable mineral entry, mineral materials disposal, and leasing of non-energy solid minerals. Mineral material disposals and leasing of non-energy solid minerals would be subject to a CSU stipulation that would provide some protection for Harrington's penstemon populations and their habitat. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would not be approved in areas of high resource value. Disturbances less than 5 acres in size from locatable mineral exploration and development would not be subject to existing stipulations or site-specific analysis. Alternatives A and D present a greater risk of impacts from locatable minerals on the relevant and important values of the proposed ACEC than under the Proposed RMP and Alternative C.

Alternative B (Proposed RMP)

Impacts from VRM would be the same as Alternative A. Impacts under this alternative from management actions for other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, the Lyons Gulch area would be designated as an ACEC and special management prescriptions would be applied to protect the relevant and important values. These would include the following:

- Apply NSO stipulation within 200 meters of BLM sensitive plant habitat within ACECs (CRVFO-NSO-10).
- Designate as VRM Classes II and IV.
- Limit travel to designated routes, foot/horse use only; closed to over-the-snow travel.

- Miles of routes will not increase beyond baseline of designated routes.
- Designate as ROW avoidance area.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials disposal and leasing of non-energy solid minerals.
- Allow planned and unplanned fire and other vegetation treatments if they maintain or enhance Harrington's penstemon populations and habitat.

Lyons Gulch proposed ACEC would be designated in both the Proposed RMP and Alternative C, and management would be nearly identical. These alternatives would provide more benefit for the protection and enhancement of Harrington's penstemon habitat than Alternatives A or D. The approximate 100-acre reduction in size from Alternative C involves the removal of private lands from the total acreage included in the ACEC.

Impacts from Vegetation Management – General. Vegetation treatments would be allowed within the ACEC only if they maintained or enhanced populations and habitat for Harrington's penstemon. Harrington's penstemon prefers habitat with a moderate density of sagebrush, little or no woodland canopy cover, and a moderate, diverse cover of native grasses and forbs. In general, treatments to remove pinyon-juniper trees would improve Harrington's penstemon habitat in the long-term but may cause a loss of individual plants in the short-term. Treatments that result in the elimination of shrub cover or create a dense cover of grasses would not likely benefit the species. The Proposed RMP and Alternative C would provide more benefit for the protection of the relevant and important values of the Lyons Gulch proposed ACEC than Alternatives A or D.

Impacts from Special Status Species Management—Plants. In the Proposed RMP, the CSU stipulation for sensitive plant species would be replaced with an NSO stipulation prohibiting surface-disturbing activities within 200 meters of occupied Harrington's penstemon habitat within ACECs. This would provide substantial protection for Harrington's penstemon from potential indirect impacts such as loss of potential habitat for population growth, erosion, and introduction of noxious weeds in the vicinity of occupied habitat. Special status plants management under the Proposed RMP would be more beneficial for the relevant and important values than under Alternatives A and D, and the same as Alternative C.

The NSO stipulation would prohibit surface-disturbing activities that would have adverse impacts within Harrington's penstemon habitat while allowing flexibility to implement vegetation treatments or other actions that would enhance habitat. The Proposed RMP and Alternative C would provide the most protection for the relevant and important values of the Lyons Gulch proposed ACEC of any of the alternatives.

Impacts from Comprehensive Trails and Travel Management. All travel would be limited to designated routes and would be restricted to foot and equestrian use only under the Proposed RMP and Alternatives C and D. These limitations would provide additional benefits for populations and habitat for Harrington's penstemon by eliminating impacts associated with cross-country travel and the creation of new unplanned routes.

Within the ACEC miles of routes would not increase beyond the baseline of designated routes, which would prevent further surface disturbances and loss of habitat due to construction of new routes. The Proposed

RMP and Alternatives C and D would potentially result in less total disturbance and more benefit to the protection of the relevant and important values than under Alternative A.

Impacts from Lands and Realty Management. Under the Proposed RMP, Lyons Gulch ACEC would be managed as a ROW avoidance area. This may not restrict all ROW actions; however, occupied and adjacent suitable habitat for Harrington's penstemon habitat within the ACEC would be protected with an NSO stipulation. Impacts on the relevant and important values would be less than under Alternative A, and the same as or similar to Alternatives C and D.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals under the Proposed RMP and Alternative C. No surface disturbances associated with mineral development would occur. The Proposed RMP and Alternative C would have less adverse impact on the relevant and important values of the Lyons Gulch proposed ACEC than under Alternatives A and D.

Alternative C

Impacts under this alternative from management actions for resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Lyons Gulch proposed ACEC would be designated an ACEC under Alternative C. The same special management prescriptions would be applied to protect the relevant and important values as in the Proposed RMP. Impacts would be the same as the Proposed RMP. Under Alternative C, the ACEC is approximately 500 acres but this includes private property that was mapped with the BLM lands.

Alternative D

Impacts from VRM and locatable, salable, and non-energy leasable minerals management would be the same as Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in the Lyons Gulch area under Alternative D. Management actions that would apply to the area would include the following:

- VRM Classes II and IV designations.
- CSU stipulation within 100 meters of occupied habitat for sensitive plant species.
- Travel limited to designated routes; foot and horse use only.
- ROW avoidance for special status species occupied habitat.
- Open for mineral entry (locatable, salable, non-energy leasable).

Adverse impacts in Alternative D would be greater than the Proposed RMP and Alternative C, but less than Alternative A.

Impacts from Special Status Species Management—Plants. Impacts would be the same as or similar to Alternative A. Occupied habitat for Harrington's penstemon would be protected with a CSU stipulation with a 100-meter buffer. This may afford slightly more protection than Alternative A in that the larger buffer may keep disturbance farther away from plants.

Impacts from Comprehensive Trails and Travel Management. Travel within the Lyons Gulch area would be limited to designated routes and all existing roads would be designated for foot and equestrian use only. None of the routes in the Lyons Gulch area has public access, so administrative traffic would generally be limited to adjacent landowners and permittees. Impacts on Harrington's penstemon populations and habitat would be similar to the Proposed RMP and Alternative C.

Impacts from Lands and Realty Management. Occupied habitat for special status plants would be managed as a ROW avoidance area under Alternative D. Although the ROW avoidance does not preclude all ROW development, it would limit surface disturbances and give priority consideration to protecting special status species habitat. Impacts on Harrington's penstemon in ROW avoidance areas would be less than in areas open for ROW development. Impacts on Harrington's penstemon occupied and potential habitat would be greater than under the Proposed RMP and Alternative C, in which the entire ACEC is a ROW avoidance area; however, impacts would be less than in Alternative A, in which the Lyons Gulch area would be open for ROW development.

Summary

The Proposed RMP and Alternative C would provide the most beneficial effects on the relevant and important values of the Lyons Gulch proposed ACEC, followed in order by Alternatives D and A.

Environmental Consequences - McCoy Fan Delta Proposed ACEC

The McCoy Fan Delta proposed ACEC totals 1,500 acres (220 acres in Alternative C) located north of the Colorado River and west of McCoy, Colorado. The ACEC would protect relevant and important geologic values associated with fluvial and marine depositional events that occurred along the western margin of the Ancestral Front Range. The McCoy fan deltas are among the most exposed deltaic deposits in the Rocky Mountains and allow for study and observation of the paleontological resources. Marine deposits in the area include fossils of invertebrates, vertebrates, and plants.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in the McCoy Fan Delta under Alternative A. The following management actions would apply to the area:

- NSO stipulation for major river corridors (lower half of area) (GS-NSO-3).
- VRM Class II designation.
- Open to motorized travel on and off roads; all existing roads open to full-sized vehicles.
- Available for ROW applications.
- Open for mineral entry (locatable, salable, non-energy leasable).

Of all the alternatives, Alternative A would have the fewest protections for the relevant and important values and would allow the most ground-disturbing activities. Alternative A would have the most risk of adverse impacts on the relevant and important values within the McCoy Fan Delta proposed ACEC.

Impacts from Water Resources Management. Management actions for water resources management under all alternatives include an NSO stipulation prohibiting surface-disturbing activities within 0.5 mile on both sides of major river corridors. This NSO stipulation would apply to the Colorado River, which flows near the southern border of the proposed ACEC. The 0.5-mile buffer would overlap the southern half of the McCoy Fan Delta. This stipulation may afford some indirect protection for the relevant and important values within the proposed ACEC. However it is unclear whether this stipulation would be applied within the proposed ACEC since the McCoy Fan Delta is across the County Road from the Colorado River and has no riparian vegetation. Impacts from water resource management would be the same in all alternatives.

Impacts from Visual Resource Management. The McCoy Fan Delta would be designated as VRM Class II in all alternatives. VRM Class II designation would result in protections from most surface-disturbing activities that would modify the landscape and impact the geologic and paleontological values of the area. The VRM Class II designation would benefit the relevant and important values within the proposed ACEC.

Impacts from Recreation and Visitor Services Management. The McCoy Fan Delta is currently part of the Glenwood Springs ERMA. ERMAs generally receive only custodial management and recreational use is anticipated to be mostly dispersed use. Within the past decade, the McCoy Fan Delta has become a popular area for dirt-bike riding and OHV use. Roads and trails have been pioneered throughout much of the proposed ACEC. This unplanned trail system has created surface disturbances that could degrade the geologic value of the formation and result in loss of paleontological resources. Visitor use is expected to increase in the area, with proportional increases in impacts. R&VS management under Alternative A would result in the most adverse impacts on the relevant and important values.

Impacts from Comprehensive Trails and Travel Management. Travel management for the McCoy Fan Delta proposed ACEC would allow OHV use on and off roads. A network of OHV and single-track routes has already been pioneered in the area. Cross-country travel in open travel areas would continue to result in the creation of new unplanned routes. Roads and other routes create surface disturbances that may result in soil erosion, damage to surface geologic features, visual scarring, and exposure and potential loss of paleontological resources. Alternative A would result in the most adverse impacts from travel management.

Impacts from Lands and Realty Management. The McCoy Fan Delta proposed ACEC would be available for ROW applications under Alternative A, subject to the VRM Class II constraints. Ground-disturbing ROW actions have the potential to create soil erosion and alter the geologic features of the proposed ACEC and may destroy invertebrate and vertebrate fossil resources. Alternative A would have the greatest risk of impacts from lands and realty actions of all alternatives.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The McCoy Fan Delta would not be withdrawn from mineral entry under Alternatives A or D. Mineral material disposals and leasing of non-energy solid minerals would be subject to site-specific environmental review and any stipulations that apply to the landscape. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would not be approved in areas of high resource value. Locatable mineral exploration and development would not be subject to existing stipulations

and actions that disturb less than 5 acres would not be required to file a mining plan with BLM. Alternatives A and D may result in damage or destruction of the relevant and important values of the proposed ACEC. The McCoy Fan Delta would be recommended for withdrawal from locatable mineral entry in the Proposed RMP and Alternative C, which would provide greater protection for geologic and paleontological resources.

Alternative B (Proposed RMP)

Impacts from water resources management and VRM would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The McCoy Fan Delta area would be designated as a 1,500 acre ACEC in this alternative. This alternative would designate a substantially larger ACEC boundary than in Alternative C, and would encompass and protect significantly more paleontogical resource values. Special management prescriptions to be applied to conserve the relevant and important values within the proposed ACEC would be as follows:

- Apply NSO stipulation on all acres (CRVFO-NSO-28).
- Designate as VRM Class II.
- Designate Upper Colorado River SRMA which overlaps 800 acres of the ACEC; apply NSO stipulation (CRVFO-NSO-25).
- Limit travel to designated routes, close or obliterate certain routes, reroute others to protect resources. No increase beyond baseline of designated routes. If routes were relocated to protect ACEC values, similar route mileage will be accommodated contiguous to the trail network but outside the ACEC.
- Designate as ROW avoidance area on all acres.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials disposal and leasing of non-energy solid minerals.
- Close the ACEC to fossil collection except as authorized for scientific research.
- Close to commercial timber harvest, firewood cutting, and special forest product harvest.

Impacts from Recreation and Visitor Services Management. The Upper Colorado River would be managed as an SRMA under the Proposed RMP and Alternatives C and D. The SRMA would encompass 800 acres (Proposed RMP) or 160 acres (Alternative C) of the McCoy Fan Delta proposed ACEC. The objective of the SRMA would be to enhance river-related recreation opportunities, although less infrastructure would be developed in the Proposed RMP and Alternative C, than in D. An NSO stipulation (CRVFO-NSO-25, CRV-NSO-46) would protect the recreational setting of the SRMA from surface disturbances, which would also protect the proposed ACEC from surface disturbance related to non-recreational activities. Recreation management actions under the Proposed RMP and Alternative C would have fewer adverse impacts on the geologic and paleontological resources than under Alternative A.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, all travel would be limited to designated routes and miles of routes would not increase beyond the baseline of designated routes. Certain routes would be closed or obliterated to protect resource values and some routes would be managed for foot and horse use only. Limiting travel to designated routes would prevent the surface

disturbances associated with cross-country travel, if the designation is properly enforced. Managing the bulk of the area for motorcycle use may limit total width of routes; however, existing two-track routes may not narrow over time unless the routes are actively reclaimed. The Proposed RMP would have less adverse impact on the relevant and important values than under Alternatives A or D, and the same impacts as Alternative C.

Alternative C

Impacts from water resources management, VRM, R&VS management, and lands and realty management would be the same as or similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, 220 acres of the McCoy Fan Delta area would be designated as an ACEC to protect the unique geologic features and paleontological resources. Substantial paleontogical resources would fall outside the boundary of this ACEC and would not be afforded the special management protections of the ACEC. Management that would apply within the ACEC includes the following:

- Apply NSO stipulation on all acres (CRV-NSO-49).
- Designate as VRM Class II.
- Limit travel to designated routes; close or obliterate certain routes to protect resource values.
- Designate as ROW avoidance area on all acres.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials disposal and leasing of non-energy solid mineral.
- Close to invertebrate and vertebrate fossil collection.

The management prescriptions under Alternative C would provide the similar benefits for the maintenance of the relevant and important values associated with this proposed ACEC as in the Proposed RMP, but the management would apply to fewer acres and would not protect many important paleontological resources.

Impacts from Comprehensive Trails and Travel Management. All travel would be limited to designated routes under Alternative C, and no increase in miles of routes would be allowed. Most routes would be classified for motorized use, but certain routes would be closed and reclaimed to protect relevant and important values. Limiting travel to designated routes would prevent the surface disturbances associated with cross-country travel, if the designation is properly enforced. Closing and reclaiming some routes would establish vegetation and help prevent soil erosion that adversely affects geologic and paleontological resources. This would have a beneficial effect on maintaining the relevant and important resource values of the proposed ACEC. Alternative C would have the second-least adverse impact on the relevant and important values of all alternatives.

Alternative D

No ACEC would be designated at the McCoy Fan Delta under Alternative D. Management that would apply to the area would be similar to Alternative A, and impacts would be similar to Alternative A.

Summary

The Proposed RMP would result in the most benefit for the protection of the relevant and important values within the McCoy Fan Delta proposed ACEC, followed by Alternative C. Alternatives A and D would have the least benefit for the values within the proposed ACEC.

Environmental Consequences - Mount Logan Foothills Proposed ACEC

The Mount Logan Foothills proposed ACEC is an area northeast of the Town of DeBeque, Colorado, where several threatened and BLM sensitive plant species are concentrated. The proposed ACEC includes 4,000 acres of public lands within the CRVFO. The proposed ACEC includes all of the known occurrences of DeBeque phacelia and Naturita milkvetch within the CRVFO, nearly all of the known occurrences of the Colorado hookless cactus within the CRVFO, and small suboccurrences of Parachute penstemon, Roan Cliffs blazing star, and Cathedral Bluffs meadowrue.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. The Mount Logan Foothills proposed ACEC would not be designated under Alternative A. Lands within this proposed ACEC would be managed under the current management plan restrictions and uses. These include the following:

- VRM Class II designation across most of area; VRM Class III designation immediately adjacent to Interstate 70.
- NSO stipulation for occupied threatened, endangered, and candidate species habitat (GS-NSO-12).
- CSU stipulation for occupied sensitive species habitat (GS-CSU-3).
- Open for livestock grazing.
- Open for vehicle use on and off roads.
- Available for ROW applications.
- Open for mineral entry.
- A total of 3,100 acres (79 percent) currently leased for oil and gas and being developed. Approximately one-half of the leases had an NSO stipulation for threatened & endangered plants attached.
- Section 7 consultation with USFWS required for actions that may affect any of the federally listed plant species.

Of all the alternatives, Alternative A would result in the least protection for the relevant and important values.

Impacts from Visual Resource Management. Most of the Mount Logan Foothills proposed ACEC falls within VRM Class II designation, except the portion next to Interstate 70, which is designated Class III. The Class II designation would benefit special status species habitat by limiting potential surface disturbances within occupied habitat but would not necessarily preclude all surface-disturbing activities within potential but currently unoccupied habitat. VRM Class III designation would allow surface disturbances that would moderately modify the visual character of the landscape. VRM designations would have some beneficial impacts on special status species but would provide less protection than under Alternative C, which would designate all acres within the proposed ACEC as VRM Class II.

Impacts from Special Status Species Management – Plants. Occupied habitat for federally listed, proposed, or candidate plant species would be protected with an NSO stipulation. Occupied habitat for BLM sensitive species would be protected by a CSU stipulation. The NSO stipulation would generally protect the Colorado hookless cactus, DeBeque phacelia and Parachute penstemon populations from direct impacts of surface-disturbing activities but would not protect currently unoccupied, but potential habitat for these species. The CSU stipulation would provide some protection for the BLM sensitive plants but would not apply to potential habitat, and would not prevent overall habitat fragmentation. Neither of these stipulations would apply to existing oil and gas leases if they were issued without an NSO or CSU stipulation attached. Section 7 consultation under the ESA would be required for surface-disturbing actions that may affect listed species.

Impacts from Livestock Grazing Management. The Mount Logan Foothills proposed ACEC encompasses two grazing allotments: County Line and Smith Gulch. Under Alternative A, these allotments would be open to livestock grazing. Grazing can cause direct mortality of plants through herbivory or trampling. Indirect impacts could include loss of vegetation cover, changes in species composition, introduction or expansion of weeds, and soil erosion or compaction, all of which would degrade habitat quality for the special status plants.

The Rifle-West Watershed Land Health Assessment, conducted in 2004 (BLM 2005c), determined that neither the County Line allotment nor the Smith Gulch allotment was meeting the Standards for Public Land Health. Livestock grazing management within the County Line allotment was a significant contributing factor in the failure to meet Land Health Standards. The Smith Gulch allotment had not been grazed for a number of years, so current livestock grazing was not contributing to land health conditions. In 2008, the County Line allotment was placed under a temporary deferral of grazing for vegetation recovery. If grazing resumes in this allotment, changes in livestock grazing management would be implemented to move towards meeting Land Health Standards.

Impacts from Comprehensive Trails and Travel Management. Travel management within the Mount Logan Foothills proposed ACEC would be open to OHV use on and off roads, and all existing routes would be open to full-sized vehicles. Cross-country travel in open travel areas may lead to the creation of new unplanned routes. In addition, twelve known special status plant sites are within 200 meters of an existing road. Roads and other routes create surface disturbances that damage or destroy vegetation, including special status plants, provide vectors for noxious weed invasion, contribute to dust deposition and sedimentation, and lead to loss or degradation of habitat for special status plants and their pollinators. Alternative A would result in the most adverse impacts from travel management.

Impacts from Lands and Realty Management. The Mount Logan Foothills proposed ACEC would be available for ROW applications under Alternative A, subject to the VRM Class II constraints and restrictions on special status plant-occupied habitat. Lands and realty actions could allow surface disturbances such as pipelines, power lines, roads, and communication site facilities. Surface disturbance and increased traffic associated with the ROW activity would reduce habitat capable of supporting expansion of plant populations. Surface-disturbing activities have the potential to introduce or escalate noxious weed invasions, which would degrade habitat suitable for supporting special status plants. Noxious weeds such as cheatgrass are extremely difficult to eradicate once they become established and have the potential to completely dominate the site and outcompete special status plants. Lands and realty actions under Alternative A may have an adverse impact on the relevant and important values of the proposed ACEC.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Nearly 80 percent of the Mount Logan Foothills proposed ACEC has already been leased for oil and gas and is undergoing development. Approximately 40 percent of the known habitat for special status plants within the proposed ACEC was leased without an NSO or CSU stipulation attached. These leases were issued under the standard terms and conditions. The BLM can develop COAs on APDs or voluntary mitigation, such as fencing of special status plants within the vicinity of surface-disturbing activities, to reduce impacts on special status species. However, the COAs and voluntary mitigation are likely to be less protective than if a stipulation were placed on the lease.

Direct impacts associated with mineral development and seismic explorations could include mortality of special status plants from crushing, loss of habitat or adverse modification of habitat through loss of vegetation, changes in species composition and invasion by noxious weeds, and disturbance to habitat of the species' pollinators. Construction and operation of facilities expand current roadway systems and increase both traffic and visitation to otherwise remote areas. Increased traffic could result in increased mortality of special status plants from crushing, soil compaction, and poaching by illegal collectors. Dust associated with increased soil disturbance and vehicular traffic within special status plant habitat can reduce the photosynthetic activity of plants and reduce pollination success. In the long term, this may reduce seed productivity and recruitment of young special status plants needed to replace mortality due to senescence.

In addition to direct human-caused mortality, special status species could also be affected through exposure to chemical spills or other sources of contaminants. Indirect impacts include weed introduction, weed spread, sedimentation, and erosion associated with construction of infrastructure and use of access roads. Fluid mineral development would fragment habitats and could degrade or eliminate potentially suitable habitat for special status plants.

Reclamation of temporary disturbances and weed control measures which are required for fluid mineral actions would help reduce, but not eliminate, impacts. Reclamation, particularly in salt desert shrub communities or in areas of poor soils where these plants often occur, has been only marginally successful. Noxious weeds such as cheatgrass are extremely difficult to eradicate once they become established and have the potential to completely dominate a site and outcompete special status plants.

Under all alternatives, fluid minerals management may result in adverse impacts on the special status plant species that occupy the Mount Logan Foothills proposed ACEC. Alternative A would have the greatest risk of adverse direct and indirect impacts since potential habitat that is not currently occupied or has not been surveyed could be leased without any protective stipulations.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Lands within the Mount Logan Foothills area would not be withdrawn from mineral entry under Alternatives A or D. Mineral material disposals and leasing of non-energy solid minerals would be subject to site-specific environmental review and stipulations that may apply to the landscape. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would not be approved in areas of high resource value. Locatable mineral exploration and development would not be subject to existing stipulations and actions that disturb less than 5 acres would not be required to file a mining plan with BLM. Alternatives A and D would have a greater risk of impacts on the special status plants within the Mount Logan Foothills proposed ACEC than under the Proposed RMP or Alternative C.

Alternative B (Proposed RMP)

Impacts to ACECs from VRM and fluid minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. A 4,000-acre ACEC would be designated in the Mount Logan Foothills area under the Proposed RMP. Management actions that would apply to the area include the following:

- NSO stipulation on all acres within the ACEC (CRVFO-NSO-28).
- Close County Line allotment and occupied habitat within Smith Gulch allotment to livestock grazing under the Proposed RMP and Alternatives C and D.
- Travel limited to designated routes; all routes not currently used for access to oil and gas facilities would be closed if directly impacting special status plant habitat or limited to pedestrian and equestrian use.
- Designate as ROW avoidance area.
- Recommend for withdrawal from mineral location, close to mineral materials sales, close to non-energy solid minerals leasing.

The Proposed RMP would provide more benefit for the protection of the relevant and important values than under Alternatives A or D, and similar benefit as in Alternative C.

Impacts from Special Status Species Management—Plants. The existing NSO stipulation for federally listed, proposed, and candidate threatened or endangered species would be extended to include a 200-meter buffer around occupied threatened, endangered, proposed, and candidate plant species habitat. The new NSO stipulation would apply to Colorado hookless cactus, DeBeque phacelia, and Parachute penstemon populations. The existing CSU stipulation for sensitive plant species would be replaced with an NSO stipulation prohibiting surface-disturbing activities within 200 meters of occupied sensitive plant habitat within ACECs. This NSO stipulation would apply to populations of Naturita milkvetch, Roan Cliffs blazing star, and Cathedral Bluffs meadowrue. These new stipulations would provide greater protection for both occupied and potential habitat, as well as habitat for pollinators than under Alternatives A and D, however, the NSO stipulation on all acres within the ACEC would provide even broader protection. Special status plants management under the Proposed RMP and Alternative C would be more beneficial for the relevant and important values than under Alternatives A and D.

Impacts from Livestock Grazing Management. The two allotments within the ACEC would be closed to livestock grazing under the Proposed RMP. Closing the allotment would have generally positive impacts on special status plant habitat by decreasing the risk of trampling or browsing damage or adverse changes in habitat conditions. However, the County Line allotment and portions of the Smith Gulch allotment are heavily infested with cheatgrass, and removing livestock grazing alone may not be sufficient to restore the native plant community to desired conditions. Additional vegetation treatments may be needed to improve habitat for special status plants. There would be no impacts from grazing on the relevant and important values within the proposed ACEC.

Impacts from Comprehensive Trails and Travel Management. All travel would be limited to designated routes and, under the Proposed RMP, all routes not currently used for access to oil and gas facilities would be closed if they were directly impacting special status plant habitat or would be designated for pedestrian and equestrian use only. Special status plants would benefit from the elimination of cross-country travel and the proliferation of new unplanned routes. Closing routes not needed for oil and gas access to motorized and mechanized use would minimize dust impacts, transport of noxious weeds to uninfested sites, overall surface disturbance, and habitat fragmentation. The Proposed RMP would cause less adverse impacts from travel management than under Alternative A.

Impacts from Lands and Realty Management. The Mount Logan Foothills proposed ACEC would be designated as an avoidance area for ROW actions under the Proposed RMP and Alternative C. This would limit most surface-disturbing activities, especially within occupied habitat, but may not restrict all ROW actions in unoccupied but potential habitat. Surface-disturbing activities within potential habitat for special status plants would reduce habitat capable of supporting expansion of plant populations. Lands and realty management actions under the Proposed RMP and Alternative D would have less adverse impacts than under Alternative A.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals under this alternative. No surface disturbances associated with mineral development would occur. Alternative C would have less adverse impact on the relevant and important values of the Mount Logan Foothills proposed ACEC than the other alternatives.

Alternative C

Impacts to the Mount Logan Foothills proposed ACEC from fluid minerals, livestock grazing, comprehensive trails and travel management, lands and realty, and locatable minerals, salable minerals, and non-energy leasable minerals would be the same as or similar to the Proposed RMP.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, the Mount Logan Foothills proposed ACEC would receive ACEC designation. Special management prescriptions would be applied to protect and enhance the relevant and important values. These would include the following:

- NSO stipulation for 200 meters around occupied habitat for all special status plant species (threatened, endangered, proposed, candidate and sensitive plants) (CRV-NSO-19).
- VRM Class II designation for all acres.
- Close County Line and Smith Gulch allotments to livestock grazing.
- Travel limited to designated routes; most routes, except those currently used for access to oil and gas facilities, would be closed and reclaimed.
- ROW avoidance on all acres.
- Recommend for withdrawal from mineral location, close to mineral materials sales, close to non-energy solid minerals leasing.

By limiting non-oil and gas surface-disturbing activities, the special management prescriptions under Alternative C would have a positive impact on the relevant and important values within the proposed ACEC. Impacts of oil and gas activities on existing leases without NSO or CSU stipulations would be minimized through the application of COAs and any conservation measures from Section 7 consultation for listed species.

Impacts from Special Status Species Management—Plants. The existing NSO stipulation for federally listed, proposed, and candidate threatened or endangered species would be extended to include a 200-meter buffer and would also be applied to BLM sensitive plants. This new stipulation would provide greater protection for both occupied and potential habitat, as well as habitat for pollinators, than under Alternatives A and D, but less than the Proposed RMP, which would apply an NSO stipulation to the entire ACEC. Special status plants management under Alternative C would be more beneficial for the relevant and important values than under Alternatives A and D, but less than the Proposed RMP.

Impacts from Visual Resource Management. The portion of the Mount Logan Foothills proposed ACEC that is currently designated VRM Class III would be changed to VRM Class II. Managing the entire ACEC as VRM Class II would benefit special status species habitat by limiting potential surface disturbances within occupied habitat but would not necessarily preclude all surface-disturbing activities within potential, but currently unoccupied habitat. VRM designations in this alternative would result in the least adverse impacts of all alternatives.

Alternative D

Impacts to ACECs from VRM, fluid minerals management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to Alternative A. Impacts to ACECs from livestock grazing management and lands and realty management, would be the same as or similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in the Mount Logan Foothills area under Alternative D. The proposed ACEC would be managed in a similar fashion to the Proposed RMP, with the following exceptions:

- NSO stipulation with 200-meter buffer around habitat for listed, proposed, and candidate plants (CRVFO-NSO-18).
- CSU stipulation with 100-meter buffer around occupied habitat for BLM sensitive plants (CRV-CSU-9).
- Close County Line and Smith Gulch allotments to livestock grazing.
- Travel limited to designated routes; most existing routes remain open to full-sized vehicles.

Impacts from Special Status Species Management—Plants. Under Alternative D, federally listed, proposed, and candidate plant species would be protected with an NSO stipulation within 200 meters of occupied habitat. BLM sensitive plants would be protected with a CSU stipulation with a 100-meter buffer around occupied habitat. Neither the NSO nor the CSU stipulation would apply to any existing oil and gas leases issued without an NSO or CSU stipulation. The NSO stipulation would provide adequate protection for federally listed, proposed, and candidate plants from non-oil and gas activities. The CSU stipulation on

sensitive species may protect most occupied habitat from surface disturbances; however, it would be unlikely to prevent disturbances in unoccupied, but potential habitat. Due to the larger buffer for the special status plant stipulations, Alternative D would result in slightly less adverse impacts than under Alternative A.

Impacts from Comprehensive Trails and Travel Management. Although travel would be limited to designated routes under Alternative D, most routes would remain open to full-sized vehicles, except two dead-end routes that would be limited to pedestrian and equestrian use. The elimination of cross-country travel would benefit special status plants by avoiding unintentional destruction of plants or habitat. Alternative C would leave more routes open to full-sized vehicle use, resulting in slightly more potential adverse impacts than under the Proposed RMP and Alternative C, but less than Alternative A, which would be open for cross-country travel.

Summary

The Proposed RMP and Alternative C would have the most beneficial impacts on the relevant and important values, followed by Alternatives D and A, in that order.

Environmental Consequences - Sheep Creek Uplands Proposed ACEC

The Sheep Creek Uplands proposed ACEC is located west of the Colorado River and north of Sweetwater Creek. This proposed ACEC would consist of mostly sagebrush and mixed mountain shrub vegetation. The ACEC would protect relevant and important special status plant habitat. The Sheep Creek Uplands area includes high-quality occurrences of Harrington's penstemon that are considered a core population of this species.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. The Sheep Creek Uplands proposed ACEC would not be designated under Alternative A. The lands within this proposed ACEC would be managed under the directives and restrictions of the current management plan. This would include the following:

- CSU stipulation on occupied BLM sensitive species habitat.
- VRM Class II, III, and IV designations.
- Open to cross-country travel.
- Available for ROW applications.
- Open for locatable mineral entry, mineral materials disposal, and non-energy solid mineral leasing.

Alternative A would provide the least protection for Harrington's penstemon habitat of all alternatives.

Impacts from Special Status Species Management—Plants. A CSU stipulation for sensitive species would apply to the occupied habitat for Harrington's' penstemon within the Sheep Creek Uplands proposed ACEC under Alternative A. The CSU stipulation may guide where surface-disturbing activities would occur but would be unlikely to prevent disturbance and fragmentation of unoccupied, but potential habitat. Management of special status plant species under Alternative A would have the greatest risk of adverse impacts on populations and habitat for Harrington's penstemon.

Impacts from Visual Resource Management. Under Alternative A, the northern half of the Sheep Creek Uplands proposed ACEC would be designated as VRM Class II. The southern half of the proposed ACEC would be managed as VRM Class III and IV. The Class II designation would benefit special status species habitat by limiting most surface-disturbing activities that could impact plant habitat. VRM Class III and IV designations would be unlikely to provide any protection for the relevant and important values since these designations would allow surface disturbances that would require moderate or major modifications to the visual character of the landscape. VRM designations would have some beneficial impacts on special status species but would provide less protection than under Alternative C.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, travel management for the Sheep Creek Uplands area would be open to OHV use on and off roads, and all existing routes would be open to full-sized vehicles. Both travel on existing routes and travel off existing routes could impact populations of special status plants. Off-road vehicle use would probably have the greatest impact on populations of Harrington's penstemon, because these activities occur over widespread areas and are not subject to site-specific environmental review and mitigation. Impacts can include direct mortality through crushing or trampling, loss of pollinator habitat, and changes to special status plant habitat quality through soil compaction, reduced total vegetation cover, changes in vegetation structure and species composition. Most of the Harrington's penstemon sites within the Sheep Creek Uplands are within 200 meters of an existing road. Indirect impacts of travel within special status plant habitat include dust deposition on plants that may inhibit pollination success, and the risk of transporting noxious weeds and other invasive species from infested areas to uninfested areas. Alternative A would result in the most adverse impacts from travel management.

Impacts from Lands and Realty Management. Under the current management plan, the Sheep Creek Uplands would be available for ROW applications, subject to the VRM Class II constraints and CSU stipulations on Harrington's penstemon occupied habitat. Ground-disturbing ROW actions would be designed to avoid occupied habitat as much as possible, but this may be difficult to achieve where populations of Harrington's penstemon are extensive. Impacts on Harrington's penstemon populations and habitat may include direct loss of individuals, loss, degradation, or fragmentation of habitat, and loss of pollinator habitat, all of which would have an adverse impact on the relevant and important values of the proposed ACEC. Impacts would be greater than under the Proposed RMP and Alternative C, but similar to Alternative D.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Sheep Creek Uplands area would not be withdrawn from mineral entry under the Proposed RMP or Alternatives A and D. Mineral material disposals and leasing of non-energy solid minerals would be subject to site-specific environmental review and stipulations that may apply to the landscape. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would not be approved in areas of high resource value. Locatable mineral exploration and development would not be subject to existing stipulations and actions that disturb fewer than 5 acres would not be required to file a mining plan with BLM. The Proposed RMP and Alternatives A and D may result in damage or destruction of the relevant and important values of the proposed ACEC.

Alternative B (Proposed RMP)

Impacts on the Sheep Creek Uplands proposed ACEC from VRM designations would be the same as under Alternative A. Impacts under this alternative from management actions for other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Sheep Creek Uplands proposed ACEC would be designated as an ACEC under the Proposed RMP. Special management prescriptions to protect and enhance the relevant and important values of the proposed ACEC are listed below. Under the Proposed RMP, the special management for the ACEC would provide greater protection for the relevant and important values than under Alternatives A and D, but less than C. The Proposed RMP management would include the following:

- Apply NSO stipulation within 200 meters of occupied Harrington's penstemon habitat (CRVFO-NSO-10).
- Designate underlying VRM Classes (VRM Class II, III, and IV).
- Limit travel to designated routes, close certain routes or change to pedestrian and equestrian to protect special status plant habitat, keep remaining routes open to full-sized vehicles.
- Miles of routes will not increase beyond the baseline of designated routes.
- Designate all acres for ROW avoidance.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials sales, and close to leasing of non-energy solid minerals.
- Allow fire and other vegetation treatments only if they maintain or enhance Harrington's penstemon populations and habitat.

Under the Proposed RMP, the special management for the ACEC would provide similar protection as in Alternative C and greater protection for the relevant and important values than under Alternatives A and D.

Impacts from Special Status Species Management—Plants. Under the Proposed RMP, the CSU stipulation for sensitive plant species would be replaced with an NSO stipulation prohibiting surface-disturbing activities within 200 meters of occupied Harrington's penstemon habitat within ACECs. This would provide substantial protection for Harrington's penstemon from potential indirect impacts, such as loss of potential habitat for population expansion, erosion, and introduction of noxious weeds in the vicinity of occupied habitat. Special status plants management under the Proposed RMP would be more beneficial for the relevant and important values than under Alternatives A and D, and the same as under Alternative C.

Impacts from Comprehensive Trails and Travel Management. All travel would be limited to designated routes under the Proposed RMP and Alternatives C and D. A few routes that were open to full-sized vehicles would be closed or changed to pedestrian and equestrian use. Closing certain routes would reduce habitat fragmentation. Changing other routes to pedestrian and equestrian use would minimize potential impacts from dust deposition and transport of noxious weeds from infected areas to uninfected areas. The Proposed RMP would have less adverse impact on Harrington's penstemon populations and habitat than under Alternative A.

Impacts from Lands and Realty Management. The Sheep Creek Uplands ACEC would be managed as a ROW avoidance area. This would limit some surface-disturbing activities, but may not restrict all ROW actions. Some impacts on Harrington's penstemon may occur under this alternative, particularly impacts on unoccupied, but potential habitat, which would not necessarily be avoided by ROW authorizations. Impacts under the Proposed RMP would be the same as Alternative C, as but less than under Alternatives A and D.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals under this alternative. No surface disturbances associated with mineral development would occur. Lands and realty actions would have less adverse impact on the relevant and important values in the Sheep Creek Uplands under the Proposed RMP and Alternative C than under Alternatives A and D.

Alternative C

Impacts to ACECs from comprehensive trails and travel management, lands and realty management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, the Sheep Creek Uplands area would be designated as an ACEC. Special management prescriptions for the ACEC would be the same as for the Proposed RMP, with the following exceptions:

- NSO stipulation with 200-meter buffer for all listed, proposed, candidate and BLM sensitive plants (CRV-NSO-19).
- VRM Class II designation on all acres.

These prescriptions would provide the greatest benefit to the relevant and important values of all alternatives.

Impacts from Special Status Plants Management. Special status plants management in the Sheep Creek Uplands ACEC would have the same impacts under Alternative C as in the Proposed RMP since the 200-meter NSO stipulation would apply to all Harrington's penstemon habitat in both alternatives.

Impacts from Visual Resource Management. Within the ACEC, all acres would be designated as VRM Class II to protect the relevant and important values. This would benefit Harrington's penstemon habitat by limiting potential surface disturbances within the ACEC but would not necessarily preclude all surface-disturbing activities. The beneficial Impacts from Visual Resource Management would be greater under Alternative C than under the other alternatives.

Alternative D

Impacts to ACECs from special status plant species management, VRM, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in the Sheep Creek Uplands proposed ACEC area under Alternative D. Management actions and restrictions that would affect the area include the following:

- CSU stipulation with a 100-meter buffer on occupied BLM sensitive species habitat (CRV-CSU-9).
- VRM Class II, III, and IV designations.

- Travel limited to designated routes, with more routes open to full-sized vehicles than in the Proposed RMP and Alternative C.
- ROW avoidance for special status plant occupied habitat.
- Open for mineral entry.

Impacts from Comprehensive Trails and Travel Management. Limiting travel to designated routes would benefit special status plants by restricting access to undisturbed sensitive plant habitat. Impacts would be less than Alternative A, but more than the Proposed RMP and Alternative C, which would close more routes or convert some from full-sized vehicle to pedestrian and equestrian use only.

Impacts from Lands and Realty Management. Only occupied habitat for special status plants would be managed as a ROW avoidance area under Alternative D. Although the ROW avoidance does not preclude all ROW development, it would limit surface disturbances and give priority consideration to protecting special status species habitat. Impacts on Harrington's penstemon in ROW avoidance areas would be less than in areas open for ROW development. Impacts on Harrington's penstemon occupied and potential habitat would be greater than under the Proposed RMP and Alternative C, in which the entire ACEC is a ROW avoidance area; however, impacts would be less than under Alternative A, in which the Sheep Creek Uplands area would be open for ROW development.

Summary

Designation of the Sheep Creek Uplands proposed ACEC and associated management prescriptions under the Proposed RMP and Alternative C would provide the greatest benefit for the relevant and important values. Alternative A would present the least protection for the relevant and important values within the Sheep Creek Uplands area, followed by Alternative D.

Environmental Consequences - The Crown Ridge Proposed ACEC

The Crown Ridge proposed ACEC is on the ridgeline of The Crown southeast of Carbondale, Colorado. This proposed ACEC would consist of 1,000 acres of mostly sagebrush and oakbrush/mixed mountain shrub vegetation. The ACEC would protect relevant and important special status plant habitat. The Crown Ridge supports an excellent quality occurrence of Harrington's penstemon.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated within The Crown Ridge area under Alternative A. The lands within this proposed ACEC would be managed under the directives and restrictions of the current management plan of Alternative A. These include the following:

- CSU stipulation on occupied BLM sensitive species habitat (GS-CSU-3).
- VRM Class II designation.
- Travel open to OHV use on and off roads; all roads open to full-sized vehicles.
- Available for ROW applications.
- Open for locatable mineral entry, mineral materials disposals, and leasing of non-energy solid minerals.

Impacts from Visual Resource Management. Lands within The Crown Ridge proposed ACEC would be designated as VRM Class II in all alternatives. VRM Class II designation would allow for some small-scale surface disturbances such as vegetation treatments, as long as project design features met the VRM Class requirements and mitigations were adequate. The VRM classification would benefit Harrington's penstemon habitat by limiting potential surface disturbances but would not necessarily preclude all surface-disturbing activities. Impacts from VRM would be the same in all alternatives.

Impacts from Special Status Species Management—Plants. Under the current management plan, a CSU stipulation would apply to the occupied Harrington's penstemon habitat. The CSU stipulation may allow relocation of surface-disturbing activities to avoid occupied habitat but would not likely protect potential, but currently unoccupied habitat. This may allow overall habitat fragmentation, loss of pollinator habitat, and risk of weed invasion that would degrade habitat for special status plants. Alternatives A and D would have similar risks of adverse impacts on Harrington's penstemon populations and habitat.

Impacts from Recreation and Visitor Services Management. Recreational activities, such as hiking, mountain biking and OHV riding, and recreation developments, such as construction of trails, campgrounds, and parking lots, may cause direct loss of special status plants, reduced habitat quality, and habitat fragmentation. Current recreational use in The Crown area is quite high, due to its proximity to nearby towns and the diverse terrain, which offers many recreational opportunities. Recreational use is expected to increase as the human population in the Roaring Fork Valley continues to expand. Impacts on the relevant and important values within The Crown area are expected to increase proportionally.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, travel management for The Crown Ridge proposed ACEC would be open to OHV use on and off roads. Disturbances from unregulated OHV use would probably have the greatest impact on populations of Harrington's penstemon because these activities can result in proliferation of numerous new roads and trails within special status plant habitat without benefit of site-specific environmental review and mitigation. Several existing roads and trails are located less than 200 meters from Harrington's penstemon populations. Impacts can include direct mortality through crushing or trampling, dust deposition on plants that may inhibit pollination success, and changes in habitat quality through soil compaction, reduced total vegetation cover, and changes in vegetation structure and species composition. The increasing use of OHVs and mountain bikes within the area could also transport noxious weeds and invasive weed seeds from infested areas to uninfested areas. Adverse impacts of travel management actions on Harrington's penstemon populations and habitat within The Crown Ridge proposed ACEC are likely to be greatest under Alternative A.

Impacts from Lands and Realty Management. The Crown Ridge area would be available for ROW applications under Alternative A. Lands and realty actions could allow surface disturbances such as pipelines, power lines, roads, and communication site facilities within The Crown Ridge area, subject to the CSU stipulation for sensitive plant species. The CSU stipulation may require relocation of the activity outside known populations, but may allow such activities within unoccupied, but potential habitat for Harrington's penstemon. Surface disturbance and increased traffic associated with the activity would potentially escalate the spread of weeds into occupied habitat and limit the potential expansion of Harrington's penstemon. Alternative A would result in greater risk of adverse impacts than the other alternatives because the stipulations regulating ROW actions are the least restrictive.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Under Alternative A, The Crown Ridge area would be open to locatable mineral entry, mineral materials disposal, and leasing of non-energy solid minerals. Mineral material disposals and leasing of non-energy solid minerals would be subject to a CSU stipulation that would provide some protection for Harrington's penstemon populations and their habitat. Mineral material disposals and leasing of non-energy solid minerals are also discretionary actions that would not be approved in areas of high resource value. Locatable mineral exploration and development would not be subject to existing stipulations or site-specific analysis. The risk of impacts from locatable minerals on the relevant and important values of The Crown Ridge proposed ACEC would be greatest under Alternative A.

Alternative B (Proposed RMP)

Impacts to ACECs from special status plant species management and VRM would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Crown Ridge proposed ACEC would not be designated under the Proposed RMP. The proposed ACEC would be located within The Crown SRMA and managed to protect the recreation outcomes and settings for that area. Management actions and restrictions that would impact The Crown Ridge proposed ACEC include the following:

- CSU stipulation with a 100-meter buffer on occupied Harrington's penstemon habitat outside of ACECs (CRVFO-CSU-6).
- VRM Class II designation.
- NSO stipulation on priority wildlife habitat (northern half of proposed ACEC) (CRVFO-NSO-7).
- NSO stipulation on all acres for SRMA (CRVFO-NSO-25).
- Travel limited to designated routes; northern half mostly mechanized, southern half either full-sized vehicles or ATV use.
- ROW avoidance on all acres within SRMA.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials disposal, close to leasing of non-energy solid minerals.

Impacts from Terrestrial Wildlife Management. The northern half of The Crown Ridge area has been identified as a core wildlife habitat area under the Proposed RMP and Alternative C, with an NSO stipulation applied to prohibit surface-disturbing activities. Harrington's penstemon habitat would be protected from surface disturbances where the core wildlife habitat overlaps with special status plant habitat. Wildlife management actions under the Proposed RMP and Alternative C would have more benefit for the relevant and important values of the proposed ACEC than under Alternatives A and D where the NSO stipulation does not apply.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP, 9,100 acres of public land within The Crown area would be designated as a SRMA. The SRMA would completely encompass the 1,000-acre The Crown Ridge proposed ACEC. The SRMA would be divided into two recreation management zones: RMZ 1 tailored to beginning OHV riders, and RMZ 2 emphasizing novice-

intermediate mountain biking opportunities. Both zones would be managed primarily for residents of the Roaring Fork Valley and the objective would be to maintain similar recreational experiences as exist now. Most of the recreation infrastructure has been created. As much as 6 to 8 miles of new single-track trails are expected to be constructed in order to create loop trails and reduce the amount of biking on roads. The final travel management network of trails would be determined at the implementation level with site-specific analysis. At that time, mitigation would be applied to minimize adverse impacts on Harrington's penstemon populations and habitat.

An NSO stipulation would prohibit surface-disturbing activities within the SRMA that were incompatible with the recreation management objectives for the area. This would indirectly benefit Harrington's penstemon habitat by limiting non recreation-related surface disturbances. Adverse impacts from recreation management would outweigh beneficial impacts in all alternatives, but the Proposed RMP would have less impact than the other alternatives due to the restrictions on the number of new routes, the NSO stipulation that would apply to the SRMA, and the active management within the SRMA that would minimize inadvertent impacts on the relevant and important values.

Impacts from Comprehensive Trails and Travel Management. Travel within The Crown Ridge proposed ACEC would be limited to designated routes under the Proposed RMP. Most of the routes in the northern half of the proposed ACEC would be designated for mechanized use, whereas most of the routes in the southern half would be designated for full-sized vehicles or ATV trails to accommodate a range of recreational activities. As mentioned above, the total number of trails is likely to increase from Alternative A, but no acres would remain open for off-road travel. Impacts on Harrington's penstemon populations and habitat would be less than under Alternative A.

Impacts from Lands and Realty Management. The Crown SRMA would be managed as a ROW avoidance area to protect the character of the recreational setting. This would limit most surface-disturbing activities within The Crown Ridge proposed ACEC, but may not restrict all ROW actions. Some impacts on Harrington's penstemon may occur under this alternative, particularly impacts on unoccupied, but potential habitat. Impacts under the Proposed RMP would be less than under Alternative A, but similar to Alternatives C and D.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from mineral location, closed to mineral materials disposal, and closed to leasing of non-energy solid minerals. No surface disturbances associated with mineral development would occur. The Proposed RMP and Alternative C would have the least adverse impacts on the relevant and important values within The Crown Ridge proposed ACEC.

Alternative C

Impacts to ACECs from VRM, terrestrial wildlife management, lands and realty, and locatable minerals, salable minerals and non-energy leasable minerals management would be the same as or similar to the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative C, The Crown Ridge proposed ACEC would receive ACEC designation and special management prescriptions would be applied to protect the relevant and important values. These would include the following:

- Apply NSO stipulation for 200 meters around occupied Harrington's penstemon habitat within ACECs (CRVFO-NSO-10).
- Designate as VRM Class II.
- Apply NSO stipulation on core wildlife areas (northern half of proposed ACEC) (CRV-NSO-8).
- Manage The Crown area as an ERMA.
- Limit travel to designated routes and close to over-the-snow travel. Most routes remain open for full-sized vehicles, and several routes limited to pedestrian and equestrian traffic.
- Prohibit a net increase in motorized/mechanized routes, with the exception of new administrative routes.
- Designate as ROW avoidance on all acres.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials disposal, close to leasing of non-energy solid minerals.
- Allow fire or other vegetation treatments if they would maintain or enhance Harrington's penstemon populations and habitat.

Compared with the other alternatives, Alternative C would result in the greatest beneficial impact on the relevant and important values.

Impacts from Special Status Species Management—Plants. The CSU stipulation for sensitive plant species would be replaced with an NSO stipulation prohibiting surface-disturbing activities within 200 meters of occupied Harrington's penstemon habitat. This would provide more protection for both occupied and potential habitat than the other alternatives. Special status plants management under Alternative C would have the greatest beneficial effect on the relevant and important values within The Crown Ridge proposed ACEC of all alternatives.

Impacts from Recreation and Visitor Services Management. The Crown Ridge proposed ACEC and surrounding area would be managed as an ERMA, rather than a SRMA in this alternative. Whereas SRMAs give priority to recreation and developments, ERMAs rely on interdisciplinary resource objectives to guide recreation developments. Management addresses recreation demand but is balanced with resource protection and reducing conflicts among users and uses. Fewer new routes are anticipated, and more routes would be closed or rerouted to minimize adverse impacts on special status plants. Of all the alternatives, recreation management under Alternative C would have the fewest adverse impacts on Harrington's penstemon populations and habitat within The Crown Ridge proposed ACEC.

Impacts from Comprehensive Trails and Travel Management. Under Alternative C, there would no net increase in motorized or mechanized routes within The Crown Ridge proposed ACEC. Total miles of roads and trails would probably be least in this alternative, resulting in the least adverse impacts on the relevant and important values.

Alternative D

Impacts to The Crown Ridge proposed ACEC from special status plant species management, VRM, lands and realty, would be the same as or similar to Alternative A. Impacts to ACECs from locatable, salable, and

non-energy leasable minerals management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. The Crown Ridge proposed ACEC would not be given ACEC designation under Alternative D. The Crown area would be managed as a SRMA with an emphasis on enhancing mountain biking opportunities. Management actions or restrictions that might affect the relevant and important values of The Crown Ridge proposed ACEC include the following:

- CSU stipulation within 100meter buffer on occupied Harrington's penstemon habitat.
- VRM Class II designation.
- Travel limited to designated routes; all routes designated for mechanized use except those that dead-end on private land; new routes anticipated.
- Open for ROW development.
- Recommend for withdrawal from locatable mineral entry, close to mineral materials disposal, close to leasing of non-energy solid minerals.

Alternative D would have less adverse impacts on the relevant and important values than Alternative A, but greater than the Proposed RMP or Alternative C.

Impacts from Recreation and Visitor Services Management. Under Alternative D, The Crown area would be designated as a SRMA with an emphasis on enhancing mountain biking opportunities. The SRMA would target destination visitors as well as residents of the Roaring Fork Valley. Additional recreation infrastructure would probably be needed to meet the anticipated recreation demand. Approximately 14 to 18 miles of new single-track trails would be expected to be constructed in order to create loop trails and reduce the amount of biking on roads. This would result in a higher density of trails than proposed under the other alternatives. The final travel management network of trails would be determined at the implementation level with site-specific analysis. At that time, mitigation would be applied to minimize adverse impacts on Harrington's penstemon populations and habitat. However with a denser trail system and more concentrated recreational use, the risk of habitat fragmentation and loss of potential, but currently unoccupied habitat would be greater. Recreation management under Alternative D would likely result in more adverse impacts than under the Proposed RMP and Alternative C, but would be comparable to Alternative A.

Impacts from Comprehensive Trails and Travel Management. Travel within The Crown area would be limited to designated routes. All routes would be mechanized or allow pedestrian and equestrian use only, but Alternative D would likely result in more miles of newly created routes than any other alternative. Travel management would create slightly less impacts than under Alternative A, but more impact than under the Proposed RMP and Alternative C.

Summary

Alternative C would provide the most protection for the relevant and important values of The Crown Ridge proposed ACEC of any of the alternatives. The Proposed RMP would have slightly less protection for the relevant and important values than under Alternative C, but more than under Alternative D. Alternative A would present the least protection for the relevant and important values.

Environmental Consequences - Thompson Creek ACEC

The Thompson Creek ACEC is located along the North Fork of Thompson Creek southwest of the Town of Carbondale, Colorado. The ACEC includes 4,300 acres under Alternative A. The ACEC size would be reduced to 3,400 acres under Alternatives C, because 900 acres were determined not to contain relevant and important values. The ACEC size would be increased to 3,500 acres under the Proposed RMP because more Harrington's penstemon communities would be included. The relevant and important values associated with this ACEC are scenic, geologic, historical (cultural), botanical resources and natural processes. The outstanding scenic values are tied to the unique topography and geologic landforms (fins) and the sharp contrasting colors. Geologic values are based on the prominent, nearly vertical, geologic fins that demonstrate unusual depositional and erosional processes. Historic values are associated with remains of the abandoned Aspen and Western Railway, which operated from 1887 to 1889. The area's intact natural ecological state is also recognized as important for environmental education.

Alternative A

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, Thompson Creek ACEC would continue to be designated as an ACEC to protect the scenic, geologic, historical, and ecological values within the area. Special management to protect and preserve these values would include the following:

- Prohibit fluid minerals leasing in the Thompson Creek Natural Environment Area (portion of the area).
- Apply NSO stipulation on all acres.
- Designate as ROW exclusion area.
- Designate as VRM Class I and III.
- Classify as closed to unauthorized motorized travel.
- Allow fire and other vegetation treatments only if they maintain or enhance relevant and important values.
- Recommend for withdrawal from mineral location, close to mineral materials sales and leasing of non-energy solid minerals.

Impacts from Visual Resource Management. The Thompson Creek area would be mostly designated as VRM Class I to retain the high scenic quality of the area. Most surface-disturbing activities would not be allowed, as this would degrade the scenic values. In the small areas where VRM Class III would apply, impacts would be minimal as the ACEC NSO stipulation would still apply.

Impacts from Managing to Protect Wilderness Characteristics. No decisions to manage for wilderness characteristics outside existing WSAs would be proposed under Alternative A, resulting in no additional protections for the ACEC values.

Impacts from Recreation and Visitor Services Management. The Thompson Creek ACEC would also be designated as a SRMA under Alternative A. The overlapping designations have created management conflicts where enhancement of certain recreation activities may not be compatible with protecting the relevant and

important values of the ACEC. Intensive climbing activities on the geologic fins within Thompson Creek could impact both the scenic and geologic values.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, the ACEC is designated closed to unauthorized motorized vehicle travel, including over-the-snow travel, which protects the relevant and important values by preventing visual scarring, loss of vegetation, and risk of noxious weed invasion that would degrade the scenic and ecological integrity of the area.

Impacts from Lands and Realty Management. Under the Proposed RMP and Alternatives A and C, the Thompson Creek ACEC would be managed as a ROW exclusion area, which would prohibit ROW actions that would impact the ACEC values. No impacts on the relevant and important values would be anticipated.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The Thompson Creek Natural Environment Area (NEA) would be closed to fluid minerals leasing. The NEA encompasses a 960-acre tract of land at the core of Thompson Creek canyon. Closing the area to fluid minerals leasing would protect the core of the ACEC from surface disturbances related to oil and gas development. Any leases issued outside the NEA would be subject to the NSO stipulation covering the entire ACEC. There would be negligible impacts on the relevant and important values of the ACEC from fluid minerals development.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The ACEC would be recommended for withdrawal from locatable mineral entry, closed to mineral materials disposal and leasing of non-energy solid minerals. The withdrawal and closures would benefit the ACEC values by precluding any surface-disturbing activities associated with these actions.

Impacts from Wild and Scenic Rivers Management. Under Alternative A, Thompson Creek is determined to be eligible for inclusion in the NWSRS. Interim management would protect the ORVs, the free-flowing condition of the stream and the tentative classification within a 0.25-mile buffer on both sides of the stream centerline. Management to protect the eligible stream segment would complement management prescriptions to protect the relevant and important values within the ACEC.

Alternative B (Proposed RMP)

Impacts would be similar to Alternative A, except that the additional management restrictions and prescriptions would afford somewhat greater protection than under Alternative A. Impacts to ACECs from lands and realty management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Designation and protective management would continue for the Thompson Creek ACEC under the Proposed RMP and Alternative C. The Proposed RMP would include an additional 100 acres of Harrington's penstemon plant communities that support the ecological value of the ACEC. The ACEC would be managed as under Alternative A, but with the following additional provisions:

- Prohibit fluid minerals leasing on the entire ACEC (3,500 acres).
- Designate the entire ACEC as VRM Class I.

- Designate the ACEC as an ERMA.
- Classify as closed to over-the-snow travel and motorized and mechanized use.
- Recommend for withdrawal from locatable mineral exploration and development.
- Prohibit installation of bolts or other human-caused devices on identified relevant and important geologic features outside the existing climbing rock fin.
- Close to commercial timber harvest, firewood cutting, and special forest product harvest.
- Allow vegetation treatments and burns if they would maintain or enhance the identified relevant and important values.

Impacts from Visual Resource Management. The Thompson Creek area would be wholly designated as VRM Class I to retain the high scenic quality of the area. Most surface-disturbing activities would not be allowed, as this would degrade the scenic values.

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP, a total of 8,200 acres within the Thompson Creek area would be managed for wilderness characteristics. This would include most of the Thompson Creek ACEC as well as BLM lands to the north of the ACEC. Management prescriptions to protect wilderness characteristics would prohibit surface-disturbing activities in the area, and would complement actions to protect the relevant and important values of the ACEC. The larger boundary and management for wilderness characteristics under the Proposed RMP may benefit the ACEC by protecting the scenic views seen from the northern boundary of the ACEC, and by restricting fragmentation of the ecological system that extends beyond the ACEC.

Impacts from Recreation and Visitor Services Management. The Thompson Creek ACEC would not be designated a SRMA under the Proposed RMP, but an ERMA. Management of the recreational use of the area would focus on interdisciplinary travel management and basic visitor services, and maintain a predominately natural landscape that supports participation in a variety of established recreation activities (e.g., mountain biking, sport climbing, hiking, horseback riding and hunting). The activity of mountain biking would occur outside of the ACEC on a designated route in the ERMA.

There would be minimal impacts from recreation on the relevant and important values within the ACEC. Management of the ACEC under the Proposed RMP would prohibit installation of bolts or other permanent climbing aids outside the existing climbing rock fin. This would afford protection for the scenic quality of the other geologic fins.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, the ACEC would be designated closed to unauthorized motorized and mechanized travel, including over-the-snow travel, which would protect the relevant and important values by preventing visual scarring, loss of vegetation, and risk of noxious weed invasion that would degrade the scenic and ecological integrity of the area. This is more protective than Alternative A, which does not include closure to mechanized travel within the ACEC.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The fluid minerals leasing closure in the Thompson Creek NEA would apply to the entire ACEC under the Proposed RMP. The fluid minerals leasing closure would complement the NSO stipulation covering the

entire ACEC. There would be no impacts on the relevant and important values of the ACEC from fluid minerals.

Impacts from Wild and Scenic Rivers Management. Thompson Creek stream segment would be not be determined to be suitable for inclusion in the NWSRS under the Proposed RMP. Impacts of not designating this stream segment as suitable would be minimal. The portion of the stream segment which lies within the ACEC is already afforded protection with an NSO stipulation on the entire ACEC. Impacts would be the same as or similar to Alternative A.

Alternative C

Impacts would be similar to Alternative A, except that the additional management restrictions and prescriptions would afford somewhat greater protection than under Alternative A. Impacts to ACECs from lands and realty management, and locatable, salable, and non-energy leasable minerals management would be the same as or similar to Alternative A. Impacts from management of other resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. Designation and protective management would continue for the Thompson Creek ACEC under Alternative C. The ACEC would be managed as under Alternative A, but with the following additional provisions:

- Prohibit fluid minerals leasing on the entire ACEC (3,400 acres).
- Designate the entire ACEC as VRM Class I.
- Designate as closed to over-the-snow travel and to motorized and mechanized travel.
- Recommend for withdrawal from locatable mineral exploration and development.
- Prohibit installation of bolts or other human-caused devices on identified relevant and important geologic features outside the existing climbing rock fin.
- Close to commercial timber harvest, firewood cutting, and special forest product harvest.
- Allow vegetation treatments and burns if they would maintain or enhance the identified relevant and important values.

Impacts from Visual Resource Management. The Thompson Creek area would be wholly designated as VRM Class I to retain the high scenic quality of the area. Most surface-disturbing activities would not be allowed, as this would degrade the scenic values. Impacts would be the same as the Proposed RMP.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, a total of 8,200 acres within the Thompson Creek area would be managed for wilderness characteristics. This would include the entire Thompson Creek ACEC as well as lands to the north of the ACEC. Management prescriptions to protect wilderness character would prohibit surface-disturbing activities in the area and would complement actions to protect the relevant and important values of the ACEC. The larger boundary and management for wilderness characteristics under Alternative C may benefit the ACEC by protecting the scenic views seen from the northern boundary of the ACEC, and by restricting fragmentation of the ecological system that extends beyond the ACEC.

Impacts from Recreation and Visitor Services Management. The Thompson Creek ACEC would not be designated a SRMA under Alternative C, but an ERMA. Management of the recreational use of the area would focus on nonmotorized, dispersed use. There would be no actions implemented to enhance opportunities for hiking, climbing, or mountain biking. The existing natural landscape would be retained. There would be minimal impacts from recreation on the relevant and important values within the ACEC. Management of the ACEC under Alternative C would prohibit installation of bolts or other permanent climbing aids outside the existing climbing rock fin. This would afford protection for the scenic quality of the other geologic fins.

Impacts from Comprehensive Trails and Travel Management. Under Alternative C, the ACEC is designated closed to unauthorized motorized and mechanized travel, including over-the-snow travel, which would protect the relevant and important values by preventing visual scarring, loss of vegetation, and risk of noxious weed invasion that would degrade the scenic and ecological integrity of the area. This would be more protective than Alternative A, which does not include closure to mechanized travel within the ACEC, and the same as the Proposed RMP.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The fluid minerals leasing closure in the Thompson Creek NEA would apply to the entire ACEC under Alternative C. The fluid minerals leasing closure would complement the NSO stipulation covering the entire ACEC. There would be no impacts on the relevant and important values of the ACEC from fluid minerals.

Impacts from Wild and Scenic Rivers Management. Thompson Creek stream segment would be considered suitable for inclusion in the NWSRS under Alternative C. Impacts would be the same as or similar to Alternative A.

Alternative D

Impacts under this alternative from management actions for resources, uses, and special designations would be as described below.

Impacts from Areas of Critical Environmental Concern Management. No ACEC would be designated in this alternative and no special management prescriptions would be applied to protect and preserve the relevant and important values. This alternative would present the greatest risk of impacts to the relevant and important values of the proposed ACEC. Management actions and allowable use decisions would include the following:

- NSO stipulation for 100 meters from historic properties.
- CSU stipulation on the entire SRMA, which includes all of the Thompson Creek ACEC area.
- VRM Class II designation.
- Travel limited to designated routes; over-the-snow travel prohibited.
- Open for mineral entry.

Impacts from Cultural Resource Management. Under Alternative D, cultural resources in the Thompson Creek area would be protected by an NSO stipulation for historic properties that would prohibit surface occupancy and surface-disturbing activities within 100 meters (328 feet) of historic properties. This stipulation

would protect cultural resources from adverse direct impacts and would reduce the potential for indirect impacts. The stipulation would provide indirect benefits to other relevant and important values where they occur within this buffer, but would not protect relevant and important values elsewhere in the ACEC.

Impacts from Visual Resource Management. Under Alternative D, VRM would change the designation from VRM Class I to VRM Class II. VRM Class II would be managed to retain the existing character of the landscape, and the level of change to the landscape should be low. VRM designations under Alternative D would afford the least protection for the relevant and important values of all alternatives.

Impacts from Managing to Protect Wilderness Characteristics. No management actions to maintain wilderness characteristics on lands outside existing WSAs would be proposed under Alternative D, resulting in no protection for the ACEC values. Impacts would be the same as under Alternative A.

Impacts from Recreation and Visitor Services Management. The Thompson Creek area would be designated as a SRMA under Alternative D. The Thompson Creek area would be managed as a SRMA with three distinct Recreation Management Zones. RMZ 1 would focus on day-use sport climbers, RMZ 2 would target day-use hikers, and RMZ 3 would focus on mountain biking recreation opportunities for destination visitors. RMZ 3 would be managed to enhance mountain biking opportunities and additional single-track trails would be constructed to eliminate trespass and create loop systems. Management of the area as a SRMA would probably attract more visitors to the Thompson Creek area, particularly in RMZ 3, which would be marketed for destination visitors. Construction of new trails would result in loss of vegetation and may provide a niche for invasive species to expand in the area. These activities may degrade the ecological condition of the vegetation communities and detract from the visual quality of the ACEC. Installation of additional bolts would be allowed within the climbing zone, but BLM would encourage using bolts and other permanent devices that are painted to match the surrounding rock. The installation of more bolts, particularly on new fins, would impact the high scenic quality of the geologic fins. Impacts from recreation to the relevant and important values would be greatest under Alternative D.

Impacts from Comprehensive Trails and Travel Management. As in the other alternatives, the Thompson Creek area would be closed to unauthorized motorized travel. Under Alternative D, mechanized travel would be allowed in the northern part of the area on designated routes. New routes would be constructed to enhance the network of mountain biking trails. Additional surface disturbances associated with construction and use of mechanized routes could impact the ecological values in the ACEC and may result in a decline in visual qualities. Alternative D would have the greatest impacts from travel management of all alternatives.

Impacts from Lands and Realty Management. In the absence of an ACEC designation, the Thompson Creek area would be managed as a ROW avoidance area rather than a ROW exclusion area. The area would be avoided for ROW actions unless no feasible alternatives could be found, and relevant and important values could be mitigated.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Thompson Creek ACEC would not be designated under Alternative D. The area would be open to fluid minerals leasing subject to the NSO constraints on historic properties and the CSU stipulation attached to minimize impacts on the SRMA values. Although these stipulations would protect cultural resources from direct impacts, it is likely that some surface disturbances would occur within the Thompson Creek area.

Surface disturbances associated with oil and gas development would adversely affect the visual and ecological resources within the ACEC boundary. Alternative D would have the most risk of adverse impact on relevant and important values of all the alternatives.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. The Thompson Creek area would remain open to locatable mineral entry, disposal of mineral materials, and leasing of non-energy solid minerals. Disposal of mineral materials and leasing of non-energy minerals would be subject to the management constraints in the RMP. These are also discretionary actions that would not be allowed in areas of high resource value. Exploration and development of locatable minerals may create surface disturbances that would adversely affect the relevant and important values within the Thompson Creek area. Plans of operations would not be required for locatable mineral activities that would cause surface disturbances of 5 acres or less (43 CFR 3809.21[a]). Because activities of 5 acres or less require only a notice to be filed with the BLM, adverse impacts would be anticipated to the scenic, cultural, and geologic resources in the area. Potential impacts from locatable mineral entry under Alternative D would be greater than the other alternatives.

Impacts from Wild and Scenic Rivers Management. The Thompson Creek stream segment would not be determined as suitable for inclusion in the NWSRS under Alternative D. Interim protection for suitable WSR segments would not be applied. There would be no protection for the relevant and important values within the Thompson Creek ACEC from managing eligible or suitable WSR stream segments.

Summary

The Proposed RMP would afford the most protection for the relevant and important values of the Thompson Creek ACEC, followed by Alternative C. Alternative D would have the least benefit to protection of the ACEC values followed by Alternative A.

Cumulative Impacts

The cumulative impact analysis boundary for ACECs includes public and private lands within the planning area and neighboring federal lands with designated ACECs or Research Natural Areas (RNAs). ACECs are designated to provide special management attention for relevant and important resources that include physical values such as scenic and geologic features, hazardous soils and cultural resources, and biological values such as important fisheries and wildlife habitat, exemplary ecosystems or plant communities, or special status species populations and habitat. A discussion of cumulative impacts on the ACECs is really an analysis of the incremental impacts from past, present, and RFFAs on the relevant and important values within the existing and proposed ACECs. Within the six existing ACECs, the implementation of special management prescriptions has adequately protected the relevant and important values from past actions. Most of these areas have been protected with an NSO stipulation, excluded from ROW development, closed to motorized vehicles, or at least restricted from a net increase in routes. Past actions have not resulted in irreparable loss of values.

The relevant and important values in areas proposed but not currently designated as ACECs have experienced incremental impacts from a variety of past actions. Off-road vehicle activity in the McCoy Fan Delta area has created soil erosion that threatens to degrade the fossil resources and the evidence of this fluvial and marine depositional feature. Mining for cinder blocks and landscaping rock has taken place immediately adjacent to the Dotsero Crater, creating a visual impact and a loss of some of the geologic features associated with this volcanic event. Approximately one-half of the Grand Hogback proposed ACEC has been leased for oil and

gas development. Although no drilling has taken place within the Hogback area yet, surface disturbances associated with oil and gas activity could degrade the geologic and scenic values of this proposed ACEC. Oil and gas development and associated infrastructure within the Mount Logan Foothills proposed ACEC has resulted in few direct losses of special status plants, but has resulted in some loss of potential habitat and overall habitat fragmentation for the special status plant species. Proliferation of user-created motorized and mechanized travel routes has contributed to losses of special status plants and fragmentation of special status wildlife habitat in several proposed ACECs. Fire suppression and livestock grazing have contributed to encroachment of pinyon and juniper woodlands into sagebrush habitat, with detrimental effects on sagebrush-dependent species such as greater sage-grouse. Many of these activities are expected to increase in the future, resulting in further declines in the quantity and quality of the relevant and important values over time.

Currently there are six ACECs totaling 27,030 acres in the CRVFO. The adjacent Kremmling Field Office is considering designation for an additional seven ACECs. In the neighboring Grand Junction Field Office, 23,240 acres are designated within eight ACECs in their 1987 RMP. Of those eight ACECs, three contain relevant and important geologic processes, one contains scenic values, two contain protected special status plant populations, one supports a sensitive butterfly species, and one covers scenic, cultural, and endangered plant resources. The adjacent WRNF manages five RNAs for a total of 53,100 acres. These areas are designated to protect excellent representative examples of diverse plant communities throughout the Forest. Designation of ACECs within the CRVFO would complement the management of relevant and important resources in adjacent land management agencies. The nature of the relevant and important values that would be protected would be similar to those in surrounding areas, but the actual resources, species, and features protected would be unique, resulting in a better regional representation of the relevant and important values.

Designation of ACECs would have a cumulative beneficial impact on the relevant and important values by providing special management prescriptions to restrict surface disturbances that would detract from the values and by allowing management actions that would enhance these values. Alternative A would retain the currently designated six ACECs to protect outstanding scenic, geological, and cultural values and public safety hazards within the CRVFO. Other resource values, such as special status plants and wildlife, and other geologic values found within the CRVFO would not be represented. Alternative D proposes even fewer ACECs than under Alternative A, designating only three ACECs to protect selected scenic, cultural, and public safety hazards.

While the relevant and important values of the proposed ACECs not identified for designation in each alternative would receive some direct and indirect protection through management actions associated with various resource programs, ACEC designation provides a more comprehensive suite of management restrictions and allowable uses designed not only to protect, but also to enhance, the relevant and important values. Areas without special designations are managed to accommodate a wide variety of uses and users, and may allow surface disturbances and habitat fragmentation from these uses that would degrade the quality and integrity of the relevant and important values.

Among the alternatives proposed, Alternative D would have the most potential for cumulative effects on the relevant and important scenic, geologic, cultural, and biological values and public safety concerns because it would designate the fewest ACECs, have the fewest overall restrictions, and result in the most development of mineral resources, ROWs, and other surface disturbances. Alternative A would be similar to Alternative D and would allow for greater potential cumulative effects than under the Proposed RMP and Alternative C.

The Proposed RMP would designate 11 areas as ACECs (46,400 acres), including Mount Logan Foothills ACEC that contains all of CRVFO's occupied habitat for two listed plant species and one sensitive species, and portions of the occupied habitat for three other special status plants. The Proposed RMP would also designate ACECs for three areas of high quality habitat for Harrington's penstemon identified as core populations of this special status species, and the McCoy Fan Delta, containing unique geologic and paleontological features. Alternative C would designate all 16 of the proposed ACECs (79,700 acres), including key/core habitat areas for special status species such as the Colorado River cutthroat trout, greater sage-grouse, and nearly all of CRVFO's special status plants. Alternative C would provide the most protection for the broadest spectrum of values within the planning area and would complement similar designations on adjoining federal lands. The Proposed RMP would protect the highest quality relevant and important values, and would provide moderate protection for the other relevant and important values through other protective measures. The Proposed RMP and Alternative C would have the least amount of cumulative impacts when added to the other actions and activities occurring on federal, state, and private lands within the scope of the analysis.

4.4.2 Wilderness and Wilderness Study Areas

Methods and Assumptions

Impacts on the wilderness characteristics of naturalness, opportunities for solitude, primitive or unconfined recreation, and special features were considered in this analysis. Existing conditions concerning wilderness and WSAs are described in Section 3.4.2. Impacts a re limited to potential changes in wilderness characteristics for the WSAs. There is no Congressionally designated wilderness in the CRVFO.

The analysis was based on the following assumptions:

- Under all alternatives, wilderness characteristics would be preserved in WSAs in accordance with nonimpairment standards as defined under the BLM Manual 6330 – *Management of Wilderness Study Areas* – until Congress either designates these lands as wilderness or releases them for other purposes. BLM Manual 6330 (BLM 2012c) replaced the *Interim Management Policy for Lands under Wilderness Review* (BLM 1995a) in July 2012.
- The general standard for interim management is that lands under wilderness review must be managed so as not to impair their suitability for preservation as wilderness. This standard is referred to as nonimpairment, which applies to all uses and activities except those specifically exempted from this standard by FLPMA (such as grandfathered uses).
- BLM Manual 6330 identifies the guidelines for specific activities so as not to impair the suitability of WSAs for preservation as wilderness.
- Permitted activities in WSAs (except grandfathered and valid existing rights) are temporary uses that create no new surface disturbance or involve permanent placement of structures.
- Those grazing, mining, and mineral leasing uses that existed on October 21, 1976 (the date FLPMA was approved) may continue in the same manner and degree as on that date, even if these uses would impair wilderness suitability.
- Lands under wilderness review may not be closed to appropriation under the mining laws to preserve their wilderness character.
- Valid existing rights are recognized.
- Continued increases in visitation would reduce opportunities for solitude and increase evidence of visitor use (human waste, trash, and travel violations). These implementation issues would be addressed on a case-by-case basis through the life of the plan.
- WSA acres have been reviewed through GIS and the actual GIS acreage may be different from previous reports, although this acreage may change in the future to provide for on-the-ground accuracy and to make sure boundaries match existing BLM public lands, USFS boundaries, or special designation boundaries. The BLM currently does not have the ability to change WSA boundaries, but must use its most current technology and information to determine what those boundaries are.

Impacts on WSAs would be considered significant if management actions "impair the suitability of [WSAs] for preservation as wilderness" (FLPMA Section 603[c]).

Within WSAs, the Manual identifies the guidelines for land use management so as not to impair the suitability of WSAs for preservation as wilderness. Because of the Manual, many resource and resource use proposals

would either (1) not apply, (2) be duplicative, or (3) have a negligible impact (only contain any management action or allowable use decisions that would have little adverse affect or benefit to wilderness study areas). The resource and resource uses that would have negligible direct impacts under any alternative include air quality, climate, soils, water resources, cultural resources, paleontological resources, caves and karsts, forestry, transportation facilities, and public health and safety. Direct and indirect impacts from these programs will not be discussed further in this section. To avoid unnecessary repetition, impacts from special status species are grouped with their respective fish and other aquatic wildlife, terrestrial wildlife, or plants sections.

Terrestrial wildlife resources (including special status species) are a special feature that contribute to an area's wilderness character. Improved aquatic wildlife populations would enhance the supplemental values found within WSAs. Larger and healthier wildlife populations would expand opportunities for primitive and unconfined recreation opportunities, including wildlife viewing, nature study, hunting, and scientific research.

Since wildlife use BLM lands outside WSAs, as well as inside WSAs, it is likely the proposed stipulations would protect and conserve terrestrial wildlife populations and benefit supplemental values found within WSAs. All alternatives propose a variety of management action and allowable use decisions to protect and conserve native fish and other aquatic wildlife populations.

Environmental Consequences

Impacts on WSAs would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on WSAs under any of the four alternatives.

Alternative A

Impacts from Wilderness Study Area Management. As opposed to Alternative B (the Proposed RMP) and Alternatives C and D, there would be no NSO stipulation prohibiting surface occupancy and surface-disturbing activities in WSAs. Proposals would be evaluated on a case-by-case basis. Activities proposed under leases, permits, and mining claims would be subject to the BLM Manual 6330 – *Management of Wilderness Study Areas* nonimpairment criteria, except to the extent a specific proposal is affected by the grandfathered or valid existing rights provision. WSAs, if released by Congress, would undergo a separate planning effort to determine how those lands would be managed.

Impacts from Fisheries and Aquatic Wildlife Management. Fish and other aquatic wildlife resources (including special status species) are special features that contribute to an area's wilderness character. Improved aquatic wildlife populations would enhance the supplemental values found within WSAs. Larger and healthier wildlife populations would expand opportunities for primitive and unconfined recreation opportunities, including wildlife viewing, nature study, hunting, and scientific research. All alternatives propose a variety of management action and allowable use decisions to protect and conserve native fish and other aquatic wildlife populations. Alternative C, followed by the Proposed RMP, would offer more aquatic wildlife conservation measures than either Alternatives A or D.

Impacts from Terrestrial Wildlife Management. Terrestrial wildlife resources (including special status species) are a special feature that contributes to an area's wilderness character. Improved terrestrial wildlife populations would enhance the supplemental values found within WSAs. Larger and healthier wildlife populations would expand opportunities for primitive and unconfined recreation opportunities, including wildlife viewing, nature study, hunting, and scientific research.

Within WSAs, the Manual identifies the guidelines for wildlife management so as not to impair the suitability of WSAs for preservation as wilderness. Since wildlife use BLM lands outside WSAs, as well as inside, it is likely the proposed stipulations would protect and conserve terrestrial wildlife populations and benefit supplemental values found within WSAs. All alternatives propose a variety of management action and allowable use decisions to protect and conserve terrestrial wildlife populations. Alternative C, followed by the Proposed RMP, offer more terrestrial wildlife conservation measures than either Alternatives A or D.

Impacts from Visual Resource Management. Alternative A's VRM Class II designations (Table 4.4.2-1) allow for changes to the visual landscape and are not compatible with preservation of wilderness characteristics. This classification is inconsistent with direction in the Manual that a low level of contrast must be maintained within WSAs.

Table 4.4.2-1
CRVFO Acres of VRM Classes in WSAs

	Alternative A				Alternative B (Proposed RMP) and Alternatives C and D			
VRM Class	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**
Bull Gulch WSA (15,200 acres)	15,200	0	0	0	15,200	0	0	0
Castle Peak WSA (12,200 acres)	0	12,200	0	0	12,200	0	0	0
Eagle Mtn. WSA (320 acres)	0	320	0	0	320	0	0	0
Hack Lake WSA (4 acres)	0	4	0	0	4	0	0	0

Acronyms and Abbreviations:

CRVFO Colorado River Valley Field Office
VRM visual resource management
WSA wilderness study area

Impacts from Wildland Fire Management. All WSAs are currently managed to allow fire, which would not change under any action alternative (the Proposed RMP or Alternatives A, C, and D). These areas are where unplanned and planned wildland fire may be used to achieve desired objectives, such as to improve vegetation, wildlife habitat, or watershed conditions. These areas would be the lowest priority for fire suppression in a multiple-fire situation and fuels treatments. WSAs would be the highest priority for emergency stabilization and rehabilitation. It is projected that the current management would continue to lessen the direct and indirect impacts of wildland fire suppression on WSAs, and beneficially contribute to ensuring that wilderness characteristics in WSAs would be protected through the life of the plan.

Impacts from Recreation and Visitor Services Management. Under all alternatives, the CRVFO would continue to manage R&VS consistent with BLM manual guidelines for recreation. Recreational activities that would impair wilderness suitability are prohibited in WSAs. Examples of activities that are allowed in WSAs are hunting, rockhounding, camping, hiking, horseback riding, fishing, and trapping as regulated under state and federal laws.

Under Alternative A, SRMAs overlap with the Bull Gulch and the Hack Lake WSAs. Recreation activities and management are subject to limitations aimed at protecting wilderness characteristics. The SRMAs are being managed consistently with the provision of opportunities for primitive and unconfined types of recreation in WSAs.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, the Eagle Mountain WSA is designated as open to OHV use and the other WSAs are closed to OHV use (Table 4.2.2-2). OHV closure is helping to protect 27,404 acres of WSAs by reducing vehicle presence and impacts within the WSAs. The open area OHV designation for the Eagle Mountain WSA could impact wilderness characteristics. However, the rugged and steep terrain currently restricts vehicles from the WSA. The rugged terrain of the Eagle Mountain WSA has presented a barrier to vehicle intrusions and would probably continue to do so in the future, although advancing technology could make the area accessible and open to impacts from motorized and mechanized travel.

Table 4.4.2-2
OHV Area Designations for WSAs

	Alternative A			Alternative B (Proposed RMP) and Alternatives C and D		
OHV Designation	**Open**	**Closed**	**Limited**	**Open***	**Closed***	**Limited***
Bull Gulch WSA (15,200 acres)	0	15,200	0	0	15,200	0
Castle Peak WSA (12,200 acres)	0	12,200	0	0	12,200	0
Eagle Mtn. WSA (300 acres)	300	0	0	0	300	0
Hack Lake WSA (4 acres)	0	4	0	0	4	0

*Includes mechanized travel

Acronyms and Abbreviations:

CRVFO Colorado River Valley Field Office
OHV off-highway vehicle
VRM visual resource management
WSA wilderness study area

Impacts from Livestock Grazing Management. Eagle Mountain and Hack Lake WSAs receive little to no grazing because of the rugged terrain. Bull Gulch and Castle Peak WSAs are annually grazed by livestock. Implementation-level grazing decisions would comply with Rangeland Standards and Guidelines for Livestock Grazing Management and *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado* (BLM 1996 and 1997a). CRVFO land health assessments indicate that, within the Bull Gulch and Castle Peak WSAs, livestock grazing has not been a factor in the non-achievement of Colorado Public Land Health Standards. In addition, no changes in AUMs are proposed in the grazing allotments overlapping with CRVFO WSAs in any alternative. Applying this information to the Data Requirements and Maximum Acceptable Impacts for Range Developments and Livestock Grazing Increases in the Manual, livestock grazing has not and would not exceed the maximum allowable impact standards designed to protect the wilderness values in an alternative (BLM 2012c).

Impacts from Lands and Realty Management. As opposed to the Proposed RMP and Alternatives C and D, there is no specific designation of WSAs as ROW exclusion areas under Alternative A. Existing ROWs may be renewed if they are still being used for their authorized purpose. Necessary routine maintenance authorized in the original permit is still authorized. New ROWs may be authorized for temporary or permanent uses that satisfy the nonimpairment criteria under certain conditions as described in BLM Manual 6330. Land disposal would be managed under Manual 6330 (BLM 2012c).

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Approximately 27,700 acres of federal mineral estate within WSAs would be designated as closed to fluid mineral leasing under all alternatives. In Alternative A, WSAs are open to (1) coal leasing, exploration and development, (2) salable minerals (moss rock, sand, and topsoil), and (3) non-energy solid

leasable minerals (sylvite and halite), provided the sale or lease meets the Manual's nonimpairment criteria, and provided that those activities began before the passage of FLPMA. However, no mineral operations currently meet these criteria.

These actions and allowable use decisions support the Manual's nonimpairment criteria and help retain the WSAs natural character. According to the Manual, lands under wilderness review may not be closed to appropriation under the mining laws to preserve their wilderness character.

Impacts from Areas of Critical Environmental Concern Management. In all alternatives, the Bull Gulch WSA and the Bull Gulch ACEC overlap (10,400 acres). The relevant and important values (scenic and botanical) of the ACEC are special features that also contribute to the wilderness character of the area. Management prescriptions that protect the relevant and important values within the Bull Gulch ACEC are consistent with wilderness Manual.

Alternative B (Proposed RMP)

Impacts to wilderness study areas from wildland fire management and livestock grazing management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Wilderness Study Area Management. Under the Proposed RMP and Alternatives C and D, an NSO stipulation on surface-use and surface-disturbing activities would be applied. (The stipulations administratively support the nonimpairment standard in the BLM Manual 6330 – Management of Wilderness Study Areas.) Activities proposed under leases, permits, and mining claims would be subject to the stipulation, except to the extent a specific proposal is covered by the grandfathered or valid existing rights provision identified in the Manual. Wilderness characteristics would be assured long-term protection by clearly restricting activities and uses that would create new surface disturbances. WSAs, if released by Congress, would be managed under prescriptions set forth in this RMP revision (see Chapter 2, Wilderness Study Areas).

Impacts from Managing to Protect Wilderness Characteristics. The Proposed RMP would protect and preserve wilderness characteristics (naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation) through special management of lands having those characteristics outside WSAs, based on the Lands with Wilderness Characteristics—Assessment for the CRVFO (Appendix D). The areas would include Castle Peak Addition (3,900 acres), Deep Creek (4,300 acres), Flats Tops Addition (3,500 acres), Pisgah Mountain (14,500 acres) and Thompson Creek (8,200 acres). Additional protection would be provided by closing these areas to fluid mineral leasing and by an NSO stipulation prohibiting surface occupancy and surface-disturbing activities.

The Castle Peak Addition is adjacent to the Castle Peak WSA. The Flat Tops Addition is adjacent to the Hack Lake WSA. Protecting these units for their wilderness characteristics would (1) create a larger, contiguous, intact landscape to protect naturalness and supplemental values; (2) enhance opportunities for solitude; and (3) and enhance opportunities for primitive and unconfined recreation within the existing Castle Peak WSA and Hack Lake WSA.

Impacts from Visual Resource Management. BLM Instruction Memorandum No. 2000-096 clarifies the appropriate VRM class designation for WSAs. Recognizing case-by-case exceptions for valid existing rights

and grandfathered uses, IM 2000-096 directs that all WSAs be classified as Class I when RMPs are prepared that contain WSAs. The objective of VRM Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes. It does not preclude limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention, thereby helping preserve the visual integrity of the WSAs. Under the Proposed RMP and Alternatives C and D, WSAs would be designated as VRM Class I (Table 4.2.2-1). Therefore, the impacts on WSAs from VRM decisions would be the same for all action alternatives.

Impacts from Recreation and Visitor Services Management. Impacts from recreation on WSA are similar across all alternatives. Under the Proposed RMP and Alternatives C and D, a CSU stipulation would be applied to protect recreation opportunities if the WSAs are released by Congress. The WSAs would be managed as ERMAs where recreation would be planned for and managed for the specific area based on resources and conditions of the area. A continued emphasis on nonmotorized, non-mechanized recreation would provide many of the benefits of wilderness-oriented management despite the change in status. (CRV-CSU-13 under the Proposed RMP; CRV-CSU-22 under Alternatives C and D.).

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP and Alternatives C and D, BLM would designate all WSAs as closed to OHV travel and closed to mechanized travel. Travel management decisions which close WSAs to motorized and mechanized travel effectively promote opportunities for primitive and unconfined recreation, prevent additional intrusions, and enhance wilderness values, which would result in long-term benefits. If released by Congress from WSA status, the WSA areas would be closed to motorized and mechanized travel under 43 CFR 8342.1. This travel designation would ensure that many of the recreation and environmental benefits provided by wilderness-oriented management were still realized despite the change in status.

Impacts from Lands and Realty Management. The Proposed RMP and Alternatives C and D would designate WSAs as a ROW exclusion area (also applies to renewable energy applications) where no new temporary or permanent ROW proposals would be considered (CRVFO-NSO-29 in the Proposed RMP; CRV-NSO-50 in Alternatives C & D). Existing ROWs may be renewed or maintained if they are still being used for their authorized purpose. This allowable use action would clearly support the Manual and preclude impacts on wilderness characteristics from the authorization of new temporary or permanent ROWs. WSAs would be designated as retention areas (lands retained for long-term management), and land exchanges would not be considered even under very limited cases or unique situations as described in the Manual.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Approximately 27,700 acres of federal mineral estate within WSAs would be closed to fluid minerals leasing under all alternatives (Alternatives A through D). Under the Proposed RMP and Alternatives C and D, WSAs would be closed to (1) coal leasing, exploration and development, (2) salable mineral removal (moss rock, sand, and topsoil), and (3) non-energy solid leasable mineral development (sylvite and halite). These allowable use prohibitions administratively protect wilderness characteristics and support the nonimpairment standard in BLM Manual 6330 (BLM 2012c).

Alternative C

Impacts to wilderness and wilderness study areas from wildland fire management, livestock grazing management, and comprehensive trails and travel management would be the same as or similar to those under

Alternative A. Impacts from management of other resources and uses would be the same as or similar to those under the Proposed RMP, except as described below.

Impacts from Managing to Protect Wilderness Characteristics. Alternative C proposes to protect and preserve wilderness characteristics (naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation) through special management of lands having those characteristics outside WSAs, based on the Lands with Wilderness Characteristics--Assessment for the CRVFO (Appendix D). The areas include Castle Peak Addition (3,900 acres), Deep Creek (4,300 acres), Flats Tops Addition (3,500 acres), Grand Hogback (11,400 acres), Pisgah Mountain (14,500 acres) and Thompson Creek (8,200 acres). Additional protection would be provided by closing these areas to fluid mineral leasing and an NSO stipulation prohibiting surface occupancy and surface-disturbing activities. The Castle Peak Addition is adjacent to the Castle Peak WSA. The Flat Tops Addition is adjacent to the Hack Lake WSA. Protecting these units for their wilderness characteristics would (1) create a larger, contiguous, intact landscape to protect naturalness and supplemental values; (2) enhance opportunities for solitude; and (3) and enhance opportunities for primitive and unconfined recreation within the existing Castle Peak and Hack Lake WSAs.

Alternative D

Impacts to wilderness and wilderness study areas from livestock grazing management and comprehensive trails and travel management would be the same as or similar to those under Alternative A. The exception is Alternative A's designation of Eagle Mountain WSA as open to OHVs, which is less protective of wilderness character than Alternative D's closure of Eagle Mountain WSA to OHV use. Impacts to management of other resources and uses would be the same as or similar to those under the Proposed RMP.

Cumulative Impacts

See the combined discussion of cumulative impacts in Section 4.2.12 Lands Proposed for the Protection of Wilderness Characteristics.

4.4.3 Wild and Scenic Rivers

Methods and Assumptions

This section is a discussion of the potential impacts of implementing the management actions in this RMP on WSRs, based on the existing conditions of WSR resources described in Section 3.4.4. Section 5(d)(1) of the Wild and Scenic Rivers Act (Public Law 90-542 16 USC, Sections 1271 to 1287) directs federal agencies to consider potential WSRs whenever they undertake a land and water planning effort (for example, an RMP or LUP revision). To fulfill this requirement, the CRVFO completed a WSR eligibility study in September 2002 for the Roan Plateau and in March 2007 for the rest of the CRVFO area. A WSR suitability study is being conducted as part of the current RMP revision process. The *Final WSR Eligibility Reports* identified 26 eligible segments in the CRVFO to be carried forward for analysis in the suitability study.

The National Wild and Scenic Rivers System stream suitability analysis for eligible Roan Plateau stream segments (East Middle Fork Parachute Creek Complex and East Fork Parachute Creek Complex) was included in the Draft RMP/Draft EIS and is also contained in this document (including Appendix C - Final Wild and Scenic Rivers Suitability Report). Suitability determinations for eligible stream segments on the Roan Plateau have been deferred to the supplemental EIS. BLM will maintain eligible status for East Middle Fork Parachute Creek Complex and East Fork Parachute Creek Complex until a record of decision is entered for the Roan Plateau planning area. The draft suitability analysis for eligible Roan Plateau stream segments will be converted to a final suitability determination when the BLM State Director signs a ROD for the Roan Plateau plan. At that time, BLM will render a suitability determination using information and alternatives from this planning process, along with any new alternatives and information generated for the Roan Plateau planning area supplemental EIS.

The 13 eligible segments outside of the Roan Plateau planning area serve as the baseline for this impact analysis in the Proposed RMP and Alternatives C and D. The 26 eligible segments including the Roan Plateau planning area are the baseline for Alternative A.

In addition, this section discusses the potential impacts of a range of suitability determinations on four WRNF eligible WSR segments. These segments—two on the Colorado River and two on Deep Creek—were determined eligible in the WRNF Land and Resource Management Plan, 2002 Revision. The WSR suitability determinations for both the BLM and the WRNF, to be implemented as a component of this RMP, would conclude the WSR Suitability Study (Appendix C).

Potential impacts are addressed in two separate discussions under each alternative because implementation of the RMP includes direct WSR administrative determinations. The first discussion addresses the potential impacts resulting from the administrative WSR determinations described in Chapter 2 of the RMP. The second discussion addresses the potential impacts on WSRs from implementing other resource (not WSR) management actions. Below is a description of the methods used for each of these discussions.

Effects Resulting from WSR Determinations

This discussion focuses on potential impacts on WSR resources from implementing the range of administrative WSR determinations described in Chapter 2. As described above, the BLM and WRNF are conducting a WSR suitability study as part of this RMP, and the alternatives analyzed address the full range of potential suitability study results. The baseline for the analysis of impacts on wild and scenic resources described in Section 3.4.3 is defined as the final eligibility determinations presented in the March 2007

eligibility study (26 segments were determined eligible) and in the 2002 Forest Plan for the WRNF (WRNF 2002a).

The potential administrative WSR determinations being analyzed for each segment are as follows:

- Eligible – This is the "no action" alternative, under which the eligibility determinations in BLM's March 2007 Eligibility Report would remain in place. The WRNF eligibility determinations and subsequent management area prescriptions from the 2002 Forest Plan would remain in place. Under this alternative, no further WSR determinations would be made, and the eligible segments would be managed under guidelines of the Wild and Scenic Rivers Act through agencies' existing administrative authorities.
- Not Suitable – The BLM and WRNF would make a determination of "not suitable," and the river segment would be managed under other resource allocations and land use prescriptions as adopted in this LUP. The segment would no longer have agency administrative protections for "eligible" stream segments.
- Suitable – The BLM and WRNF would make a determination of "suitable," and the river segment would be managed under the protective provisions of the Wild and Scenic Rivers Act. BLM and USFS would also use resource allocations and land use prescriptions in the LUP to maintain and enhance the outstandingly remarkable values, tentative classification, free flowing condition and water quality. Current WRNF management area prescriptions from the 2002 Forest Plan would remain in place. BLM and USFS would actively recommend designation of these segments to the President and Congress.
- Defer Suitability Determination for Certain Segments and Rely upon the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, in concert with BLM Land Management Authorities. The broad-based Upper Colorado River Stakeholder Group (stakeholder group) has proposed a plan that provides a management alternative for Colorado River Segments 4 through 7, from Gore Canyon within the KFO through a point 1 mile east of the confluence with No Name Creek in the CRVFO (See Appendix Q). Under this alternative, the eligibility determinations made by the BLM and the WRNF would remain in place, along with the protections afforded to eligible segments under the Wild and Scenic Rivers Act and other federal administrative authorities. However, BLM and WRNF would defer its suitability determination for these segments while the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* was implemented and the effectiveness of the plan was evaluated. A more detailed description of the BLM's and WRNF's proposed oversight of the *Upper Colorado River Stakeholder Wild and Scenic Group Management Plan* is provided below.

In addition, this analysis considers the potential impacts of federal WSR designation. Formal designation would require an act of Congress and therefore is beyond the scope of this RMP. However, a BLM or WRNF determination of suitability would increase the likelihood that a particular segment would be formally designated a WSR by Congress. Therefore, these segments are analyzed below to identify the potential effects of congressional designation.

Analysis Framework. The level of protection of a river segment's free-flowing condition, water quality, ORVs, and classification afforded by the various components of protective river management (Table 4.4.3-1), such as data collection, ease of implementation, and response to other projects, was used to identify the extent of protective measures to be implemented under various WSR determination scenarios. The net level

of protection afforded each segment is the basis for evaluating potential impacts. There are multiple concepts that are important for interpreting the impact analysis found in the matrix.

Wild and Scenic Rivers Act Protections. There are two levels of protection afforded to stream reaches under the Wild and Scenic Rivers Act. The first level of protection occurs as a result of WSR analysis conducted by a land management agency. A BLM and WRNF determination of eligibility or suitability obligates the agencies within its authority to manage the segments for the protection of their free-flowing condition, water quality, ORVs, and tentative classification. The BLM and WRNF are also obligated to protect the water quality necessary to support the ORVs. It is important to note that the agencies can change their eligibility or suitability determinations with a LUP amendment or revision. Therefore, protections under the Wild and Scenic Rivers Act short of a designation by Congress cannot be considered permanent protections. When a segment is added to the NWSRS by Congress, obligations on the federal land management agencies are formalized and made permanent. In addition, the BLM and WRNF would be required to formulate a coordinated Comprehensive River Management Plan (CRMP) with cooperating agencies and stakeholders to maintain and enhance outstandingly remarkable values in the river segment. Furthermore, all other federal agencies are obligated to protect WSR values in their decisions on proposed actions that may affect the stream segment. For example, the US Army Corps of Engineers would be required to protect WSR values in making decisions regarding dredge and fill permits under Section 404 of the Clean Water Act. Similarly, the US Bureau of Reclamation would be required to protect WSR values in making decisions regarding new projects or new storage contracts.

Land Use Planning Protections. The BLM has authorities other than the Wild and Scenic Rivers Act that can be used to protect and enhance ORVs, the free-flowing condition of stream segments, the level of classification, and water quality that supports the ORVs. These authorities are primarily found under Sections 202, 204, and 205 of FLPMA. These sections provide BLM with authority to make administrative designations as part of a land use planning decision, such as designating specific locations as an ACEC or SRMA. In addition, BLM can make land use allocations as part of a LUP, such as closing specific areas to new ROWs, or placing stipulations on usage, such as an NSO. Sections 205 and 206 of the FLPMA provide authority to acquire private lands from willing sellers, and to exchange lands with other parties, both of which can be used to protect and enhance river-related values. It is important to note that land use planning protections are not permanent, and that BLM can modify or remove these protections by amending the LUP or modifying the protections in a comprehensive LUP revision. In the following matrix that identifies impacts, the protections for river-related values that are provided by land use planning decisions are referred to as "Land Use Planning Protections." For segments determined to be eligible or suitable in the ROD, BLM would protect ORVs in accordance with interim protection guidelines, which mandate protection of the free-flowing condition, water quality, ORVs, and tentative classification, pending Congressional action or for the duration of the RMP.

Like the BLM, the WRNF has land use planning authorities other than the Wild and Scenic Rivers Act that can be used to protect resources including identified WSR values. These authorities are found in the Forest and Rangeland Renewable Resources Planning Act (RPA) as amended by the National Forest Management Act of 1976 (NFMA), FLPMA, NEPA, Organic Administration Act of 1897, and Multiple-Use Sustained-Yield Act of 1960. These acts provide the WRNF authority to make administrative decisions and subsequent management direction for all National Forest System lands as part of the land use planning process. A forest plan provides guidance for all resource management activities. It establishes forest-wide goals and objectives, management requirements (standards and guidelines), desired conditions, direction for specific management

areas, monitoring and evaluation requirements, designation of lands as suitable or not suitable for resource management activities, and recommendations to Congress for establishment of wilderness areas, wild, scenic, and recreational river eligibility, and other special designations. No recommendations to Congress for WSR designation have occurred to date on the WRNF. This planning process will analyze the suitability of four segments on two rivers found to be eligible in the 2002 Forest Plan.

Protections under Other Federal Laws. Federal agencies have additional authorities to protect WSR values under other federal laws. These laws include the Federal Water Pollution Control Act of 1986, as amended, and the Clean Water Act of 1977, as amended. Specifically, Sections 208 and 303 of the Clean Water Act provide authority for implementation of water quality planning processes and best management practices with state governments. In addition, Executive Order 11988 regarding Floodplain Management provides authority to federal agencies to take actions to preserve and enhance floodplain functions. Since implementation of these authorities is unlikely to differ between determinations that stream segments are eligible or suitable under the Wild and Scenic Rivers Act, they are not discussed in the following matrix that displays WSR impacts.

Protection of Flow-Related ORVs. While both agencies are obligated to use their legal authorities to protect ORVs in eligible, suitable, or designated river segments, they do not possess comprehensive authority to manage flows through these segments. The federal government has delegated authority to state governments for water allocation, and accordingly, cannot control flow rates. For most of the river segments that have been designated as eligible, a substantial number of existing water rights have been created pursuant to Colorado water law procedures. Administration of these water rights and their relative priorities drives the flow rates experienced in these segments.

BLM and WRNF authorities related to flow rates are primarily found within FLPMA, which allows the agencies to make decisions on land use authorizations for water facilities on BLM and WRNF lands. Both agencies have the discretion to deny applications for new facilities or modification of existing facilities or attach terms and conditions to an authorization for protecting flow rates necessary to support ORVs.

The other flow-related authority that the BLM and the WRNF can rely on is within the Wild and Scenic Rivers Act, and this authority is conferred upon the BLM and WRNF when a river segment is designated by Congress into the NWSRS. Designation creates federal reserved water with a priority date that is equal to the date of designation. The BLM and WRNF quantify the flow rates necessary to support the ORVs and seek an adjudication of the water right through the Colorado water court system. Since the water right is junior, it cannot prevent or change the exercise of senior water rights, but it can assist in preserving current flow regimes.

Upper Colorado River Wild and Scenic Stakeholder Group Management Plan Analysis Assumptions. As mentioned previously, a broad-based group of stakeholders has proposed a river management plan for Colorado River Segments 4 through 7 (Appendix Q). Relying on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* complies with BLM and USFS policies regarding implementation of the Wild and Scenic Rivers Act. The BLM and USFS Wild and Scenic Rivers manuals specifically require BLM and USFS to evaluate various river management options to identify the method that will best support the outstandingly remarkable values while acknowledging other uses of the river corridor. The BLM and USFS manuals also require protection of river values identified on eligible rivers until a final resolution on suitability. If the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* succeeds, it could be the best possible approach

for supporting the outstandingly remarkable values. The BLM and WRNF have made multiple assumptions to complete a NEPA analysis of the alternative. These assumptions are listed below.

- The *Upper Colorado River Wild and Scenic Stakeholder Group Management Pla*n will ultimately be formally supported by a broad range of stakeholder groups and ultimately formally endorsed by their respective boards.
- The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* will comprehensively address Colorado River Segment 7 in Glenwood Canyon. The plan will ultimately be formally supported by a broad range of stakeholders who operate in the Eagle River watershed, because flows in the Eagle River have a significant impact on Segment 7.
- The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* will have adequate indicators for the status of the various ORVs within the river segments and provide adequate flow rates to support the ORVs.
- The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* will have a provisional period when the ORV indicators and the range of flow rates necessary to support the ORVs are further refined and verified.
- Sufficient funds and personnel time to operate the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* alternative will be provided by members of the stakeholder group.
- The stakeholder group will consider changes to their proposed plan that are suggested by the public review of the plan that will occur through this EIS process.
- The final *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* will consider hydrologic changes created by the authorization of the Windy Gap Firming Project (Northern Colorado Water Conservancy District) and the Moffat Tunnel Firming Project (Denver Water Board), and implement actions necessary to insure that ORVs continue to be supported even when these projects are operating. Unless the stakeholder group Plan's "Poison Pill" is invoked, efforts under the plan incorporate modeled hydrology with the Moffat Project and the Windy Gap Firming Project in place.
- One of the primary advantages offered by the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* is a commitment to operate existing water management facilities to provide flow rates that support the ORVs, to the extent that such operations can be consistent with water supply and water yield requirements for the owners of the facilities. This commitment addresses an element that is critical to the long-term viability of the ORVs but is an element over which the BLM and the WRNF do not have management authority. In addition, the stakeholder management plan has proposed an instream flow appropriation on Colorado River Segments 4 through 7 by the CWCB. While the BLM could also make an instream flow recommendation to the CWCB, such a recommendation would likely not be approved without broad support from stakeholders who are working toward creation of the stakeholder management plan. It is important to note that an instream flow water right held by the CWCB would not be able to protect flows needed to support the recreational ORV because CWCB appropriations are limited to flows necessary to support the natural environment. However, there is a stakeholder group commitment to explore and, when available, implement cooperative measures, such as enhanced flows in Segments 4-7, to support ORVs.

- *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* Oversight. If the BLM and WRNF choose to rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* in concert with BLM land management authorities for Colorado River Segments 4 through 7, the agencies will not delegate their WSR management responsibilities to the stakeholder group. The BLM and WRNF will remain responsible for ensuring that the ORVs, classification, water quality, and free-flowing condition of the portions of the river segments that are on federal land are protected. Accordingly, if the BLM or the WRNF choose to rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, the agencies will implement the following oversight mechanisms:
    - The BLM will proceed to amend its LUP to include a determination that Colorado River Segments 4 through 7 will be managed as eligible. The BLM and USFS will defer a suitability determination while they evaluate the effectiveness of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* in protecting the ORVs. The deferral will continue as long as the BLM and USFS conclude the plan is effective. If BLM and USFS conclude that the stakeholder management plan is not effective in protecting the ORVs, or lacks sufficiently broad-based support to continue to serve as a viable management alternative, BLM will initiate a process to complete a suitability determination for Colorado River Segments 4 through 7.
    - In conjunction with WRNF, BLM will establish a multi-disciplinary review team comprised of resource specialists and managers from both agencies. The review team will meet annually to evaluate whether the stakeholder management plan is effective in supporting and protecting the ORVs. To make its determination, the review team may utilize WSR management criteria found in agency manuals and directives, annual reports and information provided by the stakeholder group, and information collected by agency personnel. The agency review team may also elect to consider sources of information concerning the status of ORVs that are created independently of studies conducted by the stakeholder group. These additional sources of information may include studies by independent consultants or reports of management outcomes produced in other forums, such as within the implementation of BLM's SRMA for the Colorado River, or within BLM-USFS cooperative management of Glenwood Canyon.
    - The BLM and USFS will initiate a partnership with the stakeholder group to facilitate coordination and communication. The partnership will include a commitment by BLM and USFS to send staff members to stakeholder group meetings and to schedule periodic meetings exclusively for coordinating actions between the federal agencies and the stakeholder group. The federal agencies will also commit to communicating to the stakeholder group any early indications that the stakeholder management plan is not effectively supporting the ORVs.
    - The BLM or the USFS will reserve the right to make a suitability determination at any time in response to a proposed project that could threaten the ORVs, water quality, classification, or free-flowing condition of Colorado River Segments 4 through 7. Before doing so, the BLM and/or the USFS will give the stakeholder group the opportunity to communicate with the project proponent. The purpose of this communication would be to determine if the proponent is willing to take advantage of the processes afforded to project proponents in the stakeholder management plan.

Table 4.4.3-1
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
These elements represent the various components of protective river management. The focus is protection of a particular river segment's free-flowing condition, water quality, ORVs, and classification.	*This column presents the management options available for segments determined to be not suitable for inclusion in the NWSRS. This determination would complete the assessment of the segment and remove its current status as an eligible river segment.*	*This column presents the management options available for segments remaining as eligible. The suitability study currently underway would not be completed and segments would remain eligible as identified in the BLM March 2007 study and USFS 2002 plan.*	*This column presents the management options available for segments determined to be suitable. A suitability determination is an administrative determination and does not directly result in federal designation as part of the NWSRS. However, it would increase the likelihood of formal designation as a WSR.*	*This column presents the management options available for Colorado River Segments 4-7 which would be managed through the adoption of the Upper Colorado River Wild and Scenic Stakeholder Group Management Plan. Suitability determinations would be deferred and the segments would remain as eligible. Such segments would not be recommended to Congress for formal designation.*	*This column presents the potential management options available for the protection of river segments as Congressionally designated WSR. Such a designation is beyond the scope of this RMP and the authority of the federal agencies, but is explored in this impact analysis because a suitability determination would increase the potential for formal Congressional designation.*
Data collection on characteristics, quality, and extent of ORVs	The BLM and WRNF would collect data only as needed to address emerging resource problems.	The BLM and WRNF would collect data only as needed to address emerging resource problems.	The BLM and WRNF would collect data only as needed to address emerging resource problems and to meet management objectives established in the RMP for the segment.	Engage a broad range of stakeholders, who are bringing additional resources to the table, to collect and evaluate data for all the flow-dependent ORVs.	Engage a broad range of stakeholders, within the context of a coordinated RMP, to collect and evaluate data for all the flow-dependent ORVs.
Data collection to monitor any impairment of ORVs	The BLM and WRNF would continue to collect data relevant to ongoing management of existing programs, such as recreation management. ORVs may not receive dedicated monitoring resources.	The BLM and WRNF would continue to collect data relevant to ongoing management of existing programs, and would initiate data collection on ORVs with clear threats.	The BLM and WRNF would collect data only as needed to address emerging resource problems and to meet management objectives established in the RMP for the segment.	Establish a schedule and protocol to continuously collect data to monitor changes in ORVs (early warning system).	The BLM and WRNF would likely partner with state and local agencies to identify data and establish framework for periodic monitoring, triggered when on-the-ground observations detect resource changes.

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
Monitoring of overall plan effectiveness in protecting river corridors and ORVs	The river corridor would be managed under the agencies' LUPs, updated on a 15- to 20-year cycle. A comprehensive review of plan effectiveness may not occur until the plan is revised, but the federal agencies would likely be aware of issues where plan decisions are not working well and may implement plan amendments.	The river corridor would be managed under the agencies' LUPs, updated on a 15- to 20-year cycle. A comprehensive review of plan effectiveness may not occur until the plan is revised, but the agencies would likely be aware of issues where plan decisions are not working well, and may implement plan amendments.	The river corridor would be managed under the agencies' LUPs, updated on a 15- to 20-year cycle. In cases where conditions are changing or clear threats exist to ORVs, agencies would implement monitoring to determine effectiveness of plan.	The BLM and WRNF would receive annual updates from the stakeholder group on plan effectiveness. The agencies would convene an interdisciplinary team to review and confirm findings in the update and to communicate on-the-ground concerns back to the stakeholder group for actions that are within the authorities of the stakeholder group. If the plan is deemed by the BLM and the USFS to not be effective, the agencies have the option to implement a LUP amendment in which a suitability determination would be made.	The BLM and WRNF would be required to complete a Comprehensive River Management Plan within 3 years of designation and update it on a regular basis. This update would require the BLM and WRNF to implement a process to determine if actions in the plan effectively addressed the critical resource issues that were identified.
Flow protection: How quickly can it be implemented?	The BLM and WRNF could make recommendations to the CWCB for instream flow protection. The CWCB can appropriate flows only for protection of the natural environment, and	The BLM and WRNF could make recommendations to the CWCB for instream flow protection. The CWCB can appropriate flows only for protection of the natural environment, and	The BLM and WRNF could make recommendations to the CWCB for instream flow protection. The CWCB can appropriate flows only for protection of the natural environment, and	The stakeholder group has already made instream flow recommendations to the CWCB. With this unanimity of support, it is likely that protection could be implemented within 2 years.	Flow protection could not be implemented until Congress formally designates the stream reaches, the BLM and WRNF collect the data necessary to support an application for a federal

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
	cannot appropriate flows to protect recreation uses. The recommendations process usually requires at least 3 years on major rivers. The BLM and WRNF could participate in existing cooperative flow management efforts, but these forums are not focused on supporting ORVs.	cannot appropriate flows to protect recreation uses. The recommendations process usually requires at least 3 years on major rivers. The BLM and WRNF could participate in existing cooperative flow management efforts, but these forums are not focused on supporting ORVs.	cannot appropriate flows to protect recreation uses. The recommendations process usually requires at least 3 years on major rivers. The BLM and WRNF may be able to accelerate protection by working with partners, such as CPW, to conduct studies and make a joint instream flow recommendation.		reserved water right, and the Colorado Water Court acts. Interim flow protection would rely on existing downstream senior water rights and existing instream flow water rights located downstream.
Flow protection: How permanent is the mechanism?	A federal reserve instream flow water right would not be created. If appropriated, a CWCB-based instream flow is held indefinitely as a public trust by the state. However, the right can be modified via actions of the board.	A federal reserve instream flow water right would not be created. If appropriated, a CWCB-based instream flow is held indefinitely as a public trust by the state. However, the right can be modified via actions of the board.	A federal reserve instream flow water right would not be created. If appropriated, a CWCB-based instream flow is held indefinitely as a public trust by the state. However, the right can be modified via actions of the board.	A CWCB-based instream flow is held indefinitely as a public trust by the state, but the right can be modified by the board. Cooperative flow management via coordinated operation of facilities depends on ongoing commitments from facilities operators. Other measures, such as delivery of water to endangered fishes and senior water rights, rely on continuation of administrative efforts, not on legally mandated protection.	Federal reserved water would be in place permanently and could be modified only through formal court proceedings. The BLM and WRNF would be obligated to promptly quantify, adjudicate, and perfect the water right.

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
Flow protection: How effective is the mechanism? Can the protection mechanism cooperatively address existing and future flow-related problems?	A CWCB water right, if adopted, would be a junior water right and could not address flow issues created by operation of senior water rights. A CWCB water right also cannot address flow protection for the recreational ORV. A CWCB water right would be able to address changes in flows created by proposed new water rights by proposed changes to existing rights.	A CWCB water right, if adopted, would be a junior water right and could not address flow issues created by operation of senior water rights. A CWCB water right also cannot address flow protection for the recreational ORV. A CWCB water right would be able to address changes in flows created by proposed new water rights by proposed changes to existing rights.	A CWCB water right, if adopted, would be a junior water right and could not address flow issues created by operation of senior water rights. A CWCB water right also cannot address flow protection for the recreational ORV. A CWCB water right would be able to address changes in flows created by proposed new water rights by proposed changes to existing rights.	A CWCB water right would be a junior water right and could not address flow issues created by operation of senior water rights. A CWCB water right also cannot address flow protection for the recreational ORV. A CWCB water right would be able to address changes in flows created by proposed new water rights by proposed changes to existing rights. With broad stakeholder support and monitoring, it is highly likely that the CWCB right would be effectively implemented and enforced. Coordinated management of existing facilities would enable the stakeholder group to address issues created by operation of existing water rights.	A federal reserved water right could claim flows needed to protect the recreation ORV. A federal reserved water right would be a junior water right and could not address flow issues created by operation of senior water rights. A federal reserved water right would be able to address changes in flows created by proposed new water rights by proposed changes to existing rights.

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
Protection of water quality to support the ORVs, including temperature	The BLM and WRNF would continue to participate in state water quality processes to comment on proposed permits, standards, and water quality improvement projects.	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and the USFS. The other agencies are not required to act on the BLM and WRNF comments. The BLM and WRNF would not be able to permit projects on its lands that would unreasonably diminish water quality that is necessary to support ORVs.	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and the USFS. The other agencies are not required to act on BLM and WRNF comments. The BLM and WRNF would not be able to permit projects on its lands that would unreasonably diminish water quality that is necessary to support ORVs. Water quality issues in the segment would be addressed via LUP protections and via coordination with other state, federal, and local agencies.	Stakeholder group would consider voluntary and proactive steps, such as modification of water project operations, to address water quality issues. Stakeholder group would also rely on BLM and USFS land management prescriptions to address water quality issues.	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and the USFS. Other federal agencies would be prohibited from approving projects that unreasonably diminish the water quality necessary to support the ORVs. The BLM and the USFS would not be able to permit projects on its lands that would unreasonably diminish water quality or adversely affect the ORVs.
Response to water projects that could affect ORVs and classification	There is no legal requirement for the BLM and WRNF to comment to other federal agencies on new projects, but the BLM and the USFS would be free to submit resource-oriented comments to the	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and WRNF. The other agencies are not required	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and the USFS. The other agencies are not required	Project proponents who chose to take advantage of the stakeholder group process will commit to the stakeholder group to meet either subparagraph a. or b. below: (a.) Demonstrate that project operations will	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and WRNF. Projects that

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
	decision making agency. On the BLM and WRNF lands, terms and conditions would be applied to projects to minimize resource impacts.	to act on the BLM's or USFS's comments. The BLM and WRNF would not be able to permit projects on its lands that would adversely affect the ORVs.	to act on BLM's or WRNF's comments. The BLM and WRNF would not be able to permit projects on its lands that would adversely affect the ORVs.	not unreasonably diminish the ORVs; or (b.) Demonstrate that project operations will be subject to mitigation to avoid unreasonably diminishing the ORVs.	unreasonably diminish the ORVs or invade the protected river corridors would be prohibited. No federal agency would be able to permit projects that would adversely affect the ORVs.
Response to other land-based river corridor projects that could affect ORVs and classification (bridges, roads, power lines, etc.)	There is no legal requirement for comments on consultations between federal agencies on new projects, but the BLM and WRNF would be free to submit resource-oriented comments to the decision making agency. On BLM lands, terms and conditions would be applied to projects to minimize resource impacts.	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and WRNF. The other agencies are not required to act on the BLM and WRNF comments. The BLM and WRNF would not be able to permit projects on its lands that would adversely affect the ORVs, or terms and conditions would be applied to avoid resource impacts.	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and WRNF. The other agencies are not required to act on the BLM and WRNF comments. The BLM and WRNF would not be able to permit projects on its lands that would adversely affect the ORVs, or terms and conditions would be applied to avoid resource impacts. LUP protections would be in place to avoid impacts on ORVs and classification.	BLM and USFS would seek comments from the stakeholder group on any proposed land-based project that could affect W&SR values.	Other federal agencies considering permit applications that could affect ORVs would be required to seek formal comments from the BLM and the USFS. Projects that unreasonably diminish the ORVs or invade the protected river corridors would be prohibited. No federal agency would be able to permit projects on lands that would adversely affect the ORVs, or terms and conditions would be applied to avoid resource impacts.

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

River Protection Element	Determination of Not Suitable	Eligibility Determination (No Action)	Suitability Determination	Suitability Deferral plus rely on the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* (Colorado River Segments 4 through 7)	Wild & Scenic Designation by US Congress
Integration of protection with other ongoing resource management programs	The BLM and WRNF would initiate coordination between programs, between agencies, and with stakeholders on an as-needed basis, as resource management problems arise.	River corridors would be managed according to protective provisions in the BLM and WRNF land use plans.	The river corridor would be managed according to protective provisions in the BLM and WRNF LUPs. All LUP allocations and prescriptions for all resource management programs will be designed to insure support for the ORVs and to maintain the segment classification.	The stakeholder group would rely on the BLM and WRNF LUPs for management of land use issues on the BLM and WRNF lands. For issues where BLM and WRNF lack management authority (water rights operations and wildlife populations). The stakeholder group would seek to integrate management on a real-time basis with other stakeholders in the basin. For example, the stakeholder group would assist with integrating river corridor flow management with the water rights system and with the endangered fishes recovery program.	Development of comprehensive RMP would require cooperation and integration with plans of other state and federal agencies. Issues outside the BLM's and WRNF's management authority (water rights operation and wildlife population management) may not be addressed in the plan.

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

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Ability to implement adaptive management as conditions change	The BLM and WRNF would implement adaptive management with existing cooperators as resource management issues arise. However, certain resource issues that are critical to certain ORVs, such as flow management, may not be addressed because they are not within the BLM's and WRNF's management authority.	The BLM and WRNF would manage resources in accordance with the LUPs. If an adaptive management decision were determined to be at the "implementation level" with regard to the LUP, the adaptive management could be implemented without amending the LUPs. Major changes in land use management driven by adaptive management objectives would require a LUP amendment.	The BLM and WRNF would manage resources in accordance with LUPs. If an adaptive management decision were determined to be at the "implementation level" with regard to the LUP, the adaptive management could be implemented without amending the LUP. Major changes in land use management driven by adaptive management objectives would require a LUP amendment. The BLM and WRNF would be likely to implement activity-level plans to guide implementation-level decisions.	The stakeholder group recognizes that existing data for the quality, extent, and condition of the ORVs is incomplete, and that information is incomplete on flows needed to support the ORVs. The group has suggested a process for continuous review of new data and a process to implement corrective actions if data suggest degradation of ORVs.	The requirement to publish a coordinated RMP for the river corridor would require the BLM and WRNF to make a long-term commitment to management decisions that could be changed only with a formal plan amendment. To promote adaptive management, the plan could identify where and when adaptive management will occur, and could define the parameters and limits for adaptive management.
Financial, personnel, and other resources available to maintain and enhance ORVs	Management of ORVs would be within existing budgets and existing BLM and WRNF agreements with other entities. Funding would typically not be available to address flow management issues.	Funds available are limited to requests made through the annual budget cycle and are typically project-specific funds, rather than long-term funds. Funding would typically not be available to address flow management issues.	Funds available are limited to requests made through the annual budget cycle and are typically project specific rather than long term. Projects on suitable segments typically receive higher priority than projects on eligible or non-	The stakeholder group would commit to permanent long-term engagement on issues of concern within the river corridor and may be able to bring additional resources to bear on river management issues. The	Typically, the BLM and WRNF Washington office make additional funds available for completion of a Comprehensive River Management Plan and typically make dedicated funds available for

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

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			suitable segments. Funding would typically not be available to address flow management issues.	stakeholder group would be a logical group to apply for grant funds that may benefit the river corridor. The stakeholder group may be able to bring substantial resources to bear on flow management issues.	management of the WSR. However, these funds may not be sufficient to address all issues facing the river segment, such as flow management issues.
Uses on private lands within river corridor that could affect quality of ORVs, classification, and stream flows	The BLM and WRNF would coordinate and cooperate with local governments on land use issues.	The BLM and WRNF would coordinate and cooperate with local governments on land use issues.	The BLM and WRNF would coordinate and cooperate with local governments on land use issues, and may provide technical assistance. The BLM and WRNF would be likely to actively comment on and participate in decisions made by local governments.	The stakeholder group has not yet addressed this issue. The stakeholder group plans to rely on the BLM and WRNF management actions and authorities for management of public lands to protect ORVs, water quality, tentative classification and free-flowing condition. The BLM and WRNF would coordinate and cooperate with local governments on land use issues.	Through the cooperative RMP process, local governments would be formally encouraged to cooperate with the BLM and WRNF on land use issues. The BLM and WRNF would proactively work with local governments to encourage zoning, ordinances, long-term plans, and local government land acquisitions that would protect and enhance river-related values.

Table 4.4.3-1 – continued
Wild and Scenic Rivers Analysis Framework

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Projects on private lands that could affect ORVs, classification, and stream flows (e.g., stream diversions, riprapping stream banks)	Through normal coordination and cooperation processes with local governments and private landowners, the BLM and WRNF would encourage projects that minimize impacts.	Through normal coordination and cooperation processes with local governments and private landowners, the BLM and WRNF would encourage projects that minimize impacts.	The BLM and WRNF would be likely to formally comment on projects requiring local government approval and may provide technical assistance to local governments and private landowners to design projects that minimize impacts.	The stakeholder group has not indicated whether it intends to address this issue. Through normal coordination and cooperation processes with local governments and private landowners, the BLM and WRNF would encourage projects that minimize impacts.	All federal agencies would be prohibited from authorizing or assisting with projects that create significant and negative impacts. The BLM and WRNF would formally comment on projects requiring local government approval and provide technical assistance to local governments and private landowners to design projects that minimize impacts.

Acronyms and Abbreviations:

BLM	Bureau of Land Management	RMP	resource management plan
CPW	Colorado Parks and Wildlife	stakeholder group	Upper Colorado River Wild and Scenic stakeholder group
CWCB	Colorado Water Conservation Board	USFS	US Department of Agriculture, Forest Service
LUP	land use plan	WRNF	US Department of Agriculture, Forest Service, White River National Forest
NWSRS	National Wild and Scenic Rivers System	WSR	Wild and Scenic River
ORV	outstandingly remarkable value		

- The BLM and USFS will require agency approval of any project proposed by the stakeholders under the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* to be implemented on federal lands. This process will allow NEPA analysis to be performed and will allow the federal agencies to determine whether the proposed project meets the requirements of the Wild and Scenic Rivers Act for eligible stream segments.
- The BLM and USFS will require the stakeholder group to advertise meetings where members of the public may provide comment on operation of the stakeholder management plan. The BLM and USFS will also consider public comments as part of the federal agencies' annual evaluation of the effectiveness of the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*.

Effects on potential WSR Segments from Implementation of Other Resource Management Actions

This discussion focuses on the impacts on WSR segments from implementation of other resource management actions described in Chapter 2 of the RMP. For this analysis, WSR segments are defined as those determined to be eligible or suitable under each particular alternative. There are currently no designated WSR segments in the CRVFO to be considered.

For a resource management action to have an effect on a WSR segment, it must result in a potential change to the segment's free-flowing condition, water quality, ORVs, or tentative classification.

Environmental Consequences

Impacts on WSR management would result from some of the actions proposed under other resources and uses. Programs not addressed below (both management and implementation-level actions) were deemed to have no, or only negligible, impacts on WSRs management under any of the four alternatives.

Alternative A

Impacts from Wild and Scenic Rivers Management. The CRVFO would continue to manage the 13 (plus those 13 segments on the Roan Plateau) segments identified in Chapter 2 as eligible for inclusion in the NWSRS, and would protect the free-flowing condition, water quality, associated ORVs, and tentative classifications as wild, scenic, or recreational until suitability is determined on 88 miles of river.

Implementation of Alternative A would be a continuation of current management and would not result in effects on WSR segments. Instead, it would continue to provide a long-term beneficial impact on the characteristics associated with WSRs because they would continue to be protected under the eligibility determination. Management methods implemented by the BLM for eligible segments are described above in Table 4.4.3-1.

The primary effect on other resources and land uses from the continued management of 26 eligible segments would be related to BLM's permit approval authorities. For permit applications under BLM authority, the BLM would not permit projects that would adversely affect the free-flowing condition of any of the 26 WSR segments, its ORVs, or its tentative classification. Other federal agencies considering permit applications (not under BLM authority) that could affect the free-flowing condition, water quality, ORVs, or tentative classification for any of the 26 WSR segments in the CRVFO would be required to seek formal comments from the BLM. The other agencies are not required to act on BLM's comments, so the effect on WSR segments would depend on decisions outside BLM authority. A secondary effect from the continued management of the 26 segments as eligible would be an increase in awareness of the river-related values

associated with these segments. Increased awareness may result in additional project proposals to protect and enhance the values and increased cooperative measures with other agencies that assist in managing these values, such as Colorado Parks and Wildlife (CPW).

Alternative A would not make any suitability determinations, which makes Congressional designation of any WSR segments in the CRVFO unlikely. Therefore, no analysis of effects resulting from congressional WSR designation was conducted for Alternative A. The WSR segments for Alternative A are defined as the 26 eligible segments shown in Table 2-2. Impacts on WSR segments resulting from implementing other resource management actions would be considered negligible because allowable uses in each WSR stream segment corridor would be restricted so as not to adversely affect the tentative classification, free-flowing condition, water quality, or ORVs identified for each stream segment. Additional beneficial impacts would be experienced where other special management designations overlap a stream segment, thereby providing an additional layer of protection.

Impacts from Air Resources Management. Both management and implementation-level actions could potentially enhance scenic ORVs through a better viewing window.

Impacts from Soils Management. Soils NSO and CSU stipulations would protect ORVs. NSO stipulations for the debris flow hazard zone would prohibit surface occupancy and surface-disturbing activities within Mitchell Creek's corridor. The NSO stipulation for slopes steeper than 50 percent for oil and gas facilities would prohibit surface occupancy and surface-disturbing activities on slopes greater than 50 percent for all segments except the Roan Plateau segments. The CSU stipulation for slopes steeper than 30 percent on erosive soils would require special design, construction, operation, and reclamation measures to limit the amount of surface disturbance, to reduce erosion potential, to maintain site suitability and productivity, and to ensure successful reclamation in identified areas of highly erosive soils and of slopes greater than 30 percent. This stipulation would affect the Colorado River, Hack Creek, Abrams Creek, Deep Creek, Mitchell Creek, Thompson Creek, and Battlement Creek segments. These stipulations will help to protect the ORVs of fish, scenic, geologic, and ecologic.

Implementation-level actions would monitor for areas not meeting the Land Health Standard 1, and appropriate action would be taken to correct deficiencies, which would benefit water quality related ORVs if sedimentation were an issue, or ecological or botanical resources were impacted.

Impacts from Water Resources Management. All eligible stream segments on the Roan Plateau are within Watershed Management Areas, pursuant to the Roan Plateau Land Use Plan, adopted in 2008. The actions, protective stipulations, and land use prescriptions identified in the ROD would be adequate to protect the identified ORVs of fish, scenic, and botanic (BLM 2008b). All segments within East Fork Parachute Creek and East Middle Fork Parachute Creek Complex on the Roan Plateau would benefit from additional protection measures prescribed in the Roan Plateau Land Use Plan for Watershed Management Areas.

Impacts from Vegetation Management – Riparian. The NSO stipulation for riparian and wetland zones would prohibit surface occupancy and surface-disturbing activities within riparian vegetation and would affect all segments except the Roan Plateau segments. This stipulation specifies that surface-disturbing activities within 500 feet of the outer edge of the riparian or wetland vegetation may require special design, construction, and implementation measures, including relocation of operations beyond 200 meters. This stipulation would maintain the integrity of these areas and provide indirect protections to many of the

segments' ORVs of scenic, fish, recreational, wildlife, botanic, geologic, ecologic, and historic. A CSU stipulation to protect riparian vegetation would help to maintain or enhance water quality in the affected segments. This CSU affects all segments with the ORVs identified above, except the Roan Plateau segments.

Impacts from Vegetation Management – Weeds. The Colorado River and Deep Creek would be most affected by a focus on areas of new infestations and, where possible, would extirpate existing populations within priority treatment areas, which include riparian areas, developed recreation sites, campgrounds, and campsites. Allowing for habitat restoration could result in evidence of human activity; however, these impacts would be short term and would not likely result in a change to river classifications. This alternative would benefit the ORVs of scenic and ecologic.

Impacts from Fisheries and Aquatic Wildlife Management. By prohibiting surface occupancy and surface-disturbing activities within the watershed upstream of fish hatcheries to protect the quality and quantity of surface water and underground aquifers supplying the hatcheries, the Mitchell Creek fish ORV would be better protected.

Impacts from Wildlife Management. Allowing the introduction, translocation, transplantation, restocking, augmentation, and reestablishment of native and naturalized fish and wildlife species in cooperation with CPW and/or USFWS would protect the ORVs of fish and wildlife of all segments with these ORVs.

Impacts from Special Status Species – Plants and Terrestrial Wildlife Management. For species listed as sensitive by BLM and for significant natural plant communities, a CSU stipulation specifies that special design, construction, and implementation measures, including relocation of operations by more than 200 meters, may be required. This stipulation would protect portions of the Colorado River, Abrams Creek, and Deep Creek and the associated botanic, wildlife, fish, and ecologic ORVs.

The Colorado River ORV of wildlife would be minimally protected by the NSO to prohibit surface occupancy and surface-disturbing activities within 0.25-mile buffer around eagle nests. Management actions and restrictions on use to protect and enhance bald eagle nesting sites would have beneficial effects on this segment. In addition, the Colorado River ORV of wildlife would be minimally protected by the NSO to prohibit surface occupancy and surface-disturbing activities within a 0.5-mile radius of a cliff-nesting complex for peregrine falcon.

Benefits of greater sage grouse management include prohibiting surface occupancy and surface-disturbing activities within a 0.25-mile radius of an active or historical lek would protect sections of the Colorado River. In addition, prohibiting surface occupancy and surface-disturbing activities during certain timeframes in grouse crucial winter habitat and nesting habitat would also protect small sections of the Colorado River and its associated wildlife ORV. Designating ACECs to protect the Harrington's penstemon special status plant species will protect Deep Creek's ecologic ORV.

Impacts from Cultural Resources Management. Prohibiting surface occupancy and surface-disturbing activities within 100 meters of historic properties would have minimal indirect protection in all river segments that have historic ORVs, excluding the Roan Plateau segments. If inventories and collection were to occur within river corridors, short-term impacts could result from associated surface disturbance; however, long-term impacts would be negligible and, in some instances, may provide additional values to segments. This alternative would not likely affect segment classifications.

Impacts from Paleontology Resources Management. Both management and implementation-level actions would have negligible impacts on WSRs, as paleontological resources are either non-existent or very few along WSR corridors. If more paleontological resources are discovered in the future, these actions will protect these resources, which would benefit the WSRs.

Impacts from Visual Resource Management. The VRM prescriptions include portions of the river corridor for Colorado River, Deep Creek, and all of Thompson Creek as VRM Class I; portions of Egeria Creek, Rock Creek, Hack Creek, Mitchell Creek, and portions of the Colorado River, Eagle River, Deep Creek, and Abrams Creek as VRM Class II; portions of the Colorado River, Deep Creek, Eagle River, Abrams Creek, and Battlement Creek as VRM Class III; and portions of the Colorado River, Abrams Creek and Battlement Creek as VRM Class IV. River corridors that fall under VRM Class I (ACECs) will be protected from surface occupancy and surface-disturbing activities by an NSO. Those corridors that fall under VRM Class II would be protected by another NSO, which prohibits surface occupancy and surface-disturbing activities in VRM Class II Areas with slopes over 30 percent and high visual sensitivity (Interstate-70 viewshed) to preserve the visual setting and integrity. VRM Class II would also be protected by a CSU to ensure that surface-disturbing activities comply with BLM Handbook 8431-1 to retain the existing character of the landscape and would minimize impacts to surface-disturbing activities where scenery was identified as an ORV.

Impacts from Wildland Fire Management. Management and implementation-level actions may temporarily negatively impact scenic, botanical, and ecologic ORVs, but the ultimate outcome should be to restore natural conditions in the areas, which would benefit the ORVs in the long term.

Impacts from Cave and Karst Resources Management. Deep Creek, its corridor, and the associated scenic, geologic, and ecologic ORVs would be protected by an NSO, which prohibits surface occupancy and surface-disturbing activities in the area.

Impacts from Forestry Management. Forestry management could have negative impacts to scenic and ecologic ORVs if areas are still open for commercial forestry.

Implementation-level actions would have negligible impacts.

Impacts from Livestock Grazing Management. Proposed decisions to manage livestock grazing could have minor and localized effects on some ORVs. Most river segments are inaccessible to cattle, and although livestock grazing would be allowed within all eligible river corridors, impacts to the ORVs would be minimal since management of livestock is subject to rangeland health. However, there is a potential that certain rangeland improvements could be incompatible in some of the segments because of visual intrusion to the natural character of the area and may affect scenic ORVs.

Impacts from Recreation and Visitor Services Management. Deep Creek would be protected by closing the dispersed area to camping. The Colorado River, Eagle River, and Deep Creek would be more protected from trash and noise by prohibiting the discharge of firearms for recreational target shooting in developed recreation sites. These stipulations would protect the ecologic, recreational, and wildlife ORVs.

Prohibiting surface occupancy and surface-disturbing activities in SRMAs for the protection of the recreation outcomes and setting prescriptions, effected through an NSO stipulation, would protect the recreational ORV of the Colorado River.

Portions of Deep Creek Segments 2 and 3 (970 acres) and the associated scenic, geologic, and ecologic ORVs are within the existing Deep Creek SRMA boundary. Management of the SRMA includes protecting some scenic, recreational, geologic, fish, wildlife, and cultural resource values. These management measures are similar to the protection afforded to the segments under an eligibility determination.

Colorado River Segments 6 and 7 are within the existing Upper Colorado River SRMA (9,800 acres of overlap). Management of the area is commensurate with protecting the ORVs of scenic, recreational, wildlife, botanic, and geologic, free-flowing condition, water quality, and tentative classifications of recreational, as the area is primarily managed to provide an intensive recreation opportunity.

Impacts from Comprehensive Trails and Travel Management. OHV use could impact ORVs and classifications of eligible river segments. Battlement Creek will open routes to full-sized vehicles. Thompson Creek will have both full-sized vehicles and foot and horse routes. Mitchell Creek is open to foot and horse only. The Colorado River includes full-sized vehicle routes, ATV routes, mechanized routes, and foot and horse routes. The Eagle River has some full-sized vehicle, motorcycle, and mechanized routes. Abrams Creek has some mechanized and full-sized vehicle routes. Deep Creek has some foot and horse and full-sized vehicle routes. Hack Creek has some foot and horse and full-sized vehicle routes. Rock Creek and Egeria Creek both have some full-sized vehicle routes. By limited to designated routes from an open designation, the rivers will be better protected from sedimentation and erosion. Thompson Creek, Deep Creek, Hack Creek, and portions of the Colorado River are also closed to over-snow travel, which again protects them from impact. Those not listed above would be vulnerable to vehicle intrusions that could adversely affect ORVs. The rugged terrain in some of these areas has presented a barrier to vehicle intrusions in the past and would likely continue to do so in the future, although advancing vehicle technology could allow vehicles to enter and affect areas they have not been able to access in the past. Closures to OHV use will protect the ORVs of historic, ecologic, scenic, wildlife, and botanic.

Implementation-level actions of travel management will directly impact sedimentation and erosion of used routes near the river segments. The less motorized and mechanized use, the more beneficial it will be for the ORVs and tentative classification. By limited routes from open to designated routes, the ORVs will see beneficial impact.

Impacts from Lands and Realty Management. Marginal wind energy development potential in Hack Creek, Thompson Creek, and Deep Creek could produce development in those areas. No proposed management actions from land and realty would impact the classification or ORVs of historic, scenic, geologic, or ecologic of the eligible segments, because allowable lands and realty actions and the degree of development with the corridor would be minimized and prohibited through BLM's policy to manage eligible river segments to protect their free-flowing condition, water quality, ORVs, and tentative classification. These river segments would be managed as ROW avoidance areas, which would provide additional protection to the ORVs.

Because the BLM has no control over potential modifications to a river's shoreline or any other type of development on non-public lands, impacts could occur in these areas. Land tenure adjustments that would

result in acquisition of non-BLM lands within these river corridors would provide opportunities to better manage ORVs and to mitigate any efforts that could impact the segments' classification, water quality, or free-flowing condition.

Implementation-level actions would have negligible impact to ORVs.

Impacts from Coal Management. Designating 1,560 acres as unacceptable for coal leasing would protect the corridors of portions of the Colorado River, Hack Creek, Deep Creek, and Thompson Creek and protect the associated scenic, geologic, botanic, historic, and ecologic ORVs.

Implementation-level action of applying special conditions would give the BLM a chance to mitigate any possible negative impacts to the segments.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Not leasing portions of the Colorado River corridor and Thompson Creek corridor for fluid minerals will protect the associated scenic, botanic, geologic and wildlife ORVs.

Areas of known or potential geothermal resources are within the Mitchell Creek and Colorado River below the Dotsero corridors, which could produce development in those areas. No proposed management actions from fluid minerals management would impact the classification or fish, scenic, recreational, or geologic ORVs of the eligible segments because allowable actions and the degree of development with the corridor would be minimized and prohibited through BLM's policy to manage eligible river segments to protect their free-flowing condition, water quality, ORVs, and tentative classification.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Deep Creek, Thompson Creek, a small portion of Hack Creek, and a portion of the Colorado River corridor would be recommended for withdrawal for locatable minerals, which would protect those areas and ORVs of scenic, geologic, ecologic, historic, and botanic from surface and underground disturbance. No proposed management actions from minerals management would impact the classification or ORVs of the segments because actions and the degree of development would be minimized and prohibited through BLM's policy to manage eligible river segments to protect their free-flowing condition, water quality, ORVs, and tentative classification.

Hack Creek and a portion of the Colorado River corridor would be recommended for withdrawal for salable minerals and thus protect the historic, scenic, wildlife, botanic, and geologic ORVs.

Impacts from Areas of Critical Environmental Concern Management. Portions of Deep Creek Segments 2 and 3 (970 acres) are within the existing Deep Creek ACEC boundary. Management of the ACEC includes protecting some scenic, recreational, geologic, fish, wildlife, and cultural resource values, and thus the ORVs of scenic, geologic, and ecologic. These management measures are similar to the protection afforded to the segments under an eligibility determination. Management of the Deep Creek ACEC also includes restricting surface disturbance through NSO stipulations, designating the area as a ROW exclusion area, and managing the area as VRM Class I.

Additional protection for the ORVs within Thompson Creek related to scenic, geologic, and historic resources would be experienced from management of the existing Thompson Creek ACEC (800 acres of

overlap), which includes restricting surface disturbance through NSO stipulations, designating the area as a ROW exclusion area, and managing the area as VRM Class I. Additionally, 1,100 acres of Colorado River Segment 6 is within the existing Bull Gulch ACEC. This designation provides additional protection for the scenic, recreational, wildlife, and botanic ORVs.

Mitchell Creek receives additional protection from the Glenwood Springs Debris Flow Hazard Zones ACEC (300 acres of overlap) for the protection of Colorado River cutthroat trout on the fish ORV. Management actions that restrict surface disturbance (and subsequent runoff and sedimentation) prohibit a net increase in motorized and mechanized routes, surface occupancy, and surface-disturbing activities. The ACEC is managed as a ROW avoidance area and VRM Class II area.

All eligible stream segments on the Roan Plateau are within designated ACECs, pursuant to the Roan Plateau Land Use Plan, adopted in 2008. The actions, protective stipulations, and land use prescriptions identified in the ROD would be adequate to protect the identified ORVs of fish, botanic, and scenic (BLM 2008b).

The Colorado River borders the boundaries of the Bull Gulch ACEC, Blue Hill ACEC and McCoy Fan Delta ACEC. Again, the ACEC protections will indirectly protect the river's values.

Impacts from Wilderness Study Areas Management. Eleven hundred acres of Colorado River Segment 6 are within the existing Bull Gulch WSA. This designation provides additional protection for the scenic, recreational, wildlife, and botanic ORVs. Protections afforded to the area within the WSA, including closure to oil and gas leasing and motorized and mechanized travel, would remain in place even if the segment were found not suitable, or if the suitable segment were released by Congress from WSR consideration. If the Bull Gulch WSA were released from wilderness consideration by Congress, the area would receive management benefits related to the Bull Gulch ACEC. WSA management pursuant to the IMP would continue to have a beneficial impact on all ORVs within these segments by limiting developments within this river corridor. Management for WSAs would be in accordance with the Manual 6330. Other resource management actions would be constrained to ensure that the naturalness of the WSA is not impaired. As a result, the free-flowing condition, water quality, ORVs, and tentative classification of this segment would also be protected.

White River National Forest Segments. The WRNF would continue to manage the four segments (two Colorado River and two Deep Creek segments) identified in Chapter 2 (Table 2-2) as eligible for inclusion in the NWSRS. The WRNF Land and Resource Management Plan 2002 Revision (USFS 2002a) prescribed management area direction that was designed to meet its obligations under the WSR act by protecting all rivers identified as eligible free-flowing condition, water quality, ORVs, water quality and tentative classifications within its administrative authority. The directions state that eligible river segments are to be managed to "protect and perpetuate eligible and designated" segments at the tentative classification level identified in the planning process (wild, scenic, and recreation). The continuation of current management would not result in effects on WSR segments. Instead, it would continue to provide a long-term beneficial impact on the characteristics associated with WSRs because they would continue to be protected under an eligibility determination. The management standards and guidelines as prescribed in the Forest Plan for the four eligible segments being studied for suitability are identified in 2002 Forest Plan, Chapter 3.

Federal administrative authorities prescribed in land use planning do not provide for water rights based protections or a federal water right until after designation. The effects from and to other resources, resource activities, and uses resulting from WSR determinations on WRNF lands were fully analyzed in the WRNF

Land and Resource Management Plan 2002 Revision. Therefore, a detailed analysis of effects is limited to water-based effects.

The primary effect on other resources and land uses from the continued management of four eligible segments would be related to the WRNF's permit approval authorities. For permit applications under WRNF authority, the WRNF would not permit projects that would adversely affect any of the four WSR segments free-flowing condition, water quality, ORVs, water quality, or tentative classification. Other federal agencies considering permit applications (not under WRNF) authority that could affect the free-flowing condition, water quality, ORVs, water quality, or tentative classification for any of the four WSR segments would be required to seek formal comments from the WRNF. The other agencies are not required to act on the WRNF's comments, so the effect on WSR segments would depend on decisions outside the WRNF's authority. A secondary effect from the continued management of the four segments as eligible would be an increase in awareness of the river-related values associated with these segments. Increased awareness may result in additional project proposals to protect and enhance the values and increased cooperative measures with other federal, state, and local agencies that assist in managing these values.

Alternative A would not make any suitability determinations, which makes Congressional designation of any WSR segments in the planning area unlikely. Therefore, no analysis of effects resulting from Congressional WSR designation was conducted for Alternative A.

Because no changes are being proposed to the 2002 Forest Plan and current management prescriptions would stay in place, there are no additional resource management decisions on the WRNF to be considered. Therefore, there are no effects on WSR segments from implementation of other resource management actions.

Alternative B (Proposed RMP)

Under the Proposed RMP, nine segments in the CRVFO would be determined as not suitable. However, these segments could still receive protection from management measures for other resources adopted under the Proposed RMP. Impacts on WSRs from air resources, soils resource management, weed management, wildlife management, paleontological resources, wildland fire management, livestock grazing management, fluid minerals management, and wilderness and WSAs management would be the same as or similar to those under Alternative A. Potential impacts from management of other resources and uses are as described below. BLM will maintain eligible status for East Middle Fork Parachute Creek Complex and East Fork Parachute Creek Complex until a record of decision is entered for the Roan Plateau planning area.

Impacts from Wild and Scenic Rivers Management. Two segments totaling 4.5 miles would be determined suitable under the Proposed RMP—two Deep Creek segments—which would ensure the continued protection of their WSR characteristics, representing a long-term beneficial impact. In addition, the river corridor boundary expanded to (1) incorporate the entire area within the canyon walls on the main canyon, and (2) align the boundaries with the USFS boundary for the Deep Creek segment. Suitability determinations would be deferred for two Colorado River segments. Those two segments would continue to receive protection under their eligible status. The two segments would also be managed under the Upper Colorado River Stakeholder Group Management Plan, which is expected to provide long-term protection of flows necessary to support the ORVs. The remaining eligible segments would be determined not suitable for inclusion in the NWSRS.

The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* for Colorado River Segments 6 and 7 is designed to provide sufficient flow rates to support the segments' ORVs, using a cooperative and voluntary approach that works within the existing water rights structure. The primary approach under consideration by the stakeholder group would consist of two elements. The first element would be a recommendation from the group to the CWCB to appropriate instream flow water rights for Colorado River Segments 4 through 7. This action has already occurred through appropriated flows in September 2011. The second element would be voluntary and cooperative operation of water management facilities owned by the stakeholders to provide flows needed to support the ORVs. The proposed cooperative operation of these facilities would be subject to meeting the water supply needs of the stakeholders who own those facilities, and it would be subject to maintaining the water supply yield of those facilities. If implemented successfully, this cooperative approach could provide higher long-term certainty that adequate flows would be present to support the ORVs. Since water rights administration and management are outside BLM's management authority, success of this approach could result in a long-term beneficial impact on the WSR characteristics of the suitable streams.

A determination of suitability for the two Deep Creek segments would afford these segments continued protection, similar to what they currently receive as eligible river segments. The BLM would continue to manage these areas for protection of the free-flowing condition, water quality, associated ORVs, and tentative classifications, until Congress makes a determination whether or not to designate the segments as part of the NWSRS. Similar to Alternative A, the primary effect on other resources and land uses resulting from management of the two suitable segments would be related to BLM's permit approval authorities. For permit applications under BLM authority, BLM would not permit projects that would adversely affect any of the four WSR segments' free-flowing condition, water quality, ORVs, or tentative classification. Other federal agencies considering permit applications (not under BLM authority) that could affect these aspects for either of the two WSR segments would be required to seek formal comments from the BLM. The other agencies are not required to act on BLM's comments, so the effect on WSR segments would depend on decisions outside BLM authority. However, a secondary effect from the continued management of segments as suitable would be an increase in awareness of the river-related values associated with these segments. Increased awareness may result in additional project proposals to protect and enhance the values, and increased cooperative measures with other agencies that assist in managing these values, such as the CPW.

Although formal WSR designation requires an act of Congress, a BLM determination of suitability increases the likelihood that these segments would be designated as WSRs. The overall effect of designation would be to significantly increase the authority of the federal government to address and respond to threats to the ORVs, free-flowing condition, water quality, and classification of the designated segments. Potential threats include reduction in flows, changing in timing of flows, degradation of water quality, proposed water storage projects that could invade the river segment, and development on private, local government, state government, and federal government lands within the river segment that would be incompatible with the ORVs and classification. Congressional designation as a WSR is also a more permanent form of protection for the river segment than most other forms of management. Under this designation, long-term negative impacts on the river segment are much less likely than under most other forms of management.

If the Deep Creek segments were designated by Congress, managers of water supply infrastructure could experience a variety of impacts. The time required for obtaining federal permits for project construction or modification could increase because the permitting agencies may need additional time to analyze impacts on designated river segments and to identify workable mitigation measures to prevent those impacts.

Applications for usage of federally owned water management facilities may require time for processing, as managers resolve potential conflicts created between the proposed use and the WSR designation by Congress. When they apply for new federal authorizations, water users may experience reduced water yield because of project terms and conditions imposed to protect designated river segments. If water users are applying for new junior water rights or for changes in water rights, they may experience reduced water availability for these water rights because of the flows claimed by the federal reserved water right for the designated stream segment. They may also experience longer water court procedures, as additional time is needed to resolve potential conflicts with federal water right claims.

WSR designation by Congress does not create federal control over land use on private lands within the designated river corridor. However, private landowners may experience longer processing time or denial for federal permits needed to conduct activities on private lands. Examples of permits needed for activities on private lands include permits from the US Army Corps of Engineers for dredge and fill operations within stream channels.

The nine segments determined not suitable would no longer be protected as eligible WSR segments and would be managed in accordance with the other RMP provisions, as described below. In many cases, other administrative designations such as ACECs would provide administrative protection of the identified ORVs. However, BLM would not be required to consider the ORVs, free-flowing condition, water quality, or tentative classification of these segments when the Bureau reviews permit applications for other land uses, which would have a long-term adverse effect on these segments, as compared with Alternatives A and C.

Impacts from Water Resource Management. Impacts under the Proposed RMP would be the same as those described for Alternative A plus the following additional impacts. Improving dysfunctional streams caused by unnatural factors may enhance the free-flowing condition of the segments and would affect any segment that may have factors upstream of or within the segments.

Restrictions on use to protect water would have beneficial effects on released segments. The major river corridor NSO would prohibit surface occupancy and surface-disturbing activities within 0.5 mile of either side of the high water mark (bank-full stage) of six major rivers, including the Colorado and Eagle Rivers. This NSO would help protect the non-suitable segments from management activities that would threaten water quality that supports ORVs and protects the Colorado River corridor and portions of the Deep Creek corridor. Prohibiting surface occupancy and surface-disturbing activities within 325 horizontal feet from the outer edge of the riparian and wetland zones and applying CSU constraints within 100 feet from the edge of intermittent or ephemeral stream drainages would also protect the streambank of all suitable and non-suitable segments. Filing for water rights and water use permits to protect all water uses on BLM-administered lands, improving streamflows, and making recommendations to the CWCB for protection or enlargement of instream flows on appropriate stream segments that cross BLM-administered lands will protect the ORVs of fish and the free-flowing condition in both suitable and non-suitable segments.

Implementation-level actions to conduct monitoring and improve dysfunctional streams caused by unnatural factors would only benefit the ORVs, as any action that would have a negative impact would not be approved.

Impacts from Vegetation Management—Riparian. Impacts would be the same as those described for Alternative A plus the following additional impacts.

By managing for riparian-wetland values using management and implementation-level actions for improvements or protection, there may be restrictions on recreation. These restrictions may negatively impact the recreational ORVs of all segments, while enhancing scenic and visual ORVs. However, management actions and restrictions on use for riparian vegetation would most likely result in overall beneficial effects on eligible, suitable, and not suitable segments.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be the same as those described for Alternative A plus the following additional impacts. Habitats of perennial streams, water bodies, fisheries and riparian areas would be protected under an NSO that would protect the ORVs of fish, botanic, and ecologic of all associated segments. Protecting streams for salmonid and native, non-salmonid fishes through a TL and avoid stream channel disturbances would result in overall stream health and provide a level of protection for segments with ORVs associated with fish and recreational fishing.

Implementation-level actions of identifying limiting habitat factors based on site characteristics and habitat capabilities using channel type and geology classifications, prioritizing and fixing those that can be fixed using proven river, stream, lake, and riparian methodologies (e.g., in-channel habitat structures to create pool, riparian plantings, and tamarisk removal), or placing in-channel barriers could affect the free-flowing condition of some of the non-suitable segments, while suitable segments would remain protected through the BLM.

Impacts from Wildlife Management. Closing Thompson Creek to motorized and mechanized travel from December to April also protects its scenic ORV.

Implementation-level actions of applying other practices and guidelines would assist in greater protection for wildlife-related ORVs.

Impacts from Special Species – Plants and Terrestrial Wildlife. Under the Proposed RMP, management actions for special status plants and terrestrial wildlife would protect the botanic ORV for the Colorado River. These actions include prioritizing treatments to protect against invasion and establishment of noxious weeds or other aggressive exotic plants, pursuing land tenure adjustments to facilitate conservation or recovery of special status species, restoring potential special status species habitat to suitable habitat, and applying a CSU for plant communities that meet BLM's criteria for significant plant communities.

Impacts would be the same as those described for Alternative A. In addition, portions of the Colorado River and Deep Creek would be minimally protected by NSOs for special status plants, occupied habitat, and adjacent 100-meter buffers. A CSU restriction on surface-disturbing activities within a 100-meter buffer around occupied Harrington's penstemon habitat outside ACECs would minimally protect portions of the Colorado River, Eagle River, Rock Creek, Abrams Creek, and Hack Creek.

Impacts from greater sage-grouse management would be the same as those described for Alternative A, except leks would be protected by 0.6-mile radius instead of a 0.25-mile radius.

The Deep Creek river corridor would be protected by prohibiting surface occupancy and surface-disturbing activities within a 0.25-mile radius of special status bat species hibernation, maternity, and fall swarming sites NSO.

Implementation-level actions would benefit scenic, botanical, wildlife, and ecological ORVs through improving those resources associated with those ORVs.

Impacts from Cultural Resources Management. Impacts would be the same as those described for Alternative A plus the additional following impacts. Prohibiting surface occupancy and surface-disturbing activities within 0.25 mile of traditional cultural properties or Native American areas of concern to protect the integrity of place, setting, or feeling would provide benefits to portions of the Colorado River, Eagle River, and Hack Creek.

Implementation-level actions would increase cooperation and partnership and ensure greater protection for historic ORVs.

Impacts from Visual Resource Management. The impacts would be the same as Alternative A with the following additional impacts. The Eagle River also has some VRM Class IV within its corridor; the Thompson Creek has VRM Class III within its corridor; and Battlement Creek has VRM Class II within its corridor. Concentrating new disturbances in VRM Class II areas to existing ROWs or within 200 meters of existing disturbance would provide increased protection. Designating areas as VRM Class I and II would have beneficial effects on segments with either scenic ORVs or a scenic tentative classification by protecting the scenic values through site-specific relocation requirements of the VRM criteria. Designating areas as VRM Class I and II would have beneficial effects on segments with either scenic ORVs or a scenic tentative classification by protecting the scenic values through site-specific relocation requirements of the VRM Class criteria.

Impacts from Lands with Wilderness Characteristics Management. Under the Proposed RMP, application of an NSO stipulation prohibiting surface occupancy and surface-disturbing activities on BLM lands managed for wilderness characteristics would benefit portions of the Colorado River, Hack Creek, Deep Creek, and Thompson Creek and their associated ORVs of historic, ecologic, scenic, botanic, wildlife, and geologic. Thompson Creek, Deep Creek, and Hack Creek would receive additional protection from the management prescription for lands managed for wilderness characteristics.

Impacts from Cave and Karst Resource Management. Protection would be the same as in Alternative A, although the stipulations have changed to include all cave NSOs into one stipulation.

The implementation-level action of implementing a permit system as needed would provide for greater protection of the Deep Creek ORVs.

Impacts from Forestry Management. Closing areas for forestry management would help protect the river corridors along Egeria Creek, Rock Creek, the Colorado River, Hack Creek, Deep Creek, Abrams Creek, Mitchell Creek, and Thompson Creek.

Implementation-level actions may impact ORVs in streams found not suitable; however, other protections and stipulations would probably give additional protection against forestry management.

Impacts from Recreation and Visitor Services Management. Applying CSU restrictions on developed (and future) recreation sites and to mapped (and future) national and regional trails, local system trails that connect communities and trailheads and interpretive sites would protect portions of the Colorado River,

Deep Creek, the Eagle River, and Thompson Creek. By closing camping, the Eagle River would be protected from overnight use impacts, Deep Creek and Thompson Creek would be protected, and a small portion of the Colorado River would be protected from overnight impacts. However, the recreational ORV would be negatively impacted. Prohibiting the discharge of firearms in areas along the Colorado River, Eagle River, and Deep Creek would benefit the recreational and ecologic ORVs. Applying CSU restriction within the Thompson Creek river corridor would help protect the scenic ORV.

Prohibiting surface occupancy and surface-disturbing activities in SRMAs would protect the Colorado River from State Bridge to the Forest Service boundary near Bair Ranch, and Abrams Creek. Applying a CSU (site-specific relation) for the protection of recreation outcomes and setting prescriptions would protect the Eagle River and Thompson Creek and benefit the recreational and scenic ORVs.

Implementation-level actions would enhance recreational ORVs for the Colorado River and the Eagle River. Thompson Creek would be further protected through additional resource stipulations. Abrams Creek may see impacts from being found not suitable, but stipulations for fish will protect that ORV.

Impacts from Comprehensive Trails and Travel Management. Under the Proposed RMP, impacts would be the same as those in Alternative A with the following additional impacts. Battlement Creek would be reduced in full-sized vehicle routes to more administrative routes and foot and horse routes. More full-sized vehicle routes along the Colorado River would be changed to administrative routes, although full-sized, ATV, motorcycle, mechanized, and foot and horse routes still are present. Deep Creek has only foot and horse routes and administrative routes. Abrams Creek would have changed some of the full-sized routes to mechanized routes. Rock Creek would change some full-sized vehicle routes to foot and horse and administrative routes. In addition, Abrams Creek and portions of the Eagle River corridors will also be closed to over-snow travel, while portions of the Colorado River and Mitchell Creek corridors would have limited over-snow travel. Management actions to close or restrict routes along segments would result in beneficial effects by reducing sedimentation and protecting water quality that supports ORVs. In addition, all BLM-administered waters would be closed to motorized travel unless consistent with the area's management objectives and is authorized by the BLM Field Manager. Closure would benefit the fish, recreational, and wildlife ORVs for all associated segments.

Impacts from Lands and Realty Management. Impacts would be the same as those described in Alternative A with the following additional impacts. ROW avoidance areas would include portions of the river corridors of Egeria Creek, Rock Creek, the Colorado River, Hack Creek, the Eagle River, Abrams Creek, Mitchell Creek, No Name Creek, Thompson Creek, and Deep Creek. ROW exclusion areas would include portions of the river corridors of Deep Creek, Thompson Creek, and the Colorado River. Retention areas include all segments. Lands and realty management actions along segments could have adverse impacts on segments determined not suitable through sedimentation and damage to riparian vegetation, which could result in degradation of water quality. Additional development along the non-suitable segments could result in a significantly higher level of surface disturbance and visual impacts than would be allowed under eligible status. However, other resource protection measure for water, riparian vegetation, and wildlife would add protections that would indirectly protect not suitable segments from lands and realty impacts. The lands and realty management action to retain major river corridors and perennial streams would keep non-suitable segments in BLM ownership; however, retention would not guarantee protection of the free-flowing condition, water quality, ORVs, or the tentative classification.

Impacts from Coal Management. Having no lands identified as acceptable for further consideration for coal mining would protect all river segments from this activity.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts on Colorado River Segments 6 and 7 would be similar to those described under Alternative A, except that an additional 10,000 acres (30 river miles) would be closed to oil and gas leasing. In addition, the Deep Creek segments would be more protected because they would be closed to fluid minerals leasing. Closure would provide protection to the river corridor by reducing the potential for impacts from oil and gas development and protecting the scenic, botanic, wildlife and geologic ORVs.

A total of 800 acres (2.5 not suitable river miles) of the Thompson Creek area would be closed to fluid minerals leasing, which would protect the scenic and geologic ORVs. Hack Creek and a portion of the Eagle River and Egeria Creek would also be closed to leasing. In addition, many NSO and CSU stipulations on not suitable river segments will also provide further protection. While these management actions would provide some protection of the WSR characteristics of these segments that would be determined not suitable, they would not afford the level of protection specific to the ORVs, free-flowing condition, water quality, or tentative classification that would be provided either by an eligibility or suitability determination.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts would be the same as those described in Alternative A with the following additional impacts. Portions of the Eagle River corridor and Abrams Creek would also be recommended for withdrawal and therefore protect the fish ORV. Mitchell Creek would be withdrawn. Minerals management actions along segments could have adverse impacts on segments determined not suitable through sedimentation and damage to riparian vegetation, which could result in degradation of water quality. Additional development along the segments determined not suitable could result in a significantly higher level of surface disturbance and visual impacts than would be allowed under eligible status. However, other resource protection measures for water, riparian vegetation, and wildlife would add protections that would indirectly protect segments determined not suitable from minerals management impacts.

Impacts to salable minerals would be the same as those described in Alternative A with the following additional impacts. Portions of the Eagle River, Abrams Creek, Hack Creek, Mitchell Creek, Colorado River, Thompson Creek, Deep Creek, and all suitable segments would be recommended for withdrawal for salable minerals. Minerals management actions along segments could have adverse impacts on not suitable segments through sedimentation and damage to riparian vegetation, which could result in degradation of water quality. Additional development along the segments determined not suitable could result in a significantly higher level of surface disturbance and visual impacts than would be allowed under eligible status. However, other resource protection measures for water, riparian vegetation, and wildlife would add protections that would indirectly protect segments determined not suitable from minerals management impacts.

Impacts from Areas of Critical Environmental Concern Management. Under the Proposed RMP, impacts on the two Colorado River segments would be the same as those described under Alternative A. Impacts on the two Deep Creek segments would be the same as those described under Alternative A, except that the Deep Creek ACEC boundary has changed to include only the Deep Creek Segment 2b. Additionally, the Deep Creek ACEC would be closed to motorized and mechanized travel and closed to oil and gas leasing, providing protection from surface-disturbing activities for the scenic, geologic, and ecologic ORVs.

Mitchell Creek would receive additional protection from management actions for the Glenwood Springs Debris Flow Hazard Zones ACEC, which prohibits surface-disturbing activities and a net increase in motorized and mechanized routes to protect the fish ORV.

A total of 800 acres (2.5 not suitable river miles) of the Thompson Creek ACEC would be closed to fluid minerals leasing and managed as VRM Class I to benefit the scenic and geologic ORVs.

White River National Forest Segments. Two segments (Deep Creek segments) currently managed as eligible would be determined suitable, and the two Colorado River segments would remain eligible and the suitability determination would be deferred. A determination of suitability would afford the two Deep Creek segments continued protection similar to what they currently receive as eligible segments. The management standards and guidelines currently being implemented under the existing 2002 Forest Plan would continue. Therefore, the effects of WSR management and associated forest plan standards and guidelines under the Proposed RMP would be the identical to those described for Alternative A.

Although formal WSR designation is an act of Congress, a WRNF determination of suitability increases the likelihood of these segments being designated as WSRs. The overall effect of designation would be to significantly increase the authority of the federal government to address and respond to threats to the ORVs, free-flowing condition, water quality, water quality, and classification of the designated segments. Potential threats that would be reduced include reduction in flows, changing in timing of flows, degradation of water quality, proposed water storage projects that could invade the river segment, and development on private, local government, state government, and federal government lands within the river segment that would be incompatible with the ORVs and classification. Congressional designation of a WSR is also a more permanent form of protection for the river segment than most other forms of management. Under designation, long-term negative impacts to the river segment are much less likely than under most other forms of management.

If the segments were designated by Congress, managers of water supply infrastructure and hydroelectric projects could experience a variety of impacts. Once designated, all proposed water projects must be evaluated under Section 7 (a) of the Wild and Scenic Rivers Act. A determination under Section 7 is required when (1) a project is proposed to occur within the bed and banks of the designated river and involves some type of federal action such as issuing a permit, license, loan, or grant; or (2) a project is proposed to occur in the bed and banks of the river below, above, or on a tributary to a designated river, involves some type of federal action, and is likely to result in effects within the designated river corridor.

The time needed for obtaining federal permits for project construction or modification could increase because the permitting agencies may need additional time to analyze impacts to values that caused a river to be added to the national system and to identify workable mitigation measures to prevent those impacts. The Wild and Scenic Rivers Act prohibits other federal agencies from assisting in the construction of any water resources project that would have a direct and adverse effect on a designated river. The Wild and Scenic Rivers Act also prohibits Federal Energy Regulatory Commission (FERC)-licensed facilities within a designated river corridor.

Applications for usage of federally owned water management facilities may require time for processing, as managers resolve potential conflicts created between the proposed use and the WSR designation by Congress. When they apply for new federal authorizations, water users may experience reduced water yield because of project terms and conditions imposed to protect designated river segments. If water users are applying for

new junior water rights or for changes of water rights, they may experience reduced water availability for these water rights because of the flows claimed by the federal reserved water right for the designated stream segment. They may also experience longer water court procedures, as additional time is needed to resolve potential conflicts with federal water right claims.

WSR designation by Congress does not create federal control over land use on private lands within the designated river corridor. However, private land owners with inholdings along designated river corridors may experience longer processing time or denial for federal permits needed to conduct activities on private lands. Examples of permits needed for activities on private lands include permits from the US Army Corps of Engineers for dredge and fill operations within stream channels.

A suitability determination would be deferred on the WRNF Colorado River Segments 1 and 2 in Glenwood Canyon. Those two segments would continue to receive protections prescribed in the 2002 Forest Plan under their eligible status.

The two Colorado River segments would be managed under the *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan*, which is expected to provide long-term protection of flows necessary to support the ORVs. The *Upper Colorado River Wild and Scenic Stakeholder Group Management Plan* for Colorado River Segments 4 through 7 (which includes WRNF Colorado River Segments 1 and 2 in Glenwood Canyon) is designed to provide sufficient flow rates to support the segments' ORVs, using a cooperative and voluntary approach that works within the existing water rights structure. The primary approach under consideration by the stakeholders would consist of two elements. The first element would be a recommendation from the group to the CWCB to appropriate instream flow water rights for Colorado River Segments 4 through 7. The second element would be voluntary and cooperative operation of water management facilities owned by the stakeholders to provide flows needed to support the ORVs. The proposed cooperative operation of these facilities would be subject to meeting the water supply needs of the stakeholders who own those facilities and to maintaining the water supply yield of those facilities. If implemented successfully, this cooperative approach could provide higher long-term certainty that adequate flows would be present to support the ORVs. Since water rights administration and management are outside BLM and WRNF's management authority, success of this approach may result in a long-term beneficial impact on the WSR characteristics of these stream segments.

There are no additional resource management decisions on the WRNF to be considered because no changes are being proposed to the 2002 Forest Plan and current management prescriptions would stay in place. Therefore, there are no effects on WSR segments from implementation of other resource management actions.

Alternative C

The suitable segments under Alternative C are the 13 segments identified in Table 2-2. In addition to the protections described for Alternative A and the Proposed RMP, Alternative C would include additional special management designations (not related to WSR) with associated benefits in areas that overlap with WSR corridors. This designation would provide additional layers of protection for some suitable segments, potentially enhancing ORVs; examples include stipulations for special status species, recreation management, and VRM. Overall, Alternative C would be the most protective of WSR river values among the alternatives, and therefore would provide the greatest long-term beneficial impact of other protective management on the WSR characteristics of these segments. BLM will maintain eligible status for East Middle Fork Parachute

Creek Complex and East Fork Parachute Creek Complex until a record of decision is entered for the Roan Plateau planning area.

Impacts to WSRs from weed management, wildlife management, livestock grazing management, fluid minerals management, and WSAs management, would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be the same as or similar to those under Proposed RMP, except as described below.

Impacts from Wild and Scenic Rivers Management. The CRVFO would manage all 13 segments, identified in Chapter 2 (Table 2-2, Descriptions of Alternatives A through D) as suitable for inclusion in the NWSRS. BLM, within its authority, would protect the free-flowing condition, water quality, associated ORVs, and tentative classifications as wild, scenic, or recreational until Congress designates segments or the RMP is revised. BLM would continue managing to protect the free-flowing condition, water quality, associated ORVs, and tentative classifications as wild, scenic, or recreational on approximately 65 miles of river. Implementation of Alternative C would be a continuation of current management and would not result in direct effects on WSR segments. Management methods implemented by the BLM for eligible segments are described above in Table 4.4.3-1.

The primary effect on other resources and land uses resulting from the continued management of 13 suitable segments would be related to BLM's permit approval authorities. For permit applications under BLM authority, BLM would not permit projects that would adversely affect any of the WSR segments' free-flowing condition, water quality, ORVs, or tentative classification. Other federal agencies considering permit applications (not under BLM authority) that could affect the free-flowing condition, water quality, ORVs, or tentative classification for any of the WSR segments would be required to seek formal comments from BLM. The other agencies are not required to act on BLM's comments, so the effect on WSR segments would depend on the decisions outside BLM authority. BLM anticipates that the primary impact that would occur in decision-making processes in other agencies is that the other agencies would ask project applicants to voluntarily offer mitigation measures designed to protect the ORVs of the suitable stream segments. In addition, the NEPA documents created for those decisions would clearly display impacts of the proposed projects on the suitable segments.

Although formal WSR designation is an act of Congress, a BLM determination of suitability increases the likelihood that these segments will be designated as WSRs. The overall effect of designation would be to significantly increase the authority of the federal government to address and respond to threats to the ORVs, free-flowing condition, water quality, and classification of the designated segments. Potential threats include reduction in flows, changing in timing of flows, degradation of water quality, proposed water storage projects that could invade the river segment, and development on private, local government, state government, and federal government lands within the river segment that would be incompatible with the ORVs and classification. Congressional designation as a WSR is also a more permanent form of protection for the river segment than most other forms of management. Under this designation, long-term negative impacts on the river segment are much less likely than under most other forms of management.

If all 13 segments were designated by Congress, managers of water supply infrastructure could experience a variety of impacts. The time required for obtaining federal permits for project construction or modification could increase because the permitting agencies may need additional time to analyze impacts on designated river segments and to identify workable mitigation measures to prevent those impacts. Applications for usage

of federally owned water management facilities may require time for processing, as managers resolve potential conflicts created between the proposed use and the WSR designation by Congress. When they apply for new federal authorizations, water users may experience reduced water yield because of project terms and conditions imposed to protect designated river segments. If water users are applying for new junior water rights or for changes of water rights, they may experience reduced water availability for these water rights because of the flows claimed by the federal reserved water right for the designated stream segment. They may also experience longer water court procedures, as additional time is needed to resolve potential conflicts with federal water right claims.

Designation of a WSR designation by Congress does not create federal control over land use on private lands within the designated river corridor. However, private landowners may experience longer processing time or denial for federal permits needed to conduct activities on private lands. Examples of permits needed for activities on private lands include permits from the US Army Corps of Engineers for dredge and fill operations within stream channels.

Impacts from Water Resources Management. Impacts under Alternative C would be the same as those described for the Proposed RMP with the following additional impacts. Applying CSU restrictions within 100 feet from the edge of a hydrologic feature as determined on a case-by-case basis benefits all segments except the Roan Plateau segments. On all WSR segments under Alternative C, the effect of implementing other resource management actions would be negligible because allowable uses in each WSR stream segment corridor would be restricted so as not to adversely affect the tentative classification, free-flowing condition, or ORVs identified for each stream segment.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be the same as those described for the Proposed RMP plus the following additional impacts. Upland habitats within the drainage area of live water would be designated as priority habitats, which would help protect river corridors and fish ORVs. The NSO for fish-bearing streams would not be in this alternative as it is in the Proposed RMP. However, an NSO would apply, which prohibits surface occupancy and surface-disturbing activities within 100 meters of all perennial waters, which would affect all segments. This NSO increases protection from the Proposed RMP because it includes Hack Creek.

Impacts from Special Species Status – Fish and Aquatic Wildlife Management. Hardscrabble-East Eagle ACEC would be designated to protect the Colorado River cutthroat trout, which would protect the ORV for Abrams Creek.

The Colorado River Seeps ACEC (which would protect a small portion of the Colorado River) and Deep Creek ACEC would be designated to protect the Harrington's penstemon and benefit the botanic and ecologic ORVs.

Impacts from Visual Resource Management. The impacts would be the same as the Proposed RMP with the following additional impacts. Deep Creek is only VRM Class I and II. These VRM protections are stronger than the Proposed RMP to protect the scenic ORV.

Impacts from Lands with Wilderness Characteristics Management. Under Alternative C, application of an NSO stipulation, prohibiting surface occupancy and surface-disturbing activities on BLM lands managed for wilderness characteristics, would benefit portions of the Colorado River, Hack Creek, Deep Creek, and

Thompson Creek and their associated ORVs of historic, ecologic, scenic, botanic, wildlife, and geologic. Thompson Creek, Deep Creek, and Hack Creek would receive additional protection from the management prescription for lands managed for wilderness characteristics.

Impacts from Forestry Management. Closing areas for forestry management would help protect the river corridors and associated ORVs of scenic, wildlife, botanic, ecologic, and recreational along the Colorado River, Deep Creek, Eagle River, and Thompson Creek.

Impacts from Recreation and Visitor Services Management. Prohibiting surface occupancy and surface-disturbing activities in SRMAs for the protection of recreation outcomes and setting prescriptions would protect the Colorado River and benefit the recreational and scenic ORVs.

Impacts from Lands and Realty Management. Impacts would be the same as those described in the Proposed RMP with the following additional impacts. ROW avoidance areas would include portions of the river corridor of Battlement Creek and the associated fish ORV.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as those described in the Proposed RMP with the following additional impacts. No leasing would be allowed along portions of the river corridors of the Eagle River, Egeria Creek, Rock Creek, Hack Creek, Mitchell Creek, Battlement Creek, and Abrams Creek to protect historic, fish, and recreational ORVs.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts would be the same as those described in the Proposed RMP with the following additional impacts. Portions of the Egeria Creek corridor, Rock Creek corridor, Mitchell Creek corridor, and Battlement Creek would also be recommended for withdrawal and therefore would protect the historic and fish ORVs. Impacts to salable minerals would be the same as those described in the Proposed RMP, except that all segments would be suitable, and therefore all would be recommended for withdrawal and protected.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be the same as those described in the Proposed RMP plus the following additional impacts.

Abrams Creek would receive increased protection from the management of the Abrams Creek ACEC (200 acres of overlap) for protection of the Colorado River cutthroat trout. The area would be closed to motorized and mechanized travel and it would be designated as a ROW exclusion area; surface occupancy and surface-disturbing activities would be prohibited and protect the fish ORV.

Thompson Creek would receive additional protection from management of the Thompson Creek ACEC (3,400 acres) for the scenic, geologic, and historic ORVs.

The Colorado River would have more protection from the Colorado Seeps ACEC and Sage Grouse ACEC for the wildlife, scenic, and botanic ORVs.

White River National Forest Segments. For the WRNF segments, Alternative C would be similar to the Proposed RMP. All four eligible segments described in Table 2-2 would be determined suitable for inclusion in the NWSRS.

Although formal WSR designation is an act of Congress, a determination of suitability increases the likelihood that these segments will be designated as WSRs. The overall effect of designation would be to significantly increase the authority of the federal government to address and respond to threats to the ORVs, free-flowing condition, and classification of the designated segments. Potential threats include reduction in flows, changing in timing of flows, degradation of water quality, proposed water storage projects that could invade the river segment, and development on private, local government, state government, and federal government lands within the river segment that would be incompatible with the ORVs and classification. Congressional designation as a WSR is also a more permanent form of protection for the river segment than most other forms of management. Under this designation, long-term negative impacts on the river segment are much less likely than under most other forms of management.

Alternative D

Under this alternative, BLM would no longer manage to protect the free-flowing condition, water quality, ORVs, and tentative classifications on approximately 65 miles of river, which could result in a long-term adverse impact on the WSR characteristics of these stream segments. Management of these segments would be in accordance with the management provisions of the RMP, which in many cases include protective measures. However, these measures would not afford the level of protection specific to the ORVs, free-flowing condition, or tentative classification provided by an eligibility or suitability determination. Therefore, Alternative D would have a long-term adverse impact on these 13 segments as compared with Alternatives A and C, and also as compared with the Proposed RMP, which would protect four of the 13 segments. Impacts from management of other resources and uses would be as described below. BLM will maintain eligible status for East Middle Fork Parachute Creek Complex and East Fork Parachute Creek Complex until a record of decision is entered for the Roan Plateau planning area.

Impacts to WSRs under Alternative D from weed management, wildlife management, livestock grazing management, coal management, wilderness and WSAs would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be the same as or similar to those under the Proposed RMP, except as described below.

Impacts from Wild and Scenic Rivers Management. All 13 eligible segments in the CRVFO would be determined as not suitable, a potential long-term adverse impact on the WSR characteristics of these segments, since the ORVs, free-flowing condition, water quality, and tentative classification that had been identified under Alternative A would not be protected by either eligibility or suitability management.

Impacts from Water Resource Management. Impacts would be the same as those described for the Proposed RMP except streamside management zones would not be protected under an NSO.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be the same as those described for the Proposed RMP with the following changes. Intermittent streams, ponds, and ephemeral or seasonal water would not be priority habitats. Fish bearing streams would not be protected by an NSO, but a CSU would be applied to trout-bearing streams within 100 meters, except those streams containing conservation or core conservation populations of Colorado River cutthroat trout or occupied habitat of greenback cutthroat trout. This CSU protects all segments except Hack Creek. This alternative would protect ORVs for fisheries and cutthroat trout.

Impacts from native trout would include prohibiting surface occupancy and surface-disturbing activities within 100 meters of streams containing conservation and core conservation populations of Colorado River cutthroat trout. AN NSO stipulation would protect the fish ORVs in Abrams and Battlement Creeks.

Impacts from Special Species – Plants Terrestrial Wildlife. Impacts would be the same as those described for the Proposed RMP with the following change. Habitats of special status species would not be restored to suitable habitats and would not protect river corridors. A CSU would be applied to surface-disturbing activities within a 100-meter buffer around occupied BLM sensitive species habitat. This CSU would protect the wildlife, botanic, and ecologic ORVs in portions of the Colorado River and Deep Creek.

Impacts from Visual Resource Management. The impacts would be the same as the Proposed RMP with the following additional impact: Thompson Creek includes VRM Class II to benefit the scenic ORV.

Impacts from Forestry Management. Closing areas for forestry management would help protect the river corridors and ORVs of scenic, botanic, wildlife, fish, and historic along the Colorado River, Hack Creek, Mitchell Creek, and Thompson Creek.

Impacts from Recreation and Visitor Services Management. Prohibiting surface occupancy and surface-disturbing activities in SRMAs for the protection of recreation outcomes and setting prescriptions would protect the Colorado River, a small part of the Eagle River, and Thompson Creek, and benefit the recreational and scenic ORVs.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as those described for the Proposed RMP, except for the following changes. The Colorado River and Hack Creek are the only river corridors affected by closed OHV designations. The Colorado River, the Eagle River, Thompson Creek, Hack Creek, and Deep Creek would be closed to over-snow travel to protect the scenic, recreational, wildlife, botanic, geologic, historic, and ecologic ORVs.

Impacts from Lands and Realty Management. Impacts would be the same as those described in the Proposed RMP with the following changes. ROW avoidance areas would include lesser portions of the river corridors of the Colorado River, Eagle River, Abrams Creek, and Battlement Creek. Retention Areas would include lesser portion of the river corridors of the Colorado River, the Eagle River, Deep Creek, and Abrams Creek, thus offering lesser protections than in other Alternatives.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as those described in Alternative A, except that no leasing would be allowed along portions of the river corridor of the Colorado River to benefit the scenic, wildlife, botanic and geologic ORVs.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Impacts would be the same as those described in Alternative A, except portions of the river corridors of the Colorado River, the Eagle River, Hack Creek, a small portion of Deep Creek, a small portion of Thompson Creek, and Mitchell Creek would be recommended for withdrawal and therefore protect the scenic, wildlife, geologic, ecologic, historic and fish ORVs.

Impacts from Areas of Critical Environmental Concern Management. Mitchell Creek and the associated fish ORV would be protected by the Glenwood Springs Debris Hazard Flow ACEC. Portions of the Colorado River corridor and ORVs of scenic, botanic, wildlife, and geologic would be protected from the Bull Gulch and Blue Hill ACEC. These ACECs would be recommended for withdrawal from mineral location and sales.

White River National Forest Segments. All four of the segments managed as eligible for inclusion in the NWSRS would be determined not suitable under Alternative D. The WRNF would no longer be obligated to perpetuate the rivers' eligibility and the study process would be concluded. Two Colorado River segments and two Deep Creek segments would no longer be managed as a potential WSR's. Specific protections related to WSR values such as the rivers' free-flowing condition, water quality, ORVs, and the corridors level of development classifications would be replaced with other management area direction. Potential impacts could be incurred depending on resource management activities and elements not controlled by the WRNF, such as water rights.

Current Forest Plan direction for these four eligible WSR segments would no longer be applicable. Therefore, Alternative D would result in an amendment to the 2002 WRNF Land and Resource Management Plan. (Descriptions of current management categories can be found in the WRNF, Land and Resource Management Plan 2002 Revision, Chapter 3 [(USFS 2002a].) Under Alternative D and a not suitable determination, the following new management area categories and subsequent direction would be applied:

- WRNF Colorado River Segments 1 and 2 (Glenwood Canyon) would be changed from management area prescription category 4.4, Recreation Rivers-Designated and Eligible, to management area prescription category 4.23, Scenic Byways, Scenic Areas, Vistas and Travel Corridors. (Descriptions for Alternative D management categories can be found in WRNF Scenic Byways, Scenic Areas, Vistas and Travel Corridors, Appendix T [USFS 2002].)
- WRNF Deep Creek Segments 1 and 2a would be changed from management area prescription categories 1.5, Wild Rivers-Designated and Eligible, and 3.4, Scenic River-Designated and Eligible, to management area prescription category 2.1, Special Interest Area – Minimal Use and Interpretation. (Descriptions for Alternative D management categories can be found in WRNF Special Interest Areas, Appendix T [USFS 2002].)

<u>Colorado River Segments.</u> The management area prescription changes to the two Colorado River segments could result in long-term adverse impacts to water-dependent ORVs, free-flowing condition, and water quality. The emphasis for long-term protections that makes the two segments eligible for inclusion into the National WSR System would no longer exist. Management of these segments would change from protecting and perpetuating the suite of WSR values in their current condition within the study corridor to management of the area for its scenic and recreational values. While the WRNF strongly desires to protect and preserve all ORVs associated with in-stream flows, authorities found under the Wild and Scenic Rivers Act would not be available and subsequent tools to manage water dependent values and supporting in-stream flows would be limited. To the extent that the WRNF is authorized under law to control water projects on USFS lands, the free-flowing characteristics of the river could be modified by new projects.

Under management area category 4.23-Scenic Byways, Scenic Area, Vistas and Travel Corridors, the focus of management would be on protection and enhancement of the scenic values on federal lands within the segments. In this regard, the scenic ORVs would continue to be protected and possibly enhanced. The

recreational and geologic values would no longer be afforded focused protection. However, geologic values are unlikely to be affected as they contribute to the scenic values and, as such, would continue to be protected. Proposed new uses, management actions, or facilities could be allowed on and off USFS lands as long as they preserve the scenic values. However, recreational values related to whitewater rafting would no longer be afforded focused protection for these segments. The WRNF would continue managing recreational uses, but in the long term, these values could be reduced by continued water depletion in the Colorado River resulting from water resource projects outside the agency's control. Additionally, the WRNF would no longer be mandated to manage for the protection of the free-flowing condition (other than scenic values) or water quality under the Wild and Scenic Rivers Act.

There would be no changes or impacts to other resources such as grazing, vegetation management, or timber land base. Potential for impacts to other resources from current condition and management area prescriptions may apply to mineral and energy resources program. Under both categories, the corridor could be withdrawn from mineral entry. In addition, restrictions requiring underground facilities would be removed.

Deep Creek Segments. The management changes to the two Deep Creek segments under Alternative D would remove the USFS's obligation to manage for the protection of the entire suite of WSR characteristics under the Wild and Scenic Rivers Act. Administrative protections based on LUP decisions may or may not offer long-term protections as a result of changing land use demands and political influences.

Under management area category 2.1-Special Interest Areas-Minimal Use and Interpretation, the focus of management would be to protect or enhance Deep Creek's unique ecological, geological, and scenic characteristics and natural setting. (See USFS 2002, Appendix T.) Special Interest Areas (SIAs) also can be designated to protect and manage endangered species, other elements of biologic diversity, caves, historic sites, and the like. Deep Creek would be managed for the unique values and natural setting that render the SIA designation.

Deep Creek's rare and outstanding values are the primary management consideration and other resource values are typically secondary to protection, maintenance, and restoration of the area's special values. This consideration would most likely continue to protect the segments, ecologic, scenic, and geologic ORVs through management prescriptions.

Under all alternatives, Deep Creek could be withdrawn from mineral entry when deemed necessary to meet the objectives for which the area was proposed. This particular SIA would not allow motorized or mechanized use to protect the identified values. Recreation use emphasizes interpretation, education, and inspiration when it is compatible with the SIA values. Other management actions would be similar to current management standards and guidelines for grazing, recreation, and scenery management, as long as those uses do not threaten the values for which the area was proposed. Timber management is allowed in this prescription as long as it meets specific resource objectives for maintaining the values for which the individual area was established. The current 1.5 and 3.4 management prescriptions do not allow for timber management activities. Management under the 2.1 prescription would continue to result in minimal access and use of the area, protecting the natural features that constitute the identified ORVs.

Cumulative Impacts

Even though no stream segments would be found suitable, ORVs would still exist and could still be impacted. The BLM and USFS would not be required to prevent impacts on free-flowing condition, water quality, ORVs, or tentative classification when approving permits or resource use applications. Thus, permits or uses could be approved that degrade river-related values. It is not feasible to accurately anticipate specific projects and impacts related to potential future uses. However, without systematic consideration of impacts on river-related values in permitting decisions made by BLM, USFS and other federal agencies, it is possible that there could be significant cumulative impacts on the river-related values. This risk is especially apparent with regard to flow management, where the impacts associated with any individual project may not be large, but the cumulative effect of multiple projects may result in not meeting the flows necessary to support the ORVs.

4.4.4 National Trails and Scenic Byways

This section presents potential impacts of the alternatives on national trails and scenic byways. Existing conditions concerning national trails and scenic byways are described in Chapter 3, Section 3.4.4. Portions of the Continental Divide National Scenic Trail, the Top of the Rockies National Scenic Byway, and the West Elk Loop State Scenic and Historic Byway/National Forest Scenic Byway occur within the CRVFO planning area, but are not managed by the BLM.

The Continental Divide National Scenic Trail (CDNST) parallels the eastern boundary of the planning area, with only a small segment crossing into the planning area near the Town of Mitchell. There are no CRVFO BLM lands within the viewshed of the national scenic trail corridor. The USFS manages the greatest amount of land along the CDNST corridor, including the segment that crosses the CRVFO planning area. The trail provides for high quality, scenic, primitive recreational experiences, while conserving natural, historic, and cultural resources. Direction for the development and management of the CDNST is provided by the "Continental Divide National Scenic Trail Comprehensive Plan" (CDNST 2009).

The Top of the Rockies National Scenic Byway is located in the eastern extent of the planning area. However, only the very southwest (near Aspen, Colorado) and northwest (near Minturn, Colorado) segments are located within the planning area and are located predominantly on the WRNF. There are no CRVFO BLM lands within the viewshed of the scenic byway corridor. The intrinsic qualities provided by the byway include scenic, historic, recreational, cultural, and natural resources. These intrinsic qualities are a priority for protection within the *Top of the Rockies Scenic and Historic Byway Corridor Management Plan* (CDOT 2008). The Corridor Management Plan (CMP) and Interpretive Management Plan are currently being updated (TOR 2010).

The northern extent of the West Elk Loop State Scenic and Historic Byway is located within the planning area and begins in the Roaring Fork Valley in Carbondale, Colorado, and extends further south outside of the planning area. Although, the West Elk Loop Scenic and Historic Byway is not located on lands managed by the BLM, BLM lands are within the viewshed of the Scenic Byway corridor. The intrinsic qualities provided by the Byway include natural features, recreational opportunities, community events, historic and cultural resources. These intrinsic qualities are a priority for protection within the *West Elk Loop Scenic and Historic Byway Corridor Management Plan* (EDAW 2000).

Methods and Assumptions

There are no specific management goals or objectives, or associated land use plan decisions for national trails or scenic byways because none exist on BLM lands. The terminology and policy in the document refers only to national trails or scenic byways managed by the USFS.

Adverse effects on scenic viewsheds could occur if BLM decisions created changes to a scenic viewshed or introduced new features into the scenic viewshed that does not complement the existing landscape. Examples include surface disturbance from earthwork construction (roads, trails, rights-of-way development, mineral development etc.) and construction of structures (recreation sites, communication sites, water storage etc.). Beneficial effects on scenic viewsheds would occur if other resource management actions improve, enhance, or protect a scenic viewshed. Additional examples include vegetation treatments (range improvements, habitat improvements, fuel treatments, restoration of degraded lands, etc.) and special designations (ACECS, WSAs etc.) or stipulations (NSOs, CSUs) that constrain surface occupancy or surface disturbing activities.

Environmental Consequences

Impacts on scenic viewsheds within national trail and scenic byway corridors would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on national trails or scenic byways under any of the four alternatives.

Under all action alternatives, the intrinsic qualities and values of national trails and scenic byways would indirectly benefit from stipulations for other resources.

Alternative A

Impacts from Comprehensive Trails and Travel Management. Under all alternatives, the designation of OHV open areas could cause adverse impacts on landscapes within scenic viewsheds. The level of use, season of use, type of soil, and vegetation community all could influence the amount of change to the landscape. Although the landscape in many areas would not be impacted by cross-country use because of topographic and vegetation limitations, continuing to manage large areas as open would allow the greatest potential for changes to the landscape and impacts within scenic viewsheds because of soil disturbance, tire tracks, and hill climbs. In those areas in which OHV use is limited to designated routes, management would limit impacts on the landscape to the existing transportation system, and would eliminate the creation of new routes that would result in further changes to the landscape within scenic viewsheds. The designation of limited routes would indirectly protect scenic viewsheds by reducing the potential for the creation of additional routes and changes to the landscape, such as soil disturbance, erosion, and loss of vegetation. Areas with a closed designation would provide long-term indirect benefits to scenic viewsheds because those areas would no longer receive impacts from OHV use. As opposed to the Proposed RMP and Alternatives C and D, Alternative A has area travel designations of "open" and "limited to existing routes," which allow unplanned expansion of routes. Over time, inappropriate and unplanned travel allowed by the current travel designations under Alternative A is likely to cause the most impacts to national trails and scenic byway viewshed through the life of the plan.

Impacts from Air Quality Management. Under all alternatives, all planning area resource management actions that degrade air quality could have indirect impacts on scenic viewsheds within national trails and scenic byway corridors. Smoke, dust, haze, or other pollutants could reduce visibility in the short term and long term, and impact the overall national trail or scenic byway travel experience. Under Alternative A, the air quality management objective is to limit air quality degradation in the planning area by ensuring that BLM land use activities are in compliance with federal, state, and local laws and regulations. The proposed air quality management action and allowable use decisions would indirectly, but beneficially, contribute to maintaining the condition and the quality of scenic viewsheds within national trail and scenic byway corridors.

Impacts from Soil Management. Soil management designed to improve ecological conditions could indirectly enhance the viewsheds within national trail and scenic byway corridors. Across all alternatives, the BLM would apply an NSO and CSU stipulation that would constrain surface occupancy and surface-disturbing activities on slopes greater than 50 percent, and for erosive soils or slopes greater than 30 percent. The intention of the stipulations was to apply constraints to all public land uses, not just fluid mineral development, in order to reduce erosion and maintain soil site stability. The language under Alternative A for soils stipulations was adapted from oil and gas stipulations, unlike the Proposed RMP and Alternatives C and D stipulations that straightforwardly address all surface-disturbing activities. Overall, Alternative A is less protective to scenic viewsheds within national trails and scenic byway corridors than the Proposed RMP and Alternatives C and D.

Impacts from Water Resource Management. Water resource management designed to improve ecological conditions could indirectly enhance viewsheds within national trail and scenic byway corridors. All alternatives would be consistent with applicable state and federal water quality standards. Under all alternatives, NSO stipulations for major river corridors and municipal watersheds would prohibit surface occupancy and surface-disturbing activities in close proximity to waterways. The proposed water resource management action and allowable use decisions would indirectly, but beneficially, contribute to maintaining the condition and the quality of national trail and scenic byway viewshed corridors. Alternatives A and D are similar but less restrictive on surface-disturbing activities. Overall, Alternative A is the least protective of water resources and thus would provide the least amount of indirect benefits to scenic viewsheds.

Impacts from Vegetation Management. Under all alternatives, the overall vegetation goal is to provide healthy and productive plant communities of native and other desirable species at viable population levels. Plant communities that achieve this goal would in turn indirectly benefit national trail and scenic byway viewshed corridors. Vegetation management actions would include weed treatments, timber management, hazardous fuels reduction, vegetation treatments, and habitat restoration to achieve the overall vegetation goal.

Impacts from Fisheries and Aquatic Wildlife Management. Under all the alternatives, there are stipulations that would constrain surface occupancy and surface-disturbing activities within the watershed upstream of fisheries. These measures would indirectly support the protection of the intrinsic values provided by national trail and scenic byway corridors.

Impacts from Terrestrial Wildlife Management. Provisions to maintain and improve BLM's share of the priority wildlife habitat requirements for a variety of terrestrial wildlife species are included in all alternatives. Stipulations for priority wildlife habitat, big game winter range and winter closures, and raptor, waterfowl, and shorebird nesting habitats would constrain surface occupancy and surface-disturbing activities. These measures would indirectly support the protection of the intrinsic values of national trail and scenic byway viewshed corridors.

Impacts from Special Status Species. All alternatives prohibit actions that destroy, adversely modify, or fragment federally listed species habitat, and include habitat improvements for special status species. NSO and CSU stipulations for a variety of special status plant and wildlife species would constrain surface occupancy and surface-disturbing activities across all alternatives, which would indirectly, but beneficially, contribute to the protection of national trail and scenic byway viewshed corridors.

Impacts from Cultural Resources. The protective management of cultural resources across all alternatives would indirectly benefit national trails and scenic byway viewshed corridors.

Impacts from Visual Resource Management. The impacts on scenic viewsheds within national trails and scenic byway corridors from VRM decisions are primarily associated with limitations on surface-disturbing activities intended to maintain the scenic values of public lands. VRM designations do not preclude land use activities if the impacts of those activities can be mitigated to meet VRM Class objectives. For VRM Class I and II the level of change to the landscape should be low. Stipulations applied to the VRM classes do constrain surface-disturbing activities. Alternative A provides fewer stipulations that would directly apply to VRM than the Proposed RMP and Alternatives C and D. So qualitatively, based on the acres of NSO and CSU stipulations to protect visual resources, Alternative A is estimated to indirectly, contribute the least to

supporting the protection of national trail and scenic byway viewshed corridors. Whereas, the Proposed RMP is estimated to indirectly, but beneficially contribute the most to supporting the protection of national trail and scenic byway viewshed corridors.

The CDNST and the Top of the Rockies National Scenic Byway would be managed by the USFS, which requires the application of the USFS Scenery Management System. For the northern extent of the West Elk Loop State Scenic Byway, although not located on BLM land, BLM land is within the viewshed and would require the application of BLM's VRM System. Across all alternatives BLM lands within the viewshed of the West Elk Loop State Scenic Byway are designated as Class I, II, and III.

Impacts from Wildland Fire Management. Impacts on scenic viewsheds within national trails and scenic byways from prevention and mitigation programs aimed at reducing unwanted fire would be similar to those for vegetation treatments. However, actions related to prevention could reduce human-caused ignitions and related visual impacts caused by fire. Impacts would be minor to moderate in the short term, depending on the magnitude, but would become negligible in the long term. Wildland fires and prescribed fires would result in smoke, causing short-term, minor to moderate impacts on scenic viewsheds. The impacts of fire management on scenic viewsheds would be the same under all alternatives, with all use guided by the current FMP, whose goals are restoring the physical function and biological health of the land which would support the protection of national trail and scenic byway viewshed corridors.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative A, BLM would not manage lands to protect wilderness characteristics outside existing WSA's. There would be no indirect benefits to viewsheds within national trails and scenic byway corridors, because there would be fewer protections in the area.

Impacts from Livestock Grazing. Domestic livestock grazing would continue to be permitted under all of the alternatives. BLM lands would be grazed primarily by cattle but also sheep and some domestic horses. The relative numbers and kinds of livestock have not varied much over the last 10 years and are not expected to vary much in the future. Under all alternatives, implementation-level grazing decisions would comply with *Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado*. If livestock grazing is the cause for not achieving standards, changes would be made to address the kind, numbers, and class of livestock, and the season, duration, distribution, frequency, and intensity of grazing use. All alternatives would allow implementation-level adjustments of livestock grazing management to meet land health objectives. It is not anticipated that livestock grazing would have impacts on viewsheds within national trails and scenic byways, because meeting the land health standards would not permit degradation of the lands. When livestock use is properly managed, it would indirectly, but beneficially, contribute to the protection of national trail and scenic byway viewshed corridors.

Impacts from Recreation and Visitor Services Management. Scenic byways may be used to reach a visitor's destination, to access recreation areas on BLM lands, and become part of a visitor's overall travel experience. Under alternative A, existing stipulations for RMAs would constrain surface occupancy and surface-disturbing activities. Eight areas would be managed as SRMAs (Bocco Mountain, Bull Gulch, Deep Creek, Gypsum Hills, Hack Lake, Red Hill, Thompson Creek, and the Upper Colorado River). All but the Gypsum Hills and Bocco Mountain SRMAs have an NSO stipulation applied to retain the existing physical RSCs. Seven areas would continue to be managed as RMAs with an NSO stipulation to protect nonmotorized recreation opportunities. In all alternatives, recreation activities would take place on BLM lands unless the

lands are closed to human entry. Recreation activities would be unevenly dispersed and distributed by location, intensity, activity type, infrastructure, season, and time on BLM lands. In the CRVFO, recreation use peaks during the summer in locations like the Colorado and Eagle Rivers, on weekends and evenings on BLM lands adjacent to communities or within easy access of communities, and during the fall big game hunting seasons when many resident and out-of-town hunters add to the mix of recreation. Alternative A lacks the limitations on recreation use (camping closures, firearm use restriction) proposed under the Proposed RMP and Alternatives C and D. The risks to visitor experience from inappropriate or increasing recreation use are higher under Alternatives A and D.

Impacts from Lands and Realty. Land exchanges, acquisitions, and disposals would add or remove land from BLM jurisdiction. Land disposals could result in the loss of the indirect protection of scenic viewsheds provided by other resource management actions. In contrast, acquisitions would indirectly, but beneficially, contribute to the protection of national trail and scenic byway viewshed corridors. Under Alternative A, land tenure adjustments are performed to increase the overall efficiency and effectiveness of BLM land management.

ROW authorizations associated with roads, utilities, communication facilities, and energy facilities could impact scenic viewsheds by necessitating surface occupancy and surface-disturbing activities. This could indirectly impact a visitor's travel experience on national trails or scenic byways. BLM lands identified as avoidance areas may not be totally unavailable, but should be avoided if possible due to some resource value that may become damaged or detracted from if development were allowed. Under all alternatives, ROW avoidance and exclusion areas would apply to ROWs, other land use authorizations, and renewable energy. Under all alternatives, ROWS would be subject to NSO and CSU stipulations that would constrain surface occupancy and surface-disturbing activities. Potential adverse impacts to scenic viewsheds within national trails and scenic byways under Alternative A would be more than under the Proposed RMP and Alternatives C and D.

Impacts from Coal Management. Exploration and development of coal creates surface disturbance that could adversely affect scenic viewsheds within national trails and scenic byway corridors. While coal mining would result in surface-disturbing activities, there currently are no active coal mines in the planning area, and the potential is relatively low. Known coal resources within the CRVFO are located along the Grand Hogback between Rio Blanco Hill and Glenwood Springs and are not within any national trails or scenic byway viewsheds.

Impacts form Fluid Minerals Management. Oil and gas development activity is concentrated on the western 22 percent of the CRVFO (the area west of the Grand Hogback), where high potential for the occurrence of gas resources is found. It is estimated that 99 percent of future drilling would occur in the areas identified as high potential for the occurrence of oil and gas resources. Of the 147,500 acres of BLM mineral estate in this high potential area that is not within the Roan Plateau planning area, 88 percent has been leased and is being developed. The eastern 78 percent of the CRVFO (east of the Grand Hogback) has a lower potential for the occurrence of oil and gas resources. Approximately 1 percent of future drilling activity is likely to occur in areas of medium and low potential, and no drilling is predicted in the areas identified as no known potential. Alternative A identifies the most acres as open to leasing and gas development. Despite the variance in acres open to leasing and gas development, the scope of the impacts is not expected to vary among the alternatives, but the intensity of impacts could increase in areas with a high potential for natural gas located west of the Grand Hogback. Under Alternative A, all WSAs and the Thompson Creek ACEC

(formerly NEA) would remain closed to fluid minerals leasing and geophysical development. Over the life of the current RMP, the designation CL for these areas would continue to indirectly support the protection of national trails and scenic byway viewshed corridors.

Impacts from Locatable Minerals, Mineral Materials, and Non-Energy Leasable Minerals Management. The effects of mineral resource development and production on scenic viewsheds within national trails and scenic byways could vary, depending on the location and degree of disturbance. Acres of locatable minerals, mineral materials sales, and non-energy leasable minerals open to development would vary by alternative, with Alternatives A and D having the most open acres. However, the amount of land that is open to mineral use is not necessarily indicative of the number of acres that would be directly disturbed since the amount of expected mineral is low. Under all alternatives, minerals would be subject to the concurrent stipulations for each alternative. If mineral development would occur through the life of the plan, Alternative A would pose more risk of not supporting the protection of national trails and scenic byway viewshed corridors.

Impacts from Areas of Critical Environmental Concern Management. Under Alternative A, six ACECs would be designated where special management is needed to protect important geologic, botanic, historic, scenic values, and wildlife. ACEC designations and their management prescriptions offer long-term benefits by limiting or preventing surface disturbance. Thus, indirectly, but beneficially, these designations contribute to maintaining the condition and the quality of national trail and scenic byway viewshed corridors

Alternative B (Proposed RMP)

Impacts to national trails and scenic byways from management of resources would be the same as or similar to those under Alternative A except as described below.

Impacts from Comprehensive Trails and Travel Management. Impacts would be the same as those under Alternative A, except that the Proposed RMP would designate no acres as open to OHV use, 464,000 acres as limited to designated routes, and 41,200 acres as closed to OHVs. Compared with Alternative A, the Proposed RMP has no open designation, and would have long-term indirect beneficial impacts on the viewsheds within national trails and scenic byways.

Impacts from Air Quality Management. Impacts would be similar to those under Alternative A, except that under the Proposed RMP and Alternatives C and D, the objective would be to control or reduce emissions of air pollutants associated with oil and gas activities to help protect human health and reduce visibility-impairing pollutants. Air quality management objectives and actions under the Proposed RMP would include more stringent emission controls on oil and gas equipment and activities than Alternative A. Implementing the proposed air quality management actions and allowable use decisions would indirectly, but beneficially, contribute to maintaining the condition and the quality of national trail and scenic byway viewshed corridors.

Impacts from Water Resource Management. Impacts would be similar to those under Alternative A except that under the Proposed RMP and Alternative C, an NSO stipulation would prohibit surface occupancy and surface-disturbing activities within a buffer distance of a hydrologic feature (i.e., perennial streams, water bodies, riparian areas, and wetlands). Under the Proposed RMP, the buffer distance would be 325 horizontal feet from the outer edge of riparian/wetland zones. Alternative C would provide a similar streamside management protection zone, but with a smaller buffer distance of 50 feet from the ordinary high

water mark of any hydrologic feature (i.e., ephemeral, intermittent, perennial channels, wetland, lake, fen, spring). Under the Proposed RMP, in addition to an NSO for municipal watersheds and public water supplies, a CSU stipulation would constrain surface-disturbing activities within watersheds providing domestic water. A CSU for intermittent and ephemeral streams would also be applied, constraining surface-disturbing activities within 100 feet of the edge of intermittent or ephemeral stream drainages. Under the Proposed RMP and Alternative C, constraints on surface-disturbing activities would be increased, compared with Alternatives A and D. The stipulations would indirectly, but beneficially, contribute to maintaining the condition and the quality of national trail and scenic byway viewshed corridors.

Impacts from Vegetation Management. Impacts would be similar to those under Alternative A except that the Proposed RMP and Alternatives C and D would provide more benefits to vegetation than Alternative A. This would in turn, contribute to maintaining the condition and quality of national trail and scenic byway viewshed corridors.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP would apply an NSO stipulation for fish-bearing streams and an NSO stipulation for fish hatcheries. These stipulations would protect fish-bearing streams and hatcheries by constraining surface-disturbing activities. Alternatives C and the Proposed RMP, respectively, would propose more constraints on use and surface-disturbing activities and a larger area of constraints, so qualitatively it is estimated that they would indirectly, but beneficially, contribute to maintaining the condition and the quality of national trail and scenic byway viewshed corridors.

Impacts from Terrestrial Wildlife Management. Impacts under the Proposed RMP would be similar to those under Alternative A, with the addition of stipulations for migratory bird nesting season and priority wildlife areas, which would further prohibit surface occupancy and surface-disturbing activities. This would continue to indirectly support the protection national trails and scenic byway viewshed corridors.

Impacts from Special Status Species Management. Impacts under the Proposed RMP would be similar to those under Alternative A, with the inclusion of NSOs for additional special status species, which would further prohibit surface occupancy and surface-disturbing activities. This would continue to indirectly support the protection of national trails and scenic byway viewshed corridors.

Impacts from Managing to Protect Wilderness Characteristics. Under the Proposed RMP and Alternative C, Castle Peak Addition, Deep Creek, Flat Tops Addition, and Pisgah Mountain, Thompson Creek would be managed for wilderness characteristics. These lands would be closed to fluid minerals leasing and geophysical exploration to protect their wilderness character. In addition, the Proposed RMP and Alternative C would apply an NSO stipulation that would prohibit surface occupancy and surface-disturbing activities. Compared with Alternative C, the Proposed RMP would provide fewer benefits to scenic viewsheds within national trail and scenic byway corridors, but more than Alternatives A and D.

Impacts from Livestock Grazing Management. Impacts under the Proposed RMP would be similar to those under Alternative A, except that livestock grazing would continue to be authorized on 441,600 acres. The Proposed RMP would allow fewer acres for grazing compared with Alternative A, which would indirectly, but beneficially, contribute to maintaining the condition and the quality of national trail and scenic byway viewshed corridors.

Impacts from Recreation and Visitor Services Management. Under the Proposed RMP and Alternatives C and D, BLM lands would be designated as SRMAs or ERMAs, or they would be left undesignated. Five areas would be managed as SRMAs. Within SRMAs, R&VS management is recognized as the predominant land use focus, where specific recreation opportunities and RSCs are managed and protected on a long-term basis. An NSO stipulation for SRMAs would be applied under the Proposed RMP that would prohibit surface occupancy and surface-disturbing activities within these areas. Six areas would be managed as ERMAs. ERMAs are managed to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA. Since management within ERMAs is commensurate with the management of other resources and resource uses, all R&VS decisions would be compatible with other resource objectives. Compared with Alternatives A and C, R&VS management under the Proposed RMP would provide more indirect benefits to scenic viewsheds within national trail and scenic byway corridors.

Impacts from Lands and Realty Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP would have 191,200 acres of ROW avoidance areas and 39,400 acres of ROW exclusion areas. Compared with Alternative A, the Proposed RMP would provide more benefits to maintaining the condition and the quality of national trail and scenic byway viewshed corridors.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be similar to those under Alternative A, except that the Proposed RMP would designate 11 ACECs. Compared with Alternative A, the Proposed RMP would provide more benefits to maintaining the condition and quality of national trail and scenic byway viewshed corridors.

Alternative C

Impacts to national trails and scenic byways from management of resources would be the same as or similar to those under Alternative A except as described below.

Impacts from Comprehensive Trails and Travel Management. Under Alternative C, additional travel limitations and a reduced number of designated routes are proposed. Compared with Alternative A, Alternative C would have the most long-term indirect beneficial impacts to viewsheds within national trail and scenic byways.

Impacts from Air Quality Management. Impacts would be similar to those under the Proposed RMP, except that under Alternative C, the cumulative impacts would differ because of the cumulative emissions within the WRFO. Implementing the proposed air quality management actions and allowable use decisions would indirectly, but beneficially, contribute to maintaining the condition and the quality of the viewsheds within national trail and scenic byway corridors.

Impacts from Water Resource Management. Indirect impacts would be similar to those under the Proposed RMP, except that Alternative C would propose a 100-foot (50 feet beyond the NSO) CSU stipulation for hydrologic features. The stipulation would apply to ephemeral, intermittent, and perennial channels, wetlands, lakes, fens, and springs. The areas and acres with constraints on surface-disturbing activities would increase, compared with other alternatives.

Impacts from Fisheries and Aquatic Wildlife Management. The indirect impacts would be similar to those under the Proposed RMP and Alternatives A, except Alternative C would be slightly more beneficial

because it proposes application of an NSO stipulation to all perennial waters instead of only to fish-bearing streams. It would also apply an NSO stipulation for fish hatcheries.

Impacts from Special Status Plants and Terrestrial Wildlife Management. The Proposed RMP and Alternative C would propose more constraints on use and surface-disturbing activities, and a larger area of constraints. Therefore, it is qualitatively estimated that Alternative C and the Proposed RMP, respectively, would indirectly be the most beneficial to reducing adverse impacts from surface-disturbing activities that would affect the viewsheds of national trails and scenic byways.

Impacts from Managing to Protect Wilderness Characteristics. Under Alternative C, all lands managed for wilderness characteristics would be managed consistent with the Management and Setting Prescriptions for Lands Managed to Protect Wilderness Characteristics (Appendix F). This would ensure that these lands are managed to preserve their wilderness characteristics. The prescriptions collectively retain the area's natural integrity, which would provide indirect benefits to scenic viewsheds within national trail and scenic byway corridors.

Impacts from Livestock Grazing Management. Impacts would be the similar to those described under Alternative A. Of the 58 vacant allotments, all would be closed and three currently active allotments would be closed to grazing. Alternative C offers the greatest potential increase in herbaceous vegetation. This would provide indirect benefits to viewsheds within national trail and scenic byway corridors.

Impacts from Recreation and Visitor Services Management. Under the Alternative C theme, current recreation uses would be recognized but not necessarily accommodated when considering land uses. Impacts from R&VS would be the same as or similar to those under the Proposed RMP, except that Alternative C would designate only the Red Hill and Upper Colorado SRMAs. Three additional ERMAs (Hack Lake, King Mountain, and the Crown) would be identified to sustain the principal recreation activities and the associated qualities and conditions. Alternatives C and D and the Proposed RMP would include more limitations (e.g., camping closures, firearm use restriction, and SRPs) on inappropriate recreation use.

Impacts from Lands and Realty Management. Impacts would be similar to those under Alternative A, except that Alternative C would have 196,800 acres of ROW avoidance areas and 39,900 acres of ROW exclusion areas. Compared with Alternative A, Alternative C would provide the most indirect benefits to viewsheds within national trail and scenic byway corridors of all the action alternatives.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be similar to those under Alternative A, except that Alternative C would designate more acres as ACECs. Compared with Alternative A, Alternative C would provide the most benefits to viewsheds within national trail and scenic byway corridors of all the action alternatives.

Alternative D

Impacts to national trails and scenic byways from management of resources would be the same as or similar to those under Alternative A except as described below.

Impacts from Comprehensive Trails and Travel Management. Impacts under Alternative D would be greater than under the Proposed RMP and Alternative C, but less than Alternative A, because OHVs would

be limited to designated routes. Alternative D would designate no land as open to OHV use, 464,800 acres as limited to designated routes, and 40,400 acres as closed to OHVs.

Impacts from Water Resource Management. Impacts under Alternative D would be similar to those under Alternative A. However, Alternative D would provide more protection to water resources than Alternative A, but less protection than the Proposed RMP and Alternative C.

Impacts from Fisheries and Aquatic Wildlife Management. Impacts under Alternative D would be similar to those under Alternative A, with an additional stipulation for trout-bearing streams. Compared with Alternative A, Alternative D would offer more indirect benefits to scenic viewsheds within national trail and scenic byway corridors, but less than the Proposed RMP and Alternative C.

Impacts from Special Status Species Management. Impacts under Alternative D would be similar to those under Alternative A, but would provide less protection by stipulations for special status plants and terrestrial wildlife that would prohibit surface occupancy and surface-disturbing activities. Alternative D would provide the least protection to national trails and scenic byway viewshed corridors.

Impacts from Livestock Grazing Management. Impacts under Alternative D would be similar to those under Alternative A, except that livestock grazing would continue to be authorized on 442,200 acres. Alternative D would allow fewer acres for grazing compared with Alternative A. Alternative D would be more protective than Alternative A, but less protective than Alternative C.

Impacts from Recreation and Visitor Services Management. Impacts under Alternative D would be similar to those under the Proposed RMP and Alternative C. Seven areas would be managed as SRMAs and five areas would be managed as ERMAs. Compared with the Proposed RMP and Alternatives A and C, R&VS management under Alternative D would provide the most indirect benefits to viewsheds within national trail and scenic byway corridors of all the action alternatives.

Impacts from Lands and Realty Management. Impacts would be similar to those under Alternative A, except that Alternative D has 105,100 acres of ROW avoidance areas and 39,100 acres of ROW exclusion areas. Compared with Alternative A, Alternative D would provide more indirect benefits to viewsheds within national trail and scenic byway corridors of all the action alternatives, but less than the Project Plan and Alternative C.

Impacts from Areas of Critical Environmental Concern Management. Impacts would be similar to those under Alternative A, except that Alternative D would designate fewer ACECs. Compared with Alternative A, Alternative D would provide the least indirect protection of viewsheds within national trail and scenic byway corridors by designating the least amount of acres to ACECs that limit surface-disturbing activities.

Cumulative Impacts

The geographic extent of the cumulative impact analysis as it pertains to national trails and scenic byways would be within the eastern and southeastern extent of the planning area where existing national trails and scenic byway corridors reside or are within the vicinity. Cumulative effects include other federal, state, local, or private actions that are reasonably certain to occur in the planning area and near an existing national trail or scenic byway corridor. Potential cumulative impacts on national trails and scenic byways in the planning area

would result primarily from surface disturbance activities on adjacent lands, including OHV use, mineral exploration and development, livestock grazing, vegetation treatments (including prescribed burning), wildfires, and ROW authorizations. These activities would remove vegetation cover, exposing bare soil and creating visual scars in the landscape. These scars may not be in the corridors themselves, but would be within the corridor viewshed. These impacts would alter the natural appearance of a viewshed corridor and could diminish the scenic value, potentially affecting a visitor's overall travel experience.

BLM lands in the CRVFO contain a large amount of interspersed private lands, and some small parcels of state lands, making for an enormous amount of WUI issues with a diversity of commercial, industrial, residential, and agricultural land use. Communities bordering BLM land are certain to grow in both geographic extent and population over the life of the plan. In addition, destination resorts such as Aspen and Vail will continue to attract visitors year-round. Access to these destinations via scenic routes will become increasingly important as other more commonly traveled corridors (e.g., Interstate 70) are becoming more developed. Demands to use BLM lands and to expand development opportunities are expected to continue, and with this pressure there is more potential to impact national trail and scenic byway viewshed corridors.

Proposed management action and allowable use decisions under Alternatives A and D would maintain the scenic viewsheds within national trails and scenic byway corridors. However, this maintenance would decrease over time, since Alternatives A and D recognize and accommodate more land uses. Alternative A has the greatest risk of negative cumulative impacts on BLM lands, with those activities currently occurring and reasonably certain to occur on private lands. Alternative C would place major constraints on surface-disturbing activities and designate the most acres of ACECs, lands managed for wilderness characteristics, and ROW exclusion areas. Cumulative impacts would be the least under Alternative C. Alternative D would provide the least benefit to viewsheds within national trail and scenic byway corridors among all the action alternatives. Stipulations designed to protect other resources within the planning area would indirectly, but beneficially, support the protection of national trail and scenic byway viewshed corridors.

4.5 IMPACTS ON SUPPORT

4.5.1 Transportation Facilities

Methods and Assumptions

Access to BLM lands is crucial for the effective use and stewardship of those lands. This section describes potential impacts on transportation facilities (maintained roads) from management actions for the resources and resource uses discussed in Chapter 2. Existing conditions concerning transportation facilities are described in Section 3.5.1.

Maintained roads provide appropriate ingress, egress, and access in the planning area. The following discussion of the impacts on transportation and access focuses on management actions that restrict or facilitate transportation and access opportunities on federal-, state-, and county-maintained highways and roadways and BLM-maintained system roads described in Section 3.5.1. Potential impacts resulting from management of transportation and access are characterized by changes in vehicle movement on designated roadways within and next to the planning area because of other resource management programs. The impact analysis is based on BLM's knowledge of the planning area, best professional judgment, review of existing literature, information from BLM experts, and information from other agencies' experts.

The proposed transportation network is designated to achieve RMP goals and objectives and to provide for appropriate public and administrative access. Because transportation facilities are considered a support function, significance is based on the capability to create and manage the comprehensive travel network that best meets the full range of public, resource management, and administrative access needs for each alternative.

The transportation facility and access impact analysis was based on the following assumptions:

- BLM "Maintenance Intensities" provide guidance for appropriate "standards of care" to recognized routes within the BLM planning area. Recognized routes by definition include roads, primitive roads, and trails carried as assets within the FAMS.
- Maintenance intensities provide consistent objectives and standards for the care and maintenance of BLM routes based on identified management objectives. Maintenance intensities are consistent with land use planning management objectives (e.g., natural and cultural conditions, recreation setting characteristics, and VRM). Maintenance intensities do not describe route geometry, route types, types of use, or other physical or managerial characteristics of the route.
- In light of the wide range of needs and uses, BLM's routes represent a broad spectrum of linear features, from engineered roadways through challenging trails accessible only to nonmotorized traffic.
- BLM would coordinate with Eagle, Routt, Garfield, Mesa, and Pitkin Counties and the State of Colorado in development, maintenance, and management of BLM system, state, and county roads on lands in the planning area.
- Transportation needs would increase through the life of the RMP. The greatest needs for additional transportation facilities are associated with energy development and community expansion.
- Routes created through ROW authorizations would be maintained by the authorized users.

- If necessary, the BLM would evaluate Revised Statute 2477 road assertions under a separate process and criteria outside this planning process. Travel management planning is not intended to address the validity of any Revised Statute 2477 assertions. A travel management plan is not intended to provide evidence bearing on or addressing the validity of any Revised Statute 2477 assertions. Revised Statute 2477 rights are determined through a process that is entirely independent of the BLM's planning process. Consequently, travel management planning should not take into consideration Revised Statute 2477 assertions or evidence. Travel management planning should be founded on an independently determined purpose and need that is based on resource uses and associated access to public lands and waters. At such time as a decision is made on Revised Statute 2477 assertions, the BLM will adjust its travel routes accordingly.
- Under Alternative A in the CRVFO, resources and resource uses that would have negligible impacts on public travel and access are paleontology, wildland fire management, cave and karst resources, forestry, wild and scenic rivers, watchable wildlife, livestock grazing management, coal management, lands and realty management, and interpretation and environmental education. These resources have proposed actions or stipulations that would have benefits or negligible adverse impacts to public travel and access and are not discussed further in this section.
- There are no landing strips on BLM lands within the CRVFO planning boundary.

In addition, impacts from forest and woodlands management, rangeland management, riparian and weeds management, special status fish and other aquatic wildlife management, special status plants and terrestrial wildlife management, fisheries and aquatic wildlife and terrestrial wildlife management, lands managed for wilderness characteristics, cultural resources management, VRM, ACECs management, WSAs management, and health and safety management all have NSO, CSU, or other proposed actions that could impact transportation management by limiting ground-disturbing activities. These stipulations and proposed actions were addressed in Section 4.3.4 Comprehensive Trails and Travel Management,) and would all have similar impacts on the manageability, maintainability, and ability to meet the needs, as defined by the goals and objectives, for resources and resource uses of transportation facilities. Therefore, they are not discussed further in this section.

Table 4.5.1-1 shows road maintenance levels in the CRVFO by alternative. Maintenance levels by route are listed in Appendix N.

Table 4.5.1-1
Road Maintenance in the CRVFO by Alternative

Trails and Travel Management	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Maintenance Level 2	21	N/A	N/A	N/A
Maintenance Level 3	166	N/A	N/A	N/A
Maintenance Level 4	93	N/A	N/A	N/A
Intensity Level 0	N/A	21	23	29
Intensity Level 1	N/A	166	161	167
Intensity Level 3	N/A	93	96	84
Total CRVFO miles	280	280	280	280

Acronyms and Abbreviations:
CRVFO Colorado River Valley Field Office
N/A not applicable

Environmental Consequences

Impacts on transportation facilities would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on transportation facilities under any of the four alternatives.

Alternative A

Impacts from Transportation Facilities Management. Under this alternative, BLM would maintain approximately 280 miles of road. Maintenance and upkeep of BLM roads are critical for travel management. As costs have risen, fewer miles of BLM roads have been maintained each year. The actual miles of roads maintained each year would be based on annual budgets. Under all alternatives, the CRVFO would emphasize maintaining the majority of BLM system roads at maintenance intensities that may not provide year-round access but are intended to keep the route in use for most of the year. This level of maintenance is sufficient to meet the CRVFO's objectives across all alternatives. BLM does not remove snow, but portions on some access routes are plowed by county road maintenance, utility companies, oil and gas operators, mining companies, or private landowners if the roads provide access to their property, facilities, or operations.

Impacts from Air Quality Management. Under all alternatives, the impacts on transportation would come from dust abatement projects. These impacts would be minor and short term along unpaved travel routes (Class D roads, single-track routes, and mechanized trails). In addition, impact analysis for air management is deferred pending completion of air quality modeling.

Impacts from Recreation and Visitor Services Management. Recreation-related demands on public lands could increase the need for maintenance, depending on access requirements and recreation setting objectives. Recreation-related routes would be maintained as needed for maintaining the desired setting, and as allowed by annual budgets.

Impacts from Comprehensive Trails and Travel Management. Trails and travel management-related demands on public lands could increase the need for maintenance and access. Alternative A opens approximately 792 miles of routes to full-sized vehicles. Approximately 280 miles of these roads would be maintained, while the remaining 512 miles of routes would not be maintained by BLM. These unmaintained routes would remain open through repeated use from the public and administrative users. ATV, motorcycle, mechanized, and pedestrian and equestrian routes would be maintained as needed and as allowed by annual budgets.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Leasing the oil and gas mineral estate under the fluid minerals program would have the greatest potential effect on the transportation program by requiring construction of new roads, increasing traffic on existing roads, and upgrading existing routes for access to well pads. A short-term increase in the volume of both heavy and light traffic would occur during the construction, well drilling, and completion phases of developing gas resources. Temporary conflicts, including a potential for delays, dust, road degradation, and increased public safety concerns, would occur during the well construction and drilling phase and recompletion and workover activities. Traffic levels and their impacts would be reduced after gas wells are in operation.

The CRVFO estimates that 99 percent of new gas development and associated energy-related traffic growth would occur in high-potential areas in the western part of the CRVFO from Glenwood Springs to DeBeque,

with the remaining 1 percent in moderate- to low-potential areas throughout the remainder of the CRVFO. Because the high-potential area is already leased, the RMP would allow BLM to require COAs to control traffic volume or require the lease developer to improve roads to help ease road capacity problems.

The greatest impacts on the CRVFO transportation network would continue to occur in the western part of the CRVFO, the area with the greatest potential for natural gas occurrence. Native-surfaced roads would continue to be improved to accommodate the increased traffic and heavy equipment.

The amount of traffic attributable to oil and gas development would depend on the rate of development, but any period of intense development would impact the major points of access. Most traffic would be generated by large (larger than pickup size) vehicles. The actual distribution of traffic is hard to predict because the exact rate of drilling, the distribution of the development, the use of multi-well pads , and the use of pipelines for fluids are unknown and likely to vary from year to year.

Impacts from Locatable Minerals, Salable Minerals, and Non-Energy Leasable Minerals Management. Locatable mineral exploration and development on BLM land would be regulated under 43 CFR 3800 in all alternatives. Access roads would be constructed under all of the alternatives. New roads constructed for mining would normally be gated and would not offer new public access. In addition, these roads would be maintained by the mining claimant.

Alternative B (Proposed RMP)

Impacts to transportation facilities from, air quality management, R&VS management, and locatable minerals, salable minerals, and non-energy leasable minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Transportation Facilities Management. Impacts would be the same as or similar to those under Alternative A, except that BLM would provide maintenance on 259 miles of road.

Impacts from Comprehensive Trails and Travel Management. Trails and travel management-related demands on public lands could increase the need for maintenance and access. The Proposed RMP includes 495 miles of routes designated for full-sized vehicles. Approximately 259 miles of these roads would be maintained by BLM. The 236 miles of unmaintained routes would remain open through repeated use from the public and administrative users. ATV, motorcycle, mechanized, and pedestrian and equestrian routes would be maintained as needed and as allowed by annual budgets.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as those described under Alternative A.

Alternative C

Impacts to transportation facilities from air quality management, R&VS management, locatable minerals, salable minerals, and non-energy leasable minerals management, would be the same as or similar to those under Alternative A. Impacts to transportation facilities from fluid minerals management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources and uses would be as follows.

Impacts from Transportation Facilities Management. Impacts would be the same as or similar to those under Alternative A, except that BLM would provide maintenance on 257 miles of road.

Impacts from Comprehensive Trails and Travel Management. Trails and travel management-related demands on public lands could increase the need for maintenance and access. Alternative C includes 420 miles of routes designated for full-sized vehicles. Approximately 257 miles of these roads would be maintained by BLM. The 163 miles of unmaintained routes would remain open through repeated use from the public and administrative users. ATV, motorcycle, mechanized, and pedestrian and equestrian routes would be maintained as needed and as allowed by annual budgets.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as those described under Alternative A.

Alternative D

Impacts to transportation facilities from air quality management, R&VS management, locatable minerals, salable minerals, and non-energy leasable minerals management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Transportation Facilities Management. Impacts would be the same as or similar to those under Alternative A, except that BLM would provide maintenance on 251 miles of road.

Impacts from Comprehensive Trails and Travel Management. Trails and travel management-related demands on public lands could increase the need for maintenance and access. Alternative D includes 546 miles of routes designated for full-sized vehicles. Approximately 251 miles of these roads would be maintained by BLM. The 295 miles of unmaintained routes would remain open through repeated use from the public and administrative users. ATV, motorcycle, mechanized, and pedestrian and equestrian routes would be maintained as needed and as allowed by annual budgets.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Impacts would be the same as those described under Alternative A.

Cumulative Impacts

The cumulative impact analysis boundary includes the CRVFO boundary. Cumulative impacts on transportation and access would primarily occur from actions that facilitate, restrict, or preclude motorized access. Management actions that restrict OHV use would limit the degree of travel opportunities and the ability to access certain portions of the planning area. The continued maintenance of federal and state highways would provide arterial connections to BLM system roads. County-maintained routes that connect federal and state highways to BLM system routes would maintain and improve access to CRVFO's resources. Past, present, and reasonably foreseeable future nonfederal actions have affected, and will continue to affect, transportation management within the planning area. These actions—which include urban development patterns, the continuing growth of vehicle-based recreation, planned road and highway projects, and population growth—are expected to increase demand and construction of transportation routes near the CRVFO. Actions that would limit or restrict transportation project design (e.g., VRM designations, land use closures, and NSO stipulations) would result in impacts on transportation and access.

The actions and activities considered in this analysis, including land use restrictions for the preservation of sensitive resources, would not result in the inability of BLM to maintain transportation facilities. The degree of impact would be lowest under Alternative A because of fewer land use restrictions for the protection of sensitive resources. Conversely, implementation of increased restrictions to protect sensitive resources under Alternative C would result in the greatest level of impact on transportation and access. The Proposed RMP has slightly less restriction than under Alternative C. Alternative D would have slightly more restriction than under Alternative A.

4.6 IMPACTS ON THE SOCIAL AND ECONOMIC ENVIRONMENT

4.6.1 Public Health and Safety

Methods and Assumptions

This section describes potential impacts on public health and safety from management actions for the resources and resource uses discussed in Chapter 2. Existing conditions concerning public health and safety are described in Section 3.6.1. Abandoned mines are not discussed because most mines are closed or have exclosures to keep people out. Hot springs are not addressed because the BLM does not maintain hot springs for recreation.

The public health and safety impact analysis was based on the following assumptions:

- Public health and safety issues would receive priority consideration in the management of the BLM lands.
- Recreation participation would increase and would probably result in a corresponding increased need to maintain safe public use conditions.
- Increased public land use would result in increased exposure to energy and mineral development, mines, hazardous materials, and illegal dumpsites.
- All new hazardous materials sites would be identified and remediated.
- Resource development activities would not generate new hazardous material waste that would pose a health and safety threat to visitors.
- All hazardous material releases on BLM lands posing a substantial threat to the public or the environment are addressed as emergency cleanup actions.
- Interest in energy and mineral development on BLM lands within the planning area would continue, as identified in the RFD. The pace and timing of development would depend on a variety of factors outside the management decisions of BLM. These factors include national and international energy demand and prices, production factors (geology and technology) within the planning area, and business strategies of operators. A relatively constant rate of development is assumed for this analysis because the pace of development in the planning area is unknown. Therefore, actual impacts could vary if the rate of development or production changes over the life of the RMP.

Environmental Consequences

Impacts on public health and safety would result from some of the actions proposed under other resources and uses including air quality, water resource, R&VS, fluid minerals, ACEC designation, and public health and safety management. Other programs not addressed below were deemed to have little or no impact on public health and safety under any of the four alternatives.

Alternative A

Impacts from Public Health and Safety Management. Incidental dumping of hazardous materials occasionally occurs mostly in proximity to towns and highways within the CRVFO. Under Alternative A, an increase in the amount of illegal dumping would be expected as the population continues to grow in proximity to the BLM lands in the CRVFO.

Under all alternatives, mineral extraction operators would be required to prepare and maintain a current emergency communications plan and to adjust operating procedures to accommodate local residential concerns. Operators would be subject to oversight measures within 3 miles of Project Rulison for the benefit of public health and safety. The emergency communications plan would reduce the immediate danger to human health and safety by requiring the operator to remove the threat and to inform appropriate authorities and potentially affected citizens. The operator working in residential areas would be expected to mitigate impacts (e.g., noise, dust, and traffic) in response to public concerns. While there is no known potential for radionuclides to migrate from Project Rulison, the sampling program and oversight measures are a reasonable response to the public concern about the project.

Impacts from Air Quality Management. Allowing venting consistent with federal regulations in some instances under Alternative A may result in greater human exposure to air toxics such as VOCs in proximity to drilling activities and production facilities.

Impacts from Water Resource Management. A high degree of protection for the quality of water derived from public land in municipal watersheds would be provided under all alternatives. No surface disturbance that would adversely affect water quality would be permitted. Alternative A specifically prohibits surface occupancy and surface-disturbing activities to protect the domestic watersheds of Rifle and New Castle, of which the former is located in the high-potential area for oil and gas, with some existing development already having been approved there in collaboration with the Town of Rifle. Since not all designated municipal watersheds would be specifically protected, the potential exists under Alternative A for greater risks to municipal watersheds than under the other alternatives.

Impacts from Recreation and Visitor Services Management. BLM would continue to allow the discharge of firearms for target shooting on BLM lands, outside of areas with firearm use restrictions (e.g., developed recreation sites and within 300 feet of the centerline of North Hardscrabble Access Road -Spring Creek). Ongoing concerns about public safety and use would continue as well as concerns about illegal dumping and littering that frequently accompany target shooting (Responsive Management 2009). This litter includes clay pigeons; spent shells; and paper, metal, plastic, and glass objects brought to BLM lands for targets. The prohibitions would also protect visitor safety by minimizing the potential for accidental shootings.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). On the basis of statistical probability, fluid minerals development would increase the potential for releases of hazardous materials at well pads and during transport in trucks or pipelines in proportion to the amount of development and distance of transport. Therefore, Alternative A, with the greatest number of acres open for development, would have a greater statistical risk of hazardous materials impacts than the other alternatives, unless the larger number of wells used for the purpose of analysis in the Proposed RMP and Alternative D proves more accurate.

In recent years, public concern has become heightened regarding emissions of chemicals to the atmosphere in conjunction with oil and gas production and potential contamination of freshwater aquifers, domestic or municipal water wells, and surface waters, particularly in relation to hydraulic fracturing. To date, no studies have documented significant cancer-based or noncancer-based public health risks from oil and gas operations using emission rates and operational practices typical of current development in the CRVFO. (See Section 3.6.1 for a detailed discussion.) However, as with spills and other accidental releases on pads or during fluids transport, potential risks from airborne or groundwater-borne chemicals would be statistically related to the

amount of oil and gas activity. Alternative A, in addition to opening the most acres to development, also includes the least stringent air quality mitigation measures, and would therefore be anticipated to have the greatest potential for air quality impacts and associated risks to public health.

Impacts from Areas of Critical Environmental Concern Management. Continued designation of the Glenwood Springs Debris Flow Hazard Zone ACEC under all alternatives would result in management actions (e.g., NSO stipulations) to reduce the debris flow hazard and the potential for harm and damage from debris flow incidents.

Alternative B (Proposed RMP)

Impacts to public health and safety from ACEC (administrative designations) management would be the same as or similar to those under Alternative A. Impacts from management of other resources and uses would be as described below.

Impacts from Public Health and Safety Management. Impacts would be similar to Alternative A, except that the Proposed RMP and Alternatives C and D would close motorized vehicle access routes that lead to illegal dumpsites. Closing motorized vehicle access would result in a net decrease in the number of illegal dumpsites, and thus reduce the quantity of hazardous waste materials illegally dumped on BLM lands within the CRVFO.

Impacts from Air Quality Management. Using green completions and applicable BMPs, including locating drilling and production facility operations at suitable distances from public buildings and residences, would reduce the already low risk to humans from exposure to air toxics such as VOCs. The application under this alternative of these BMPs, more stringent air quality mitigation measures than under Alternative A, and the use of adaptive management through an Air Quality Management Plan (AQMP) would result in impacts to air quality below those of Alternatives A and D and comparable to those of Alternative C.

Impacts from Water Resource Management. The impacts from water resource management would be similar to Alternative A. However, the Proposed RMP and Alternatives C and D would expand the protection afforded under NSO stipulations to include all designated municipal watershed areas, thus affording more protection to municipal drinking water supplies within CRVFO.

Impacts from Recreation and Visitor Services Management. The types of impacts would be similar to those described under Alternative A and Alternative D. However, under the Proposed RMP and Alternative C, additional high use and urban interface areas would have firearm use restrictions on target shooting. The Proposed RMP and Alternative C would restrict firearm use for target shooting on approximately 1,100 acres and 3,500 acres respectively. The Proposed RMP only proposes restricting firearm use for target shooting on 900 acres in the urban interface zone (south portion) of Silt Mesa, whereas Alternative C proposes to restrict firearm use for target shooting on all BLM lands on Silt Mesa (3,300 acres). The 900-acre restriction would cause very minor, localized impacts to target shooting activities in the CRVFO. The 900-acre restriction would address the existing public safety concerns by minimizing a direct threat to public safety from accidental shooting and use in an urban interface zone. Other local BLM lands and state lands would probably absorb the displaced target shooting use. For example, people who want to target shoot could go to the nearby West Rifle Creek State Wildlife Area, which has a recently improved and expanded shooting range. The improved shooting range provides Garfield County (including the towns of Rifle, Silt and New Castle)

hunters and firearm enthusiasts with a safe, high-end public shooting area. Improvements include improved access, expanded parking, and the construction of additional rifle and pistol lanes (CPW 2013).

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Because the Proposed RMP assumes more wells than Alternative A, notwithstanding fewer acres designated as open to oil and gas development, potential risks to public health from accidental exposure to hazardous materials be higher under this alternative.

Alternative C

Impacts to public health and safety from ACECs management would be the same as or similar to under Alternative A. Impacts to public health and safety from air quality management, water resources management, visitor services management, and public health and safety management would be the same as or similar to the Proposed RMP. Impacts from management of other resources and uses would be as described below.

Impacts from Recreation and Visitor Services Management. The types of impacts would be similar to those described under the Proposed RMP and Alternative A. However, under Alternative C, additional high use and urban interface areas would have firearm use restrictions on target shooting (3,500 acres) and camping restrictions (20,900 acres). Alternative C proposes the most acres of use restrictions. Within the additional areas covered by these restrictions, it is anticipated that there would be a decrease in littering and unsanitary conditions as well as a reduced potential for accidental shootings from target shooting at these locations.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The types of impacts from fluid minerals management would be similar to Alternative A. However, the amount of hazardous materials impacts on public health and safety under Alternative C would be slightly less than under Alternatives A and D, because Alternative C would open fewer acres to fluid mineral extraction. Alternative C would also have fewer wells than assumed under the Proposed RMP for impact analysis. However, Alternative C would not include the AQMP to be employed by the BLM as an adaptive management tool under the Proposed RMP to ensure compliance with federal and state air quality standards.

Alternative D

Impacts to public health and safety from ACECs management would be the same as or similar to Alternative A. Impacts to public health and safety from water resources management and public health and safety management would be the same as or similar to those under the Proposed RMP. Impacts from management of other resources and uses would be as described below.

Impacts from Air Quality Management. Impacts on public health and safety from air quality management would be similar to the Proposed RMP, except that flaring would be required of natural gas well completions that do not use green completion technology.

Impacts from Recreation and Visitor Services Management. The impacts would be the same as the Proposed RMP, except that target shooting would be allowed on part of the Silt Mesa.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). The types of impacts from fluid minerals development under Alternative D would be similar to those under Alternative A despite a larger number of wells, owing to more stringent mitigation measures incorporated into

the impact analysis. The number of assumed wells would be the same as under the Proposed RMP, but without adaptive management under the AQMP incorporated into that alternative. Alternative D is assumed to have more wells than Alternative C, but with more stringent air quality controls that that alternative.

Cumulative Impacts

Cumulative impacts would be similar under all of the alternatives. The potential impacts would be caused by management actions and planning within those lands surrounding the CRVFO, including the White River, Little Snake, Kremmling, Royal Gorge, Gunnison, Uncompahgre, and Grand Junction BLM Field Offices, the State of Colorado, and the WRNF. Minerals development within surrounding areas would increase the use, generation, and transportation of hazardous materials. City and county use plans for surrounding communities could have cumulative effects, whereby mineral resources are developed adjacent to BLM lands. State lands that are surrounded by BLM land could have impacts from inholding development. Hazardous materials are regulated by the EPA and administered by state agencies regardless of land status. The incremental contribution of the alternatives on the cumulative impacts on health and safety is anticipated to be minimal if all applicable laws, regulations, safeguards, and procedures are followed.

4.6.2 Social and Economic Conditions

The economic analysis focuses on changes in labor income and employment associated with BLM planning actions and estimated outputs for the alternatives. The social analysis focuses on changes in well-being of identified communities relative to the alternatives.

4.6.2.1 Economic Conditions

Methods and Assumptions

This section presents an analysis of economic impacts of the management alternatives proposed in the Draft RMP/Draft EIS. This section discusses employment, labor income, and effects on sectors in the impact area economies that encompass the CRVFO. Impacts to revenues received by states and counties also are presented. Finally, the alternatives are discussed in light of forecasts for the area over the 20-year period of analysis. Projected resource outputs from BLM management actions for each of the alternatives are presented in Table 4.6.2-1. The projected outputs and activities are discussed by resource in the following sections.

Table 4.6.2-1
BLM Outputs by Alternative

Output	Current	Alternative A No Action	Alternative B Proposed RMP	Alternative C	Alternative D
General recreation (visits)	268,440	338,000	362,140	325,930	374,210
Fish and wildlife recreation (visits)	24,300	33,600	36,000	32,400	37,200
Grazing (AUMs)	22,800	39,200	35,500	35,500	36,500
Forest products (MMBF)	<0.1	1.8	0.9	0.9	1.4
Natural gas (bcf)	117.0	193.6	188.9	182.3	193.6
Natural gas condensate (barrels)	489,200	807,200	787,600	758,300	807,200
Sand and gravel (short tons)	2,000	2,000	2,000	2,000	2,000
Crushed stone (short tons)	35,000	35,000	35,000	35,000	35,000
Gypsum (short tons)	350,000	350,000	350,000	350,000	350,000
Pumice (short tons)	6,000	6,000	6,000	6,000	6,000

Sources: FEAST 2010 and IMPLAN 2010.
Acronyms and Abbreviations:
AUM animal-unit month
bcf 1,000,000,000 cubic feet
MMBF million board feet

This section presents estimates of changes in labor income for each alternative. Higher employment, subject to some qualifications, can be seen as a benefit to the local community. Other benefits are also present, although some are not easily measured or tied to economic activity. Examples of where effects are difficult to quantify are equity effects, impacts to social values, and non-market values. Regardless, these effects are discussed despite the inability to measure them quantitatively.

The following analytical methods and assumptions were used to complete the analysis for the economic impacts from the proposed management decisions:

- The planning area population will continue to increase and age as described in Chapter 3.
- Regional economic impacts are estimated based on the assumption of full implementation of each alternative. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use were not conducive to developing some opportunities, the impact on the economy would be different than is estimated here.
- Resource specialists projected annual resource outputs that are based on the best available information and professional judgment. The purpose of the economic analysis is to compare the relative impacts of the alternatives; it should not be viewed as absolute economic values.
- The share of timber and other forest products harvested within the impact area by logging contractors and local residents was obtained from personal communication with field office staff.
- The ratios of harvests to jobs and income used to assess the impacts of the alternatives are based on statewide ratios developed for Colorado by the University of Montana (Keegan and Dillon 2003).
- Over the long term, timber prices are residual values determined by national and international markets based on what the final product market will pay for timber, rather than supply competition at the local level (Lippke et al. 2006). In addition, the share of timber contributed to total harvest in the area is relatively too small to have price impacts in the short term.
- Projected recreation visits are distributed among different types of visitors based on the results of National Visitor Use Monitoring (NVUM) surveys and interviews with field office staff.
- The ratios of recreation visits to jobs and income used to assess the impacts of the alternatives are based on national ratios developed through the U.S. Forest Service's NVUM program (Stynes and White 2005).
- Baseline recreation demand is assumed to increase at rates based on the observed annual rate of recreation use in both the CRVFO and adjacent Kremmling Field Office (RMIS 2010).
- Non salary-related expenditures made by the CRVFO are assumed to be allocated to different economic sectors based on data compiled for the White River and Routt National Forests.
- Range revenues received by BLM and benefits of BLM forage were calculated using the conservative AUM price for 2009 of $1.35 per AUM and the 2009 statewide average AUM price for private land of $14.70 (US Department of Agriculture 2009).
- The impact area for the social and economic analysis consists of the six counties that include lands managed by the CRVFO: Eagle, Garfield, Mesa, Pitkin, Rio Blanco, and Routt Counties.
- Potential economic impacts are assessed using the Forest Economic Analysis Spreadsheet Tool (FEAST) developed by the US Forest Service Inventory and Monitoring Institute in Fort Collins, Colorado. This tool uses a Microsoft Excel workbook as an interface between user inputs and data generated using the IMPLAN input-output modeling system (FEAST 2010).
- The FEAST analysis assesses the economic impacts of the resource outputs projected under each alternative. Resource outputs in this context are the amount of a resource (e.g., forest products, AUMs, or recreation visits) that would be available for use under each alternative. Average annual resource outputs were projected by resource specialists for each alternative for a 20-year planning period based on the best available information and professional judgment.

- Employment and labor income estimates developed for this analysis include direct, indirect, and induced economic effects. Direct employment would, for example, be generated in the grazing sector. Additional employment would be generated as the affected livestock operators purchase services and materials as inputs ("indirect" effects) and ranchers spend their earnings within the local economy ("induced" effects). Direct, indirect, and induced effects are combined in the discussion of effects below.
- Theoretically, expenditures associated with changes in final demand would be available and specific enough to allocate to each of the 440 sectors contained in the IMPLAN model. In the absence of primary data, national level production functions are used. Expenditures should be delineated between local and non-local providers, as purchases out of the economic study region will have no local economic impact. The IMPLAN data contain information, called regional purchase coefficients, which describe the proportion of a given commodity that will be provided by local producers. Previous modeling experience has shown that the data contained in the IMPLAN modeling system for the various sectors are an accurate representation of impacts.
- Biomass opportunities may exist but are not analyzed given the impracticalities of projecting future scenarios for implementation.
- Oil and gas development and production are assumed to occur at constant rates over the 20-year period of analysis; consequently, effects are not distinguished for development and production periods since development would not occur over predictable timeframes. For the analysis, development and resulting production are assumed to occur at rates averaged over the 20-year period of analysis. The alternatives analyze the projected maximum potential for fluid mineral development; though the results are not guaranteed, they are useful for comparative purposes.
- Changes in population and housing availability are assessed using IMPLAN data specific to field office impact areas. For the CRVFO, data indicate there are 1.4 persons per job and 2.5 persons per household (IMPLAN 2008).
- Traffic effects from oil and gas development are assessed using available information on vehicle trips per well for all vehicle class types (1,160 trips per well for pickup and larger trucks) over a 30-day period (DOI 2006).
- Non-market values, including natural amenities, non-use values, ecosystem services, and aspects of well-being and quality of life, are assessed in qualitative terms, as appropriate.

None of the alternatives would be expected to reduce economic diversity (the number of economic sectors) or increase economic dependency, which occurs when the local economy is dominated by a limited number of industries. Shifts in emphasis could occur, but these shifts would not result from planning actions in this RMP/EIS. While the alternatives have the potential to affect local businesses and individuals, the relative contribution of BLM activities to the local economy (see Alternative A) and the relative differences between the alternatives would not be large enough to have any measurable effect on economic diversity or dependency. For example, the dependency of the local economy on the livestock industry, forest products, mining, and recreation activities would not be affected by BLM resource management under this RMP/EIS. Under all the alternatives, all BLM-related contributions—jobs and labor income—would continue to support less than 1 percent of totals within the impact area economy, but could be more important for smaller communities within the planning area.

Estimates of the levels of employment and labor income that would be supported by the alternatives are based on projected resource outputs from BLM management actions (see Table 4.6.2-1), estimated payments to counties (see below), BLM expenditures, and other externally funded activities on BLM lands. The projected outputs and activities are discussed by resource in the following sections. Estimated average annual employment and labor income from outputs and activities are summarized in Table 4.6.2-2 and Table 4.6.2-3 below.

Table 4.6.2-2
Average Annual Employment by Program by Alternative (Full- and Part-time Jobs)

Resource	Current	Alternative A (No Action)	Alternative B (Proposed RMP)	Alternative C	Alternative D
Recreation	103	143	153	138	158
Grazing	20	34	31	31	32
Forest Products	0.2	20	11	11	16
Minerals	676	1,115	1,088	1,048	1,115
Externally Funded	0.3	0.3	0.3	0.3	0.3
County Payments	131	241	232	221	241
BLM Expenditures	78	78	78	78	78
Total BLM Management	**1,009**	**1,631**	**1,593**	**1,527**	**1,640**
Change from Current		**62%**	**58%**	**51%**	**63%**

Sources: FEAST 2010 and IMPLAN 2010.
Acronyms and Abbreviations:
BLM Bureau of Land Management

Table 4.6.2-3
Average Annual Labor Income by Program by Alternative (Thousands of 2010 dollars)*

Resource	Current	Alternative A (No Action)	Alternative B (Proposed RMP)	Alternative C	Alternative D
Recreation**	$3,953	$5,471	$5,862	$5,276	$6,057
Grazing	$153	$260	$230	$230	$237
Forest Products	$6	$809	$442	$442	$655
Minerals	$54,358	$89,691	$87,516	$84,255	$89,691
Externally Funded	$8	$8	$8	$8	$8
County Payments	$6,812	$12,151	$11,620	$10,986	$12,149
BLM Expenditures	$4,154	$4,154	$4,154	$4,154	$4,154
Total BLM Management	$69,443	$112,544	$109,832	$105,351	$112,951
Percent Change from Current		62%	58%	52%	63%

Sources: FEAST 2010 and IMPLAN 2010.
*Average annual values are based on projected impacts over the 20-year analysis period. Source: Potential employment and labor income impacts are based on the estimated resource outputs summarized by alternative in Table 4.6.2-1. Potential impacts were estimated using the IMPLAN model and FEAST.
**As discussed in Chapter 3, these recreation estimates do not include visits from all local use since their expenditures do not represent new money into the economy. Within the CRVFO, it was determined that 85 percent of non-wildlife recreation use would not occur in the impact area if the opportunity on BLM land were not provided. As a result, only 15 percent of the local use is not included in the CRVFO model.
Acronyms and Abbreviations:
BLM Bureau of Land Management

In the absence of quantitative data, impacts were described using ranges of potential effects, or a qualitative analysis was performed based on the best available data, as appropriate. Expert opinions were solicited from each CRVFO and the BLM State Office regarding current conditions for specific resources and anticipated outcomes and incorporated into the evaluation.

Forest Products. Both the no action and the action alternatives would continue to make wood product materials available. As shown by the estimates of forest products output in Table 4.6.2-1, potential commercial harvest varies by alternative. However, these are estimates based on ideal market conditions, which may not provide an accurate portrayal of actual impacts. Factors such as financial limitations on operators, market conditions, and implementation of timber sale practices that limit actual sale volume are important to consider. Consequently, current removal (Table 4.6.2-1) is compared with the potential under the alternatives. Under Alternative A, timber under the current Allowable Sale Quantity (ASQ) would potentially be available, while under the action alternatives the PSQ would potentially be available.

Grazing. Dependency on BLM forage would not change under the alternatives. The permitted use limit is used to evaluate potential impacts under each of the alternatives. Table 4.6.2-1 above shows varying degrees of total forage needed to feed 2007 levels of livestock in the CRVFO area (ranging from 17 to 27 percent in the CRVFO impact area (USDA 2007). However, grazing would not fall below current levels in the CRVFO impact area (11 percent). In addition, jobs and labor income associated with BLM grazing would continue to account for less than 1 percent of area totals. Additionally, jobs and labor income in the agricultural sector associated with BLM management would account for less than 1 percent of area totals in the agricultural sector across all the alternatives.

While dependency on BLM forage would remain low, BLM forage would continue to provide a low-cost and important complement to some livestock producers' grazing, forage, and hay production. Dependency on BLM forage might also be greater for smaller communities within the impact area. In addition to potential changes in projected employment and income as a result of changes in BLM forage offered, the value of BLM forage to area operators should also be considered. This value can be estimated as the difference between the competitive market price of an AUM and the BLM lease fee. This value is experienced above the price ranchers pay for AUM leases and can be considered a benefit. The benefit to operators from the potential permitted BLM grazing varies among the alternatives, however, would not fall below current levels of actual use. Payments to counties under the Taylor Grazing Act would continue under all the alternatives; these payments are included in Table 4.6.2-4 and are discussed below.

Table 4.6.2-4
Payments to Counties Under the Alternatives (2008 dollars)

Output	Current	Alternative A (No Action)	Alternative B (Proposed RMP)	Alternative C	Alternative D
PILT	$739,913	$739,913	$739,913	$739,913	$739,913
Range revenue	$4,869	$8,155	$7,526	$7,526	$7,738
Mineral royalty distributions	$9,855,246	$16,261,156	$15,866,946	$15,275,631	$16,261,156
Total	$10,600,028	$17,009,224	$16,614,385	$16,023,070	$17,008,806

Sources: FEAST 2010 and IMPLAN 2010.
Acronyms and Abbreviations:
PILT payment in lieu of taxes

Recreation. While changes in recreation may occur as a result of planning actions in the alternatives, the role of recreation in the local economy will continue to increase as OHV use, hunting, fishing, boating, biking, and other forms of recreation continue to increase. Travel to the area from outside the area to enjoy these opportunities is not an unreasonable assumption, and average annual rates of change are based on the observed recreation use data (RMIS 2010).

While different levels of recreation are supported under the alternatives, recreation management would continue to sustain opportunities important to the area economy and well-being under all the alternatives. As noted in Chapter 3, opportunities provided to local residents are important; however, their recreation expenditures do not represent new money introduced into the economy. If BLM-related opportunities were not present, it is likely that residents would participate in other locally based recreation activities and this money would still be retained in the local economy. Therefore, only a portion of local recreation visits attributable to unique area opportunities are included in the effects from the alternatives. Even without a portion of BLM local recreation use, recreation on BLM-administered lands would sustain more jobs and labor income annually than contributions from grazing and forest products programs under all the alternatives. (See Table 4.6.2-2 and Table 4.6.2-3.)

Jobs and income associated with recreation management should not overshadow the economic value of experience held by recreation users within the planning area. For example, boating or motorized use in the planning area could change as management actions are implemented. The value of these recreation experiences could thus change as visitor use changes. Changes in the quantity and quality of these recreation experiences offered are discussed in the recreation section of this EIS.

Mineral Resources. Leasable, locatable, and salable minerals would continue to be provided by the BLM in the planning area (Table 4.6.2-1 above). Management under this RMP will determine the extent of mineral resource activity in the future. For example, withdrawal from mineral entry will occur for portions of ACECs with mineral potential. Regardless of these changes, area dependency on BLM-related employment provided to the mining sector would not change among the alternatives.

Under all alternatives, the change in population that would result from changes in mineral sector employment would be less than 1 percent of current population levels in the CRVFO impact area. In addition, the housing vacancy rate within the impact area (21 percent) would accommodate any changes in housing demand from population changes since required households would not exceed 1 percent of current vacancies under all the alternatives. However, with concentrated oil and gas activity occurring alongside high vacancy rates in individual counties, localized change could be greater within the CRVFO impact area. These potential effects are discussed below under the social effects section. It should be noted that these effects are based on current conditions in both the housing and oil and gas markets. Actual oil and gas activity and housing markets cannot be projected; thus, these estimates may not be an accurate portrayal of actual impacts. However, they provide a frame of reference for discussion of housing. In addition projected population increases, discussed in Chapter 3 and the cumulative effects section below, also temper potential effects on housing availability and affordability at the local level.

Crushed stone, sand, and gravel removal by county and state governments is authorized under free use permits, such that no revenues or lease fees are received by the BLM and consequently no payments to counties are made. No fees are collected from removal of saleable and locatable minerals; however, royalties

from oil and gas production are distributed back to local governments under the 1902 Reclamation Act and the 1920 Mineral Leasing Act. These payments are discussed below.

Impacts to Counties. Costs to local governments would remain largely unchanged as a result of planning actions, consequent changes in population, or oil and gas development; demand for services and infrastructure would not significantly change as a result of BLM planning actions. Payments to counties would remain an important portion of local government revenue (ranging from 4 to 6 percent of total revenue in the CRVFO impact area). Any changes under the alternatives in grazing revenues would not be large enough to substantially affect the overall amount of payments made to counties since these payments make up a small portion of county payments by alternative (less than a tenth of 1 percent under all the alternatives [Table 4.6.2-4]). Minerals royalty payments in CRVFO counties provide at least 95 percent of BLM-associated payments under all the alternatives. However, impracticalities exist in predicting actual levels of production, market prices, and the resulting royalties paid.

Under all alternatives, BLM land identified for retention or disposal varies; however, the identification of this land for potential land tenure changes does not guarantee disposal would occur. Further site-specific NEPA processes not covered under this plan would evaluate the availability of this land for disposal if proposed. If this land is disposed of, it would no longer count toward the entitlement acres used in PILT calculations, which could slightly decrease the contribution to county payments from BLM land in the area. However, predicting county payments based on entitlement acres alone is impractical as a result of other factors used to determine PILT payments, such as changes in the population ceiling, Congressionally approved annual appropriation acts, and other factors discussed in Chapter 3. Nevertheless, if BLM land is disposed of, it would be subject to property taxes, whereas before disposal it was not. Payments under PILT are designed to help offset losses in property taxes that result from the nontaxable status of federal lands within state or county boundaries. Therefore, county property taxes could offset losses from the qualifying entitlement acres for PILT.

BLM Expenditures and Employment. Levels of expenditures and employment at the CRVFO are not expected to vary as result of the alternatives. While different alternatives may cost more or less to implement, speculating whether the budget will be available is impractical. However, implementation is not impractical as a result, since management priorities are likely to determine how funds are allocated to actions outlined in the plan. Thus, a constant budget over the life of the plan is a reasonable and practical assumption, based on the average annual salary and non-salary expenditures of the CRVFO. Under all the alternatives, it is estimated that average annual BLM expenditures would continue to support around 78 total jobs and $4.2 million in total labor income (Table 4.6.2-2 and Table 4.6.2-3) in the CRVFO impact area economy. In addition to direct job and income impacts, these estimates include impacts to industries that provide factors of production to BLM and other industries impacted by wage-related spending.

Externally Funded Ecosystem Restoration. A portion of the management actions performed on BLM lands is carried out with funds not provided by the BLM. Thus, these expenditures are not accounted for under the category of BLM expenditures discussed above. Recent examples of such projects include trail work and travel management implementation funded by Colorado State Parks, habitat improvement projects funded by CPW, and implementation of range improvement projects funded with a portion of royalties from grazing payments. These treatments are labor intensive and use agricultural industries and associated businesses contained within the impact area economy. As a result of these treatments, less than one job and

$10,000 in labor income would be supported annually in the CRVFO impact area economy. (See Table 4.6.2-2 and Table 4.6.2-3.)

Role of Amenities, Migration, and Non-Market Values. The economic analysis assesses the economic effects of the direct use of resources in terms of jobs and income. This type of analysis does not include other types of economic value, often referred to as non-market values. Non-market values are important to the well-being of visitors, area residents, and others outside the planning area. These values include natural amenities, quality of life factors, recreational opportunities, ecosystem services, and non-use values such as existence, option, and bequest values. Non-market values are difficult to quantify and insufficient data exist to assess the effects of management actions. However, the fact that no monetary value is assigned to these values does not lessen their importance in the decision-making process.

In addition, helpful inferences can be made. While there is a general consensus that non-use values exist, the methodologies for measuring these values are controversial and difficult to apply. Wilderness has been the subject of numerous non-use studies, usually conducted for specific natural areas. However, no attempt has been made to directly elicit potential non-use values associated with the alternatives under this RMP. The alternatives establish units to be managed for wilderness characteristics and changes to ACECs and other special designations. These designations would further maintain and perhaps enhance non-market values associated with natural amenities protected on these lands.

Additionally these ACECs, land to be managed for wilderness character, and VRM designations that protect the integrity of the natural environment may attract new residents and tourists to the area, which would then contribute to area economic activity. While in some cases land protection directly reduces employment growth, it has been shown that natural amenities can offset job losses through increases in net migration (Eichman et al. 2010). Natural amenities and quality of life have been increasingly recognized as important factors in the economic prospects of many rural communities in the West (Rudzitis and Johnson 2000). In addition, non-labor income is intimately tied to natural amenities, as discussed in Chapter 3. Rural county population change, the development of rural recreation, and retirement-destination areas are all related to natural amenities (McGranahan 1999). Thus, designations that maintain and protect natural amenities may similarly contribute to area economic well-being.

Environmental Consequences

Impacts on economic conditions would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on economic conditions under any of the four alternatives.

Alternative A

As a result of Alternative A, about 1,631 jobs and $113 million in labor income would be generated in the impact area economy on an average annual basis. This amount is 62 percent more employment and labor income than contributed currently, because of larger natural gas contributions, timber products, permitted grazing, and recreation visits evaluated under this alternative than levels evaluated under the current scenario. Oil and gas estimates are based on current prices and potential production. Because future production and market price cannot be projected, these estimates may not be an accurate portrayal of actual impacts under future market conditions. In addition, estimates of timber products and grazing are based on the sawtimber ASQ and AUM permitted use limit and thus reflect an annual average of the maximum available contribution that would be available rather than actual use. This estimate includes direct, indirect, and induced effects as a

result of BLM outputs (Table 4.6.2-1) and county payments (Table 4.6.2-4). The largest employment and labor income effects would occur in the Government, Mining, and Construction sectors. (See Table 4.6.2-5 and Table 4.6.2-6.)

Table 4.6.2-5
Average Annual Employment Contribution by Sector and Alternative

Sector	Area Total	Current	Alternative A	Alternative B (Proposed RMP	Alternative C	Alternative D
Agriculture	6,842	20	36	34	34	35
Mining	13,505	451	743	725	699	743
Utilities	1,358	8	12	12	11	12
Construction	59,134	196	389	377	359	390
Manufacturing	9,302	6	16	14	13	16
Wholesale Trade	8,619	32	45	43	42	45
Transportation & Warehousing	47,947	15	23	22	22	23
Retail Trade	11,294	106	155	152	148	155
Information	4,652	5	7	6	5	8
Finance & Insurance	10,883	19	26	24	23	26
Real Estate & Rental & Leasing	23,801	30	44	42	41	45
Professional, Scientific, & Tech Services	20,907	40	62	58	54	62
Management of Companies	914	3	5	4	4	5
Administration, Waste Management & Remediation Services	18,826	29	46	44	42	46
Educational Services	4,395	5	7	6	6	7
Health Care & Social Assistance	32,022	57	79	75	73	80
Arts, Entertainment, and Recreation	22,823	17	22	23	21	24
Accommodation & Food Services	46,850	99	159	150	142	160
Other Services	23,035	31	44	39	37	45
Government	43,632	240	366	358	349	367
Total	**410,741**	1,409	2,286	2,208	2,125	2,294

Sources: FEAST 2010 and IMPLAN 2010.

While employment and labor income contributions under Alternative A would be higher than under the Proposed RMP and Alternative C, less BLM land would be managed to protect natural amenities and scenic landscapes than under the other alternatives (Table 4.6.2-7). Therefore, Alternative A would provide less protection of non-market values and natural amenities than the other alternatives.

As discussed above under Methods and Assumptions, BLM expenditures and employment are assumed to be the same under all the alternatives. Direct, indirect, and induced effects from these contributions are displayed in Table 4.6.2-2 and Table 4.6.2-3. Externally funded restoration projects described above under Methods and Assumptions would continue under this alternative so that effects also are the same as those described above.

Table 4.6.2-6
Average Annual Labor Income Contribution by Sector and Alternative
(Thousands of 2010 dollars)

Sector	Area Total	Current	Alternative A	Alternative B (Proposed RMP)	Alternative C	Alternative D
Agriculture	$95,803	$86	$251	$239	$213	$267
Mining	$1,352,661	$62,588	$108,942	$105,158	$100,992	$109,024
Utilities	$152,966	$858	$1441	$1415	$1377	$1443
Construction	$3,384,519	$11,241	$20,522	$19,741	$18,843	$20,612
Manufacturing	$521,305	$218	$602	$527	$489	$604
Wholesale Trade	$558,499	$1,958	$2,740	$2,628	$2,605	$2,733
Transportation & Warehousing	$1,587,764	$903	$1,429	$1,401	$1,393	$1,427
Retail Trade	$656,499	$2,904	$4,412	$4,330	$4,265	$4,419
Information	$280,744	$319	$411	$369	$308	$520
Finance & Insurance	$732,593	$1,397	$1,789	$1,702	$1,660	$1,795
Real Estate & Rental & Leasing	$1,188,998	$1,475	$2,188	$2,054	$2,006	$2,201
Professional, Scientific, & Tech Services	$1,286,276	$2,412	$3,871	$3,784	$3,744	$3,876
Management of Companies	$80,185	$278	$488	$331	$327	$454
Administration, Waste Management & Remediation Services	$802,005	$1,057	$1,740	$1,689	$1,642	$1,741
Educational Services	$104,443	$113	$188	$160	$155	$189
Health Care & Social Assistance	$1,622,257	$2,711	$3,940	$3,809	$3,724	$3,971
Arts, Entertainment, and Recreation	$699,919	$498	$672	$689	$627	$701
Accommodation & Food Services	$1,339,436	$2,744	$4,190	$3,952	$3,808	$4,217
Other Services	$688,327	$923	$1,404	$1,312	$1,260	$1,437
Government	$2,446,953	$13,077	$19,943	$19,522	$19,017	$19,989
Total	$19,582,152	$107,760	$181,163	$174,812	$168,455	$181,620

Sources: FEAST 2010 and IMPLAN 2010.

Table 4.6.2-7
Protected Area Designations* in Acres

Designated Areas*	Alternative A (No Action)	Alternative B (Proposed RMP)	Alternative C	Alternative D
	274,230	317,320	404,500	282,500

*These areas include ACECs, VRM Class I, VRM Class II, and lands managed for wilderness characteristics. Based on the proposed management decisions in this RMP/EIS, these areas would typically have fewer surface-disturbing activities within their boundaries compared to other locations in the planning area. Total acres do not include VRM Class III or Class IV, since these classes include objectives other than the retention and preservation of existing character of the landscape (DOI 2010c).

Acronyms and Abbreviations:

ACEC area of critical environmental concern
VRM visual resource management

Under Alternative A, annual payments to counties in the planning area would be approximately $17 million, which includes a portion of PILT payments that can be attributed to BLM entitlement acres, a portion of payments received from grazing revenues, and a portion of royalties received from the sale of mineral material (Table 4.6.2-4). These payments would support about 241 jobs and $12.2 million in labor income (Table 4.6.2-2 and Table 4.6.2-3). Payments to counties and their impacts under this alternative are slightly higher than under the Proposed RMP and Alternative C, since the level of gas production based on anticipated well drilling is higher. As discussed above, this estimate is based on current prices and potential

production. Actual production and market price cannot be projected. Therefore, these estimates may not be an accurate portrayal of actual impacts. Regardless, contributions from these payments are likely to remain an important portion of county revenue, increasing from 2 to 4 percent of 2007 levels of local government revenue within the impact area.

Impacts from Visual Resource Management. VRM designations to protect the scenic qualities of the landscape may attract new residents and tourists to the area, which would then contribute to area economic activity, as would ACECs and lands to be managed for wilderness character. In addition, these designations would further maintain and perhaps enhance non-market values associated with natural amenities protected on these lands. Under Alternative A, less land would be managed under Class I and II VRM designations, as well as special designations and identifications, than under the other alternatives. Therefore, this alternative would provide the least protection of non-market values and natural amenities among the alternatives (Table 4.6.2-7). Consequently, well-being associated with non-market values and potential contributions from new residents and tourists attracted by intact natural landscapes could be less than the other alternatives.

Impacts from Lands with Wilderness Characteristics Management. The economic effects generated by managing for wilderness characteristics are described above under impacts from VRM.

Impacts from Forestry Management. Alternative A would allow an average annual harvest of approximately 1,800 MBF of sawtimber (Table 4.6.2-1). As stated above, this estimate is based on the sawtimber ASQ and reflects an annual average of the volume that would be available rather than actual harvest projections. Annual average harvest has been less than 1 percent of this estimate (Table 4.6.2-1). If harvests were to occur at ASQ levels, approximately 20 jobs and $809 thousand in labor income (Table 4.6.2-2 and Table 4.6.2-3) would be supported within the local economy. In addition to direct job and income impacts in the forest products industry, these estimates include impacts to industries that provide factors of production to the forest products industry and other industries impacted by wage-related spending.

Impacts from Livestock Grazing Management. Alternative A could authorize average annual grazing of approximately 31,000 cattle AUMs and 8,000 sheep AUMs (Table 4.6.2-1), and would support approximately 34 jobs with $260,000 in labor income (Table 4.6.2-2 and Table 4.6.2-3). While these contributions are higher than current contributions from grazing, it must be noted these are impacts from the established permitted use limit for AUMs in the planning area. This amount is the maximum number of AUMs that could be offered under ideal forage conditions, which may not be an accurate portrayal of actual impacts. Factors such as drought, financial limitations on operators, market conditions, and implementation of grazing practices to improve range conditions are important to consider.

The benefit of BLM forage to area operators under Alternative A would be approximately $768,000, which is less than the maximum potential benefit under Alternative D; however, this benefit is greater than the current value of $310,000. Thus, despite the relatively small employment and labor income impacts, the value of forage to area operators would remain.

Impacts from Comprehensive Trails and Travel Management and Recreation and Visitor Services Management. In general, it can be assumed recreation use would continue to increase by 3 percent per year based on rates of visitation observed in the past (RMIS 2010). Given this increase, average annual recreation visits are estimated at 338,000 general visits and another 33,600 wildlife-related visits (Table 4.6.2-1). These visits account for OHV use, hunting, fishing, boating, biking, and other forms of recreation. Expenditures of

these visitors would support approximately 143 jobs and $5.5 million in labor income in the impact area economy on an average annual basis.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Under Alternative A, an estimated 4,198 wells are assumed to be drilled on BLM mineral estate within areas with high potential over the 20-year analysis period; this number amounts to approximately 210 wells per year. Contributions to employment and income from these uses would provide approximately 1,115 jobs and $89.7 million in labor income on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3). Approximately 2 percent of employment and labor income would continue to be supported in the minerals sector under this alternative.

Impacts from Locatable Minerals, Mineral Materials, and Non-energy Leasable Minerals Management. Mineral resource management under this alternative would continue to support levels of saleable, locatable, and leasable mineral resource uses depicted in Table 4.6.2-1.

Impacts from Areas of Critical Environmental Concern Management. The economic effects generated by management of ACECs are described above under impacts from VRM.

Alternative B (Proposed RMP)

As a result of the Proposed RMP, about 1,593 jobs and $110 million in labor income would be generated in the impact area economy on an average annual basis. This level is 58 percent more employment and labor income than contributed currently and primarily results from more anticipated gas production under this alternative than levels evaluated under the current scenario. Oil and gas estimates are based on current prices and potential production, and future production and market price cannot be projected; thus, these estimates may not be an accurate portrayal of actual impacts under future market conditions. Approximately 2 percent of employment and labor income would continue to be supported in the minerals sector under this alternative. The largest employment and labor income effects would occur in the Government, Mining, and Construction sectors. (See Table 4.6.2-5 and Table 4.6.2-6.)

While employment and labor income contributions under this alternative would be the lowest among all the alternatives, apart from Alternative C, more acres would be designated under protected area designations than the other alternatives, except for Alternative C (Table 4.6.2-7). Therefore, this alternative would provide less protection of non-market values and natural amenities than Alternative C, but more than the other alternatives.

The economic impacts from BLM expenditures and employment and externally funded restoration projects under the Proposed RMP would be the same as those described above under Methods and Assumptions and under Alternative A.

Under the Proposed RMP, annual payments to counties would be approximately $16.6 million, which includes a portion of PILT payments that can be attributed to BLM entitlement acres, a portion of payments received from grazing revenues, and a portion of royalties received from the sale of mineral material (Table 4.6.2-4). These payments would support about 232 jobs and $12 million in labor income (Table 4.6.2-2 and Table 4.6.2-3). Payments to counties and their impacts under this alternative would be lower than Alternative A and Alternative D, since the level of permitted grazing and gas production would be lower. As discussed above, this estimate is based on current prices and potential gas production. Actual production and market

price cannot be projected; thus, these estimates may not be an accurate portrayal of actual impacts. Regardless, contributions from these payments to county revenues would increase from current levels (from 2 to 4 percent) and would remain an important portion of county revenue within the impact area.

Impacts from Visual Resource Management. Under the Proposed RMP more acres are managed under VRM Class I and II designations (and associated stipulations), ACECs, and LWCs then under Alternatives A and D, but less than under Alternative C (Table 4.6.2-7). Therefore, this alternative would provide more protection for non-market values and natural appearing landscapes among the alternatives, apart from Alternative C. Consequently, well-being associated with non-market values and potential contributions from new residents and tourists attracted by naturally-appearing landscape amenities could be more than these alternatives but less than Alternative C.

Impacts from Lands with Wilderness Characteristics Management. The economic effects generated by managing for wilderness characteristics are described above under impacts from VRM.

Impacts from Forestry Management. The Proposed RMP would allow an average annual harvest of approximately 900 MBF of sawtimber (Table 4.6.2-1). As stated above, this estimate is based on the sawtimber PSQ and reflects an annual average of the volume that would be available rather than actual harvest projections. Annual average harvest has been less than 1 percent of this estimate (Table 4.6.2-1). If harvests were to occur at PSQ levels, approximately 11 jobs and $442,000 in labor income (Table 4.6.2-2 and Table 4.6.2-3) would be supported within the local economy. In addition to direct job and income impacts in the forest products industry, these estimates include impacts to industries that provide factors of production to the forest products industry and other industries impacted by wage-related spending. While less volume would be available than under Alternative A, it should be emphasized that less than 1 percent of the average annual available harvest has been removed historically. Consequently, the Proposed RMP could maintain or increase the jobs and labor income levels supported currently since the PSQ estimate is greater than current levels of harvest from BLM lands.

Impacts from Livestock Grazing Management. The Proposed RMP would have a smaller permitted use limit than Alternative A and Alternative D and could thus support fewer average annual AUM contributions (Table 4.6.2-1). On an average annual basis, this permitted use limit would support 31 jobs and $230,000 in labor income within the impact area economy (Table 4.6.2-2 and Table 4.6.2-3). While closure of several inactive allotments yields this decrease, current activity could be accommodated and potentially increase under this alternative. This decrease also may be less likely with historical decreases in actual use of AUMs (DOI 2010b). Nonetheless, if demand for AUMs existed along with favorable forage and market conditions, the contribution from BLM grazing could increase relative to current use under this alternative, despite the decrease in the permitted use limit. Regardless, BLM grazing-related jobs would continue to remain below 1 percent of overall agricultural employment and labor income for the area.

Levels of employment and income associated with the Proposed RMP should not overshadow potential increases in other values as a result of grazing actions under this alternative. The benefit to permittees of low-cost BLM forage, below the cost of competitively priced AUMs, would be $486,000. This amount is less than the maximum potential benefit under Alternative A. However, it is greater than the current value ($310,000) and could reduce conflict and increase value to other resources.

Impacts from Comprehensive Trails and Travel Management and Recreation and Visitor Services Management. It is anticipated that the Proposed RMP would accommodate recreation at slightly higher levels than the expected rates of increase discussed under Alternative A. Given this increase, average annual recreation visits are estimated at 362,140 general visits and another 36,000 wildlife-related visits (Table 4.6.2-1). These visits account for OHV use, hunting, fishing, boating, biking, and other forms of recreation. Consequent expenditures of these visitors would support approximately 153 jobs and $5.9 million in labor income in the impact area economy on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3).

Jobs and income associated with this alternative should not overshadow the value of experience provided by recreation on BLM lands under this alternative. The absence of actions that support recreation facilities would result in a decrease in the value of the experience for some relative to enhanced facilities under Alternative D. However, with the SRMAs and route designation under this alternative, BLM management would likely be more commensurate with desired recreational experiences. For example, certain motorized user segments would benefit from opportunities specifically catered to their interests. Consequently, the value of the recreation experience on BLM lands is expected to slightly increase relative to Alternative A.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Less oil and gas activity would occur under the Proposed RMP than under Alternative A (Table 4.6.2-1). Under this alternative, a total of 3,940 wells are estimated to be drilled on BLM mineral estate within areas with high potential over the 20-year analysis period and amounts to approximately 197 wells per year. Contributions to employment and income from these uses would provide approximately 1,088 jobs and $87.5 million in labor income on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3). Approximately 2 percent of employment and labor income would be supported in the minerals sector under this alternative.

Decreases in gas production would result in less royalty disbursements to local governments than under Alternative A and Alternative D.

Impacts from Locatable Minerals, Mineral Materials, and Non-energy Leasable Minerals Management. Mineral resource management under this alternative would continue to support current levels of saleable and locatable uses.

Impacts from Areas of Critical Environmental Concern Management. The economic effects generated by management of ACECs are described above under impacts from VRM.

Alternative C

As a result of Alternative C, about 1,527 jobs and $105 million in labor income would be generated in the impact area economy on an average annual basis. This amount is 51 percent more employment and 52 percent more labor income than contributed currently as a result of more anticipated gas production under this alternative than under the levels evaluated under the current scenario. Oil and gas estimates are based on current prices and potential production, and future production and market price cannot be projected. Thus, these estimates may not be an accurate portrayal of actual impacts under future market conditions. In addition, fewer permitted AUMs and less timber volume would be made available (Table 4.6.2-1). These estimates are based on the sawtimber ASQ and AUM permitted use limit and thus reflect an annual average of the maximum available contribution that would be available rather than actual use. The largest employment and labor income effects would occur in the Government, Accommodation & Food Services, and Mining sectors. (See Table 4.6.2-5 and Table 4.6.2-6.)

While employment and labor income contributions under this alternative would be the lowest among the alternatives, more protected area designation would occur than the other alternatives (Table 4.6.2-7). Therefore, this alternative would ensure more protection of non-market values and natural amenities than the other alternatives.

Effects on local economic conditions from BLM expenditures and employment and externally funded restoration projects under Alternative C would be the same as those described above under Methods and Assumptions and under Alternative A. The impacts associated with payments to counties, R&VS actions, and mineral resource uses under Alternative C would be the same as effects discussed above under the Proposed RMP.

Impacts from Visual Resource Management. Under Alternative C, more acres of VRM Class I and II designations (including VRM stipulations), ACECs, and lands managed for wilderness characteristics would occur than under the other alternatives (Table 4.6.2-7). Therefore, this alternative would ensure more protection of non-market values and natural amenities than the other alternatives. Consequently, well-being associated with non-market values and potential contributions from new residents and tourists attracted by natural amenities could be more than the other alternatives.

Impacts from Lands with Wilderness Characteristics Management. The economic effects generated by managing for wilderness characteristics are described above under impacts from VRM.

Impacts from Forestry Management. Alternative C would allow an average annual harvest of approximately 900 MBF of sawtimber (Table 4.6.2-1). As stated above, this estimate is based on the sawtimber PSQ and reflects an annual average of the volume that would be available rather than actual harvest projections. Annual average harvest has been less than 1 percent of this estimate (Table 4.6.2-1). If harvests were to occur at PSQ levels, approximately 11 jobs and $442,000 in labor income (Table 4.6.2-2 and Table 4.6.2-3) would be supported within the local economy. In addition to direct job and income impacts in the forest products industry, these estimates include impacts to industries that provide factors of production to the forest products industry and other industries impacted by wage-related spending. While less volume would be available than under Alternatives A or D, it should be emphasized that less than 1 percent of the average annual available harvest has been removed historically. Consequently, Alternative C could maintain or increase the jobs and labor income levels supported currently, since the PSQ estimate is greater than current levels of harvest from BLM.

Impacts from Livestock Grazing Management. Alternative C would have a lower permitted use limit than the other alternatives (Table 4.6.2-1). On an average annual basis, this grazing would support approximately 31 jobs and $230,000 in labor income (Table 4.6.2-2 and Table 4.6.2-3). While closure of several inactive allotments yields this decrease, current activity could be accommodated and potentially increase under this alternative. This increase may be less likely with historical decreases in actual use of AUMs (DOI 2010b). Nonetheless, if demand for AUMs existed along with favorable forage and market conditions, the contribution from BLM grazing could increase relative to current use under this alternative despite the decrease in the permitted use limit. Regardless, BLM grazing related jobs would continue to remain below 1 percent of overall agricultural employment and labor income for the area.

Levels of employment and income associated with Alternative C should not overshadow potential increases in other values as a result of grazing actions under this alternative. The benefit to permittees of low-cost BLM

forage, below the cost of competitively priced AUMs, would be $479,000. This cost is less than the maximum potential benefit under Alternative A. However, it is greater than the current value ($310,000) and could reduce conflict and increase value to other resources.

Impacts from Comprehensive Trails and Travel Management and Recreation and Visitor Services Management. It is anticipated that Alternative C would accommodate recreation at slightly lower levels than the expected rates of increase under any other alternative. Given this decrease, average annual recreation visits are estimated at 325,930 general visits and another 32,400 wildlife-related visits (Table 4.6.2-1). These visits account for OHV use, hunting, fishing, boating, biking, and other forms of recreation. Consequent expenditures of these visitors would support approximately 138 jobs and $5.3 million in labor income in the impact area economy on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3).

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Less oil and gas activity would occur under Alternative C than under any other alternative (Table 4.6.2-1). Under this alternative, a total of 3,578 wells are estimated to be drilled on BLM mineral estate within areas with high potential over the 20-year analysis period and amounts to approximately 179 wells per year. Contributions to employment and income from these uses would provide approximately 1,048 jobs and $84 million in labor income on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3). Approximately 2 percent of employment and labor income would be supported in the minerals sector under this alternative.

Decreases in gas production would result in less royalty disbursements to local governments than under any other alternative.

Impacts from Locatable Minerals, Mineral Materials, and Non-energy Leasable Minerals Management. Mineral resource management under this alternative would continue to support current levels of saleable and locatable uses.

Impacts from Areas of Critical Environmental Concern Management. The economic effects generated by management of ACECs are described above under impacts from VRM.

Alternative D

As a result of Alternative D, about 1,640 jobs and $113 million in labor income would be generated in the impact area economy on an average annual basis. This amount is 63 percent more employment and labor income than contributed currently, and results from the higher anticipated gas production, timber product contributions, and permitted grazing and recreation visits evaluated under this alternative than levels evaluated under the other action alternatives. Oil and gas estimates are based on current prices and potential production and future production, and market price cannot be projected. Thus, these estimates may not be an accurate portrayal of actual impacts under future market conditions. In addition, timber and grazing estimates are based on the sawtimber ASQ and AUM permitted use limit and thus reflect an annual average of the maximum available contribution that would be available rather than actual use. The largest employment and labor income effects would occur in the Government, Mining, and Construction sectors. (See Table 4.6.2-5 and Table 4.6.2-6.)

While employment and labor income contributions under this alternative would be the highest among the alternatives, less protected area designations would occur than under the Proposed RMP and Alternative C

(Table 4.6.2-7). Therefore this alternative would ensure less protection of non-market values and natural amenities than the Proposed RMP and Alternative C and only slightly more protection than Alternative A.

The economic impacts from BLM expenditures and employment and externally funded restoration projects under Alternative D would be the same as those described above under Methods and Assumptions and under Alternative A.

Under Alternative D, annual payments to counties would be approximately $17 million, which includes a portion of PILT payments that can be attributed to BLM entitlement acres, a portion of payments received from grazing revenues, and a portion of royalties received from the sale of mineral material (Table 4.6.2-4). These payments would support about 241 jobs and $12.1 million in labor income (Table 4.6.2-2 and Table 4.6.2-3). Payments to counties and their impacts under this alternative are higher than the other alternatives with higher levels of anticipated gas production. As discussed above, this estimate is based on current prices and potential production. Actual production and market price cannot be projected; thus, these estimates may not be an accurate portrayal of actual impacts. Contributions from these payments to local government revenue could increase from current levels (from 2 to 4 percent) and thus would remain an important portion of local government revenue within the impact area.

Impacts from Visual Resource Management. Under this alternative, less protective area designations and managing lands for wilderness characteristics would occur than the other alternatives, apart from Alternative A (Table 4.6.2-7). Therefore, this alternative would provide less protection of non-market values and natural amenities among the alternatives, apart from Alternative A. Consequently, well-being associated with non-market values and potential contributions from new residents and tourists attracted by natural amenities could be more than Alternative A but less than the Proposed RMP and Alternative C.

Impacts from Lands with Wilderness Characteristics Management. The economic effects generated by managing for wilderness characteristics are described above under impacts from VRM.

Impacts from Forestry Management. Alternative D would allow an average annual harvest of approximately 1,400 MBF of sawtimber (Table 4.6.2-1). As stated above, this estimate is based on the sawtimber PSQ and reflects an annual average of the volume that would be available rather than actual harvest projections. Annual average harvest has been less than 1 percent of this estimate (Table 4.6.2-1). If harvests were to occur at PSQ levels, approximately 16 jobs and $655,000 in labor income (Table 4.6.2-2 and Table 4.6.2-3) would be supported within the local economy. In addition to direct job and income impacts in the forest products industry, these estimates include impacts to industries that provide factors of production to the forest products industry, and other industries impacted by wage-related spending. While less volume would be available than under Alternative A, it should be emphasized that less than 1 percent of the average annual available harvest has been removed historically. Consequently, Alternative D could maintain or increase the jobs and labor income levels supported currently since the PSQ estimate is greater than current levels of harvest from BLM.

Impacts from Livestock Grazing Management. Alternative D would have a lower permitted use limit than Alternative A but higher than the other alternatives (Table 4.6.2-1). On an average annual basis, this grazing would support approximately 32 jobs and $237,000 in labor income (Table 4.6.2-2 and Table 4.6.2-3). While closure of several inactive allotments yields this decrease relative to Alternative A, current activity could be accommodated and potentially increase under this alternative. This may be less likely with

historical decreases in actual use of AUMs (DOI 2010b). Nonetheless, if demand for AUMs existed along with favorable forage and market conditions, the contribution from BLM grazing could increase relative to current use under this alternative despite the decrease in the permitted use limit. Regardless, BLM grazing-related jobs would continue to remain below 1 percent of overall agricultural employment and labor income for the area.

Levels of employment and income associated with the Proposed RMP should not overshadow potential increases in other values as a result of grazing actions under this alternative (see Section 3.3.2 Livestock Grazing). The benefit to permittees of low-cost BLM forage, below the cost of competitively priced AUMs, would be $493,000. This cost is less than the maximum potential benefit under Alternative A. However, it is greater than the current value ($310,000) and could reduce conflict and increase value to other resources.

Impacts from Comprehensive Trails and Travel Management and Recreation and Visitor Services Management. In spite of the decrease in areas open to cross-county travel, it is anticipated that the increase in areas limited to designated routes would accommodate recreation at levels similar to the expected rates of increase discussed under Alternative A. In addition, improved recreation facilities and management focus under Alternative D would attract additional visitation not experienced under the other alternatives. Given this increase, average annual recreation visits are estimated at 374,210 general visits and another 37,200 wildlife related visits (Table 4.6.2-1). These visits account for OHV use, hunting, fishing, boating, biking, and other forms of recreation. Consequent expenditures of these visitors would support approximately 158 jobs and $6.1 million in labor income in the impact area economy on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3).

Job and income associated with this alternative should not overshadow the value of experience provided by recreation on BLM lands under this alternative. As noted above, actions that support recreation facilities would result in an increase in the value of experience for some relative to the other alternatives. In addition, designation of motorized routes would result in improved landscape health and associated recreation amenity values under this alternative that would likely better match the desired recreational experiences of some visitors. Thus, the value of the recreation experience on BLM lands could increase relative to the other alternatives.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Fluid mineral resource management under Alternative D would support more natural gas-related activity than the other alternatives (Table 4.6.2-1). Under this alternative, a total of 4,198 wells are estimated to be drilled on BLM mineral estate within areas with high potential over the 20-year analysis period and amounts to approximately 210 wells per year. Contributions to employment and income from these uses would provide approximately 1,115 jobs and $89.7 million in labor income on an average annual basis (Table 4.6.2-2 and Table 4.6.2-3). Approximately 2 percent of employment and labor income would be supported in the minerals sector under this alternative.

As discussed above, increases in gas production would result in more royalty disbursements to local governments than under the Proposed RMP or Alternative C.

Impacts from Locatable Minerals, Mineral Materials, and Non-energy Leasable Minerals Management. Mineral resource management under this alternative would continue to support current levels of saleable and locatable uses (the same as under the Proposed RMP and Alternatives A and C).

Impacts from Areas of Critical Environmental Concern Management. The economic effects generated by management of ACECs are described above under impacts from VRM.

Cumulative Impacts

The regional economy can be affected by a variety of factors including population growth, changes in interest rates, location of new industries, recession, growth of new sectors, tax policy, and state economic policy. When compared with these variables, the management actions under this plan have relatively small effects on the regional economy. There should be no cumulative economic effects regionally because the changes in economic activity presented above would be largely unnoticeable on a regional basis. However, cumulative economic effects may occur for smaller areas within counties and communities in the impact area.

Forest Products. The potential for biomass utilization within the planning area has been deemed favorable by many (BLM and DOE 2003); however, projecting future scenarios for utilization is impractical based on factors outside the scope of BLM management. Utilization depends on industry capacity, and decisions to invest in energy development and infrastructure depend on factors determined by regional and world markets. In addition, the cost of transportation and removal from public land (site-specific planning) could hamper development. In the future, utilization of biomass from BLM-administered lands in the planning area may become more likely with changes in energy markets and technology.

Grazing. Field office personnel noted the increasing status of allotments in non-use as larger areas of land are split up into smaller private estates and ranchettes (P. Torma and I. Pitman 2010). While these decreasing trends in AUM utilization are largely outside the spectrum of BLM management, current levels of grazing would be supported under all the alternatives, with cooperation of favorable market conditions and willing permittees.

Recreation and Comprehensive Trails and Travel Management. Recreation management and comprehensive trails and travel management decisions produce satisfying recreation experiences and beneficial outcomes for BLM visitors as well as beneficial outcomes for communities. These beneficial outcomes accrue from recreation participation, are both short and long term, and are realized onsite and offsite. Beneficial outcomes are identified in one of four categories: personal/individual benefits, social/community benefits, economic benefits or environmental benefits. The decisions included in the Proposed RMP as well as future implementation decisions (e.g., types of special recreation permits issued, recreation facilities developed, or extent of the travel system as well as the types or modes of travel) will influence the economic outcomes produced from BLM lands. Types of economic outcomes expected to be produced include: increase in desirability as a place to live or retire, greater value-added local services, and helping to maintain local tourism revenue.

Mineral Resources. Leasable, locatable, and salable mineral production would continue to be provided by BLM in the planning area (Table 4.6.2-1). Regardless of differences among the alternatives, area dependency on BLM-related employment provided to the mining sector would not change among the alternatives. Consequently, any cumulative economic effects on those dependent on these contributions will remain the same under the alternatives.

Impacts to Counties. Under all the alternatives, the share of local government revenue attributable to the BLM ranges from 7 to 9 percent in the CRVFO impact area. Thus, county programs and infrastructure supported by these payments would not differ much among the alternatives. Consequently, any cumulative

economic effects on those dependent on these contributions would remain similar under all of the alternatives. In addition, as discussed above in the social and economic sections, costs to local governments would remain largely unchanged as a result of planning actions. Consequently, significant changes in population, oil and gas development, or the demand for services and infrastructure would not result from BLM planning actions. As a result, cumulative economic effects to counties will remain the same under all of the alternatives.

BLM Expenditures and Employment. Under all the alternatives, it is assumed the level of expenditures and employment would not vary by alternative; thus, the employment and income supported by these actions would not vary among the alternatives. Consequently, cumulative economic effects on those dependent on these contributions would remain the same under the alternatives.

Externally Funded Ecosystem Restoration. Current levels of management performed on BLM lands in the CRVFO carried out with funds not provided by BLM would continue under all the alternatives. Consequently, associated cumulative economic effects would be the same among the alternatives.

Role of Amenities, Migration, and Non-Market Values. Establishing areas to be managed for their wilderness character and changes to ACECs, WSR eligibility, and VRM (Table 4.6.2-8) would further maintain and perhaps enhance non-market values associated with natural amenities protected on these lands. The effects on non-market values from special area designations and management of these attributes on private, state, and other federal land cannot be projected. However, the effects could be the greatest under Alternative C and the least under Alternative A, with the respective most and fewest acres designated among the alternatives.

Table 4.6.2-8
Social Indicators

Resource	Current	Alternative A (No Action)	Alternative B (Proposed RMP)	Alternative C	Alternative D
Non wildlife recreation (visits)	268,440	338,041	362,140	325,930	374,210
Wildlife recreation (visits)	24,263	33,576	36,000	32,400	37,200
Oil and Gas Development (# of wells per year)	177	210	197	179	210
Oil and Gas Development (average daily trips per year)	562	667	626	568	667
Trails and Travel Management (acres limited to designated routes)	0	123,000	467,600	467,400	473,500

Cumulative Effects to Population. Population increases are also anticipated over the period between 2005 and 2030 within the planning area. According to projections from the Colorado State Demography Office (2009i), the population in the CRVFO impact area would increase by 100 percent. (See the Section 3.6.2 Social and Economic Conditions, discussion of population trends.) These population increases suggest that challenges associated with increasing uses of BLM lands in the CRVFO impact area will grow along with challenges associated with BLM's urban interface.

In conclusion, projected employment changes in the area suggest economic contributions from BLM management will be small. However, the role BLM plays in the economic aspects of the CRVFO impact area may increase along with the population, since the land managed by BLM sustains area employment, income, and quality of life and will continue to do so under all alternatives. These benefits occur largely through the provision of natural amenities and recreational opportunities that attract tourists and businesses. None of the alternatives would alter the trends outlined above but would sustain employment, recreation, access, and rural character. While the provision of these resources varies by alternative, these opportunities would be available for a variety of demographic groups, area residents, tourists, and others who value the area.

4.6.2.2 Social Conditions

Methods and Assumptions

The social analysis focuses on changes to social and economic well-being as it relates to the quality of life of those individuals and communities identified in Chapter 3. While many of the potential changes in quality of life can be discussed only qualitatively, several indicators provide an approach to discuss the magnitude of effects to these communities. Table 4.6.2-8 lists these indicators and compares the alternatives for communities[1]. Comments from the RMP planning process and the North-Central Colorado Community Assessment Report provided specific information pertaining to the concerns of individuals and groups affected by this plan. All comments were examined and general categories were formed from common themes pertaining to community connections and interests in BLM management. The three communities of interest identified include individuals and groups interested in recreation and access, preservation of rural characteristics and values, and oil and gas development. These communities are described in Chapter 3, while effects to these communities are discussed below.

The following analytical methods and assumptions were used to complete the analysis for the social impacts from the proposed management decisions:

- The planning area population will continue to increase and age, as described in Chapter 3.
- The social groups are defined to facilitate the discussion of social impacts. These discussions simplify what are often quite complex and unique values and attitudes, and the groupings presented here are by no means mutually exclusive. For example, oil and gas workers also participate in recreation activities. It is also worth noting that attitudes, interests, and values often change over time. The social analysis covers the groups and individuals that are most likely to be affected by this plan.
- The social analysis assesses the potential effects of different management actions on potentially affected social groups. These groups were identified based on the results of public scoping and comments received during the planning process. This analysis addresses the potential impacts of the alternatives based on the issues and concerns raised by these groups. The analysis draws on ongoing discussions between BLM and potentially affected publics, as well as discussions with subject matter experts involved in other parts of the analysis. The analysis is primarily qualitative with potential impacts ranked by alternative. Quantitative measures, such as the number of wells, potential traffic, and recreation visitation, are used as appropriate.

[1] Changes in indicators do not imply the same change in quality of life for all communities since marginal changes in quality of life relative to the indicators cannot be considered equal among communities. For example, the change in quality of life associated with an increase in oil and gas development is different for communities interested in recreation from the change in quality of life for those interested in preservation of rural characteristics and values.

- Non-market values, including natural amenities, non-use values, ecosystem services, and aspects of well-being and quality of life, are assessed in qualitative terms, as appropriate.

In the absence of quantitative data, a qualitative analysis was performed based on the best available data, as appropriate. Expert opinions were solicited from each CRVFO and the BLM State Office regarding current conditions for specific resources and anticipated outcomes and were incorporated into the evaluation. Particularly, detractions from existing lifestyles, quality of life, sense of place, and community values did not lend themselves to quantitative analysis. This analysis involved researching the available literature concerning community values and quality of life, including newspaper articles, university research studies, the community assessment report for the planning area, and visitor surveys that reveal public opinions, levels of satisfaction, and desired outcomes. The permitted use information derived from these studies was then compared against the anticipated changes in the factors identified as important that would occur under each alternative.

Recreation and Access. Under all alternatives, wildlife and non-wildlife visits are expected to increase (Table 4.6.2-8). Employment and income related to recreational activities, many of which depend on access to public lands, will at minimum continue to support this community's quality of life. While localized changes in access could occur, recreation opportunities will be maintained and enhanced, thus accommodating existing recreation uses and expected increases in recreation uses (Table 4.6.2-8).

Effects of increased visitation on the quality of the recreation experience will depend on the type and location of the recreation activity taking place as well as on the behavior of the individual recreating. No information is currently available on the effects of increased visitation on quality of recreational experience or access to public land. Changes in the quantity and quality of the recreation experiences offered are discussed in the recreation section of this EIS.

Across all alternatives, it is important to recognize that the difference in special management area designations (such as SRMAs and areas open, closed, or limited to motorized uses) represents a change in management focus, and may not change the ability to access public land or the uses that occur on that land. In addition, drawing conclusions about changes to access based on acres or route designations may not be appropriate since substantive consideration depends on an accurate proxy for actual portrayal of effects to quality of life. Regardless, as discussed above, it is anticipated that recreation opportunities will be maintained and enhanced with these designations, thus accommodating existing recreation uses and expected increases in recreation uses (Table 4.6.2-8). Therefore, no change in recreational value is anticipated from changes in recreation access; however, the lack of site-specific information on access for other uses makes evaluation impractical.

Preservation of Rural Characteristics and Values. Individuals and communities interested in the preservation of rural characteristics and value noted the importance of access to public land. Effects on access are address in the paragraph directly above. Effects on rural character and value from oil and gas development are discussed under effects by alternative.

Oil and Gas Development. Under all alternatives, the potential change in population that would result from changes in mineral sector employment would be less than 1 percent of current population levels in the CRVFO impact area. In addition, the housing vacancy rate within the impact areas (21 percent within the CRVFO impact area) would accommodate any changes in housing demand from population changes, since required households would not exceed 1 percent of current vacancies under all the alternatives. However, localized change could be greater for individual counties within the CRVFO impact area. While possible, the

maximum potential change would still be small. If all potential changes in population and households within the impact area are examined as a percent of individual county household vacancies, the hypothetical change in vacancy rate would not exceed 4 percent of county vacancies, except in Garfield County, where the potential households' percent of current vacancies ranges from 9 to 15. While potential effects on population at a local level are small, they could occur alongside cumulative effects on population from oil and gas development, as discussed in the cumulative effects section. As a result of these cumulative effects, changes in housing affordability and availability could adversely affect local economic well-being by decreasing the local vacancy rate below sustainable amounts.

Environmental Consequences

Impacts on social conditions would result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no or only negligible impacts on social conditions under any of the four alternatives.

Alternative A

Impacts from Visitor Services Management. Under Alternative A, it is anticipated that recreation use would continue to increase by 2.5 percent per year based on rates of visitation observed in the past (RMIS 2010). Given this increase, average annual recreation visits are estimated at 338,041 general visits and another 33,576 wildlife-related visits (Table 4.6.2-8). Thus, Alternative A continues to support value to recreational users through continued access to public land.

Impacts from Comprehensive Trails and Travel Management. Under Alternative A, current access for commercial and non-commercial uses would be maintained under current travel management. Thus, Alternative A continues to support standard of living through continued access to public land.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Of particular concern to those interested in preservation of rural character and values was increased traffic from oil and gas development. Large traffic volumes can negatively impact quality of life through traffic congestion, noise, and dust. Additionally, commuting times and threats to the public's health and safety persist because of continued traffic volumes. The number of potential wells is used to estimate potential changes in traffic and is measured in trips made to a well during development. Based on an average of 1,160 trips per well (DOI 2006) and development anticipated (approximately 210 wells completed per year over 20 years), Alternative A would contribute 667 average daily trips (Table 4.6.2-8). This number of trips is more than the Proposed RMP and Alternative C.

While this traffic volume may not cause traffic congestion by itself (contributing less than 4 percent of current average daily trips along Interstate70 between Silt and Parachute), it often occurs in rural areas where additional truck traffic, noise, and dust may be easily noticed. Consequently, it could negatively impact the quality of life for those living in the vicinity of the development and those who are accustomed to and value a quiet rural setting. While the level and occurrence of this traffic volume along specific roads is not available, the maximum daily trips across the entire planning area would not exceed 13 percent of traffic along Highway 13 between Rifle and Meeker (CDOT 2009).

Employment and income generated from oil and gas development activities contribute to the standard of living for those depending on the industry and connected industries. Under this alternative, 1,115 jobs would be supported by oil, gas, and mineral uses on BLM lands within the CRVFO (Table 4.6.2-2). Consequently,

the standard of living for those who depend on oil and gas related employment would continue under this alternative.

Approximately 1,100 households depend on BLM minerals-related employment under this alternative, which is no more than 4 percent of total vacancies in individual impact area counties. This total does not include Garfield County, where total households supported by BLM minerals-related employment could account for 15 percent of current vacancies. Consequently, no effect on the availability and affordability of area housing is anticipated in individual counties, except in Garfield County. Some potential for effects on the availability and affordability of housing exists in Garfield County, given the possibility of concentrated oil and gas activity alongside low housing vacancy rates[2].

Alternative B (Proposed RMP)

Impacts from Recreation and Visitor Services Management. As described below under Impacts from Comprehensive Trails and Travel Management, it is anticipated that the increase in areas limited to designated routes (Table 4.6.2-8) under the Proposed RMP would accommodate an increased recreation demand that would be expected under the Proposed RMP. This alternative would maintain increase recreation visitation from the levels experienced under Alternative A—approximately 362,000 general visits and another 36,000 wildlife-related visits (Table 4.6.2-8).

Impacts from Comprehensive Trails and Travel Management. In spite of the decrease in areas open to cross-county travel, it is anticipated that the increase in areas limited to designated routes (Table 4.6.2-8) would accommodate the recreation access that would be demanded under the Proposed RMP. In addition, it is anticipated that the designation of routes and site-specific travel management planning would continue to accommodate other commercial and non-commercial uses of public land. Consequently, no change in quality of life is anticipated.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Of particular concern to those interested in the preservation of rural character and values was increased traffic from oil and gas development. Using the same methodology as above to calculate the number of average daily trips, the Proposed RMP would result in 626 trips (Table 4.6.2-8). This number is below the projected trip amounts for Alternatives A and D. Less traffic could improve quality of life because of the lowered traffic congestion, noise, and dust. Additionally, less traffic congestion could lead to decreased commuting times and improved public health and safety.

Regardless, oil and gas related traffic concern would remain for area communities. While this traffic volume may not cause traffic congestion by itself--it could contribute less than 4 percent of current average daily trips along Interstate 70 between Silt and Parachute--it often occurs in rural areas where additional truck traffic, noise, and dust may be easily noticed. Consequently, it could negatively impact the quality of life for those living in the vicinity of the development and those who are accustomed to and value a quiet rural setting. While the level and occurrence of this traffic volume along specific roads is not available, the maximum daily

[2] It should be noted that these effects are based on current conditions in both the housing and oil and gas markets. Actual oil and gas activity and housing markets cannot be projected. Thus, these estimates may not be an accurate portrayal of actual impacts. However, they provide a frame of reference for discussion of housing. In addition, projected population increases, discussed in Chapter 3 and the cumulative effects section below, also temper potential effects on housing availability and affordability at the local level.

trips across the entire planning area would not exceed 12 percent of traffic along Highway 13 between Rifle and Meeker (CDOT 2009).

Employment and income generated from oil and gas development activities contribute to the standard of living for those depending on the industry and connected industries. Under this alternative, 1,088 jobs would be supported by oil, gas, and mineral uses on BLM lands within the CRVFO (Table 4.6.2-2). Consequently, the standard of living for those who depend on oil- and gas-related employment would continue under this alternative.

Approximately 1,100 households would depend on the BLM minerals-related employment under this alternative (Table 4.6.2-8), which is no more than 4 percent of total vacancies in individual impact area counties, apart from Garfield County, where total households supported by BLM minerals-related employment could account for 14 percent of current vacancies. Consequently, no effect on the availability and affordability of area housing is anticipated in individual counties, except in Garfield County. Some potential for effects on the availability and affordability of housing exists in Garfield County, given the possibility of concentrated oil and gas activity alongside low housing vacancy rates.

Alternative C

Under Alternative C, impacts from R&VS Management, Comprehensive Trails and Travel Management, and Fluid Minerals Management would be similar, but slightly reduced as those described above under the Proposed RMP.

Alternative D

Impacts from Visitor Services Management. As described below under Impacts from Comprehensive Trails and Travel Management, it is anticipated that the recreation levels that would occur under Alternative A would be increased by the recreation access provided under Alternative D. This access would increase recreation visitation and other commercial and non-commercial uses of public land from levels experienced currently. In addition, facilities development for recreation purposes would provide additional visitation not experienced under the other alternatives: approximately 374,210 general visits and another 37,200 wildlife-related visits (Table 4.6.2-8). Consequently, an increase in recreational value relative to the other alternatives could occur.

Impacts from Comprehensive Trails and Travel Management. In spite of the decrease in areas open to cross-county travel, it is anticipated that the increase in areas limited to designated routes (Table 4.6.2-8) would accommodate greater recreation visits that would be experienced under Alternative A. This access would increase recreation visitation and other commercial and non-commercial uses of public land from the levels experienced currently. Consequently, an increase in recreational value is anticipated.

Impacts from Fluid Minerals Management (Oil and Gas, Oil Shale, and Geothermal Resources). Of particular concern to those interested in the preservation of rural character and values was increased traffic from oil and gas development. Using the same methodology as above to calculate the number of average daily trips, Alternative D would result in an estimated 667 trips (Table 4.6.2-8), the most of all the alternatives, along with Alternative A. More traffic than under the Proposed RMP or Alternative C would decrease quality of life through traffic congestion, noise, and dust. Additionally, increased traffic could lead to increased commuting times and threats to public health and safety.

While this traffic volume may not cause traffic congestion by itself--it could contribute 4 percent of current average daily trips along Interstate 70 between Silt and Parachute--it often occurs in rural areas where additional truck traffic, noise, and dust may be easily noticed. Consequently, it could negatively impact the quality of life for those living in the vicinity of the development and who are accustomed to and value a quiet rural setting. While the level and occurrence of this traffic volume along specific roads is not available, the maximum daily trips across the entire planning area would not exceed 13 percent of traffic along Highway 13 between Rifle and Meeker (CDOT 2009).

Employment and income generated from oil and gas development activities contribute to the standard of living for those depending on the industry and connected industries. Under this alternative, 1,115 jobs would be supported by oil, gas, and mineral uses on BLM lands within the CRVFO (Table 4.6.2-2). This number is more than the current contribution and the Proposed RMP and Alternative C; consequently, the standard of living for those who depend on oil- and gas-related employment could increase under this alternative.

Approximately 1,100 households would depend on the BLM minerals related employment under Alternative D. This number is no more than 4 percent of total vacancies in individual impact area counties, apart from Garfield County, where total households supported by BLM minerals-related employment could account for 15 percent of current vacancies. Consequently, no effect on the availability and affordability of area housing is anticipated in individual counties, except in Garfield County. Some potential for effects on the availability and affordability of housing exists in Garfield County, given the possibility of concentrated oil and gas activity alongside low housing vacancy rates.

Cumulative Impacts

Recreation and Comprehensive Trails and Travel Management. Recreation management and comprehensive trails and travel management decisions produce satisfying recreation experiences and beneficial outcomes for BLM visitors as well as beneficial outcomes for communities. These beneficial outcomes accrue from recreation participation, are both short and long term, and are realized onsite and offsite. Beneficial outcomes are identified in one of four categories: personal/individual benefits, social/community benefits. economic benefits or environmental benefits. The decisions included in the Proposed RMP as well as future implementation decisions (e.g., types of special recreation permits issued, recreation facilities developed, or extent of the travel system as well as the types or modes of travel) will influence the personal and social outcomes produced from BLM lands. Types of personal/social outcomes expected to be produced include: improved physical fitness/ better health maintenance, living a more outdoor-oriented lifestyle, heightened sense of satisfaction with one's community, lifestyle improvement or maintenance and a closer relationship with the natural world.

Mineral Resources. As discussed above, no additional effect on population change, housing affordability, housing availability, or traffic is anticipated under the alternatives. Under all alternatives, the change in population that would result from changes in mineral sector employment related to BLM activity would be less than 1 percent of current population levels within the impact areas. However, localized change could be greater for individual counties within the CRVFO impact area. Consequently, cumulative effects on population could occur to the extent that effects on traffic in rural areas, housing affordability, and housing availability adversely affect local social well-being. As noted above, the effects depend on concentrated BLM activity in particular counties where vacancy rates are low, such as in Garfield County, where 13 percent of housing units are vacant and concentrated oil and gas activity is anticipated.

Role of Amenities, Migration, and Non-Market Values. Natural amenities and quality of life have been increasingly recognized as important factors in many rural communities in the West (Rudzitis and Johnson 2000). Thus, the established ACECs, WSRs, and land to be managed for wilderness characteristics similarly contribute to area quality of life of communities interested in resource protection. The effects on quality of life from special area designations and management of these attributes on private, state, and other federal land cannot be projected. However, the effects could be the greatest under Alternative C and the least under Alternative A, with the respective most and fewest acres designated among the alternatives (Table 4.6.2-8).

Cumulative Effects to Population. The role BLM plays in the social aspects of the CRVFO impact area may increase along with the population, since the land managed by the BLM sustains area quality of life and will continue to do so under all alternatives, largely through the provision of natural amenities and recreational opportunities. None of the alternatives would alter the trends outlined above, but would sustain aspects of quality of life such as employment, recreation, access, and rural character. While the provision of these resources varies by alternative, these opportunities would be available for a variety of demographic groups, area residents, tourists, and others who value the area.

4.6.3 Environmental Justice

Methods and Assumptions

Executive Order 12898, Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations, requires identifying and addressing disproportionately high and adverse human health and environmental impacts of federal programs, policies, and activities on minority or low-income populations. To evaluate potential environmental justice impacts, guidance obtained from other federal agencies was reviewed, as follows:

- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994, *Federal Register* at 7630.
- US Environmental Protection Agency, Interim Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analysis, Office of Federal Activities, September 30, 1997.
- Council on Environmental Quality, Environmental Justice, Guidance under the National Environmental Policy Act, Executive Office of the President, December 1997.

The following four-step method was used to evaluate potential environmental justice impacts associated with land management actions proposed by the BLM:

1. Identify potential minority or low-income populations within the region of influence.
2. Identify a broad range of potential environmental and human health effects that could affect minority or low-income populations, including safety, traffic, exposure to hazardous materials, land use, and socioeconomics.
3. Assess whether these potential impacts would disproportionately affect minority and low-income populations.
4. Evaluate mitigation measures that would be used to minimize impacts on minority and low-income populations.

Relevant Bureau of the Census data for counties within the planning area, including Eagle, Routt, Garfield, Mesa, and Pitkin, as well as for the State of Colorado, were collected for this analysis, as follows:

- Total population.
- Percentage of the population with minority status (e.g., Black or African American, Hispanic or Latino, Asian American, American Indian or Alaskan Native, and Native Hawaiian and other Pacific Islander).
- Percentage of the population with low-income status, using annual statistical thresholds from the Bureau of the Census Current Population Reports.
- Percentage of the population with minority status in the entire State of Colorado.
- Percentage of the population with low-income status in the entire State of Colorado, using annual statistical thresholds from the Bureau of the Census Current Population Reports.

Environmental Consequences

Impacts on environmental justice populations could result from some of the actions proposed under other resources and uses. Programs not addressed below were deemed to have no, or only negligible, impacts on environmental justice populations under any of the four alternatives. Impacts predominately are associated with programs related to fluid minerals management and recreation and visitor services management.

Alternative A

No proposed management actions that would directly affect minority and low-income populations are incorporated into this alternative or any other alternative. However, the proposed management actions could indirectly affect the minority or low-income population's quality of life by potentially affecting local housing markets or increasing health and safety risks to children or other environmental justice populations. However, there is no evidence to suggest that minority or low-income populations would be disproportionately affected by these indirect effects. If these effects were to occur, they would probably affect all segments of the area population. Indirect impacts that would result from the proposed management actions could also benefit minority and low-income populations, such as secondary employment that could be generated by increased recreation expenditures in the regional economy or by increased oil and gas and energy development. In general, this type of employment occurs in services and retailing industries (Colorado Division of Local Government 2005), which typically employ lower income households.

Under all alternatives, oil and gas development would increase the potential for exposure to the hazardous chemicals involved in oil and gas extraction. Further, the increased traffic congestion, noise, and dust associated with oil and gas operations would be likely to adversely affect the quality of life of populations closest to oil and gas development, some of which would be considered low-income or minority populations. Environmental justice populations also could be affected by oil and gas development to the extent that there could be an influx of transient workers, who might increase the pressure on the market for affordable housing (Headwaters Economics 2008) in some areas such as Garfield County, where housing vacancies are low and concentrated BLM oil and gas activity is likely. A decrease in housing availability could disproportionately affect low-income families if housing costs (such as property taxes and rents) rise as a share of their income more than the share of the rest of the population. In addition, travel time to work for low-income families could increase if they are displaced as a result of increased costs of housing. Consequently, disproportionate effects on environmental justice populations are possible. These effects are contingent on oil and gas activity and its effect on housing markets, which cannot be accurately projected.

Changes to employment levels identified in Section 4.6.2 Social and Economic Conditions, could affect low-income and minority populations by providing additional employment opportunities. As depicted in that section's Table 4.6.2-5, much of the employment under the alternatives would be generated in the service and retail related sectors (Accommodation & Food Services, Retail Trade, Transportation & Warehousing), which typically provide lower paying jobs that employ members of low-income households. As a share of total employment provided by the alternatives, the construction sector would provide the most employment (Table 4.6.2-5).

Oil and gas development would contribute employment and income to the CRVFO planning area workforce, including low-income and minority populations. While direct employment in the minerals sector, could be taken up by a specialized temporary workforce that would reside in the area only for as long as their skills were required, additional indirect and induced employment would be supported in other industries by the oil and gas related activity on BLM lands.

An increase in the oil and gas workforce could also increase the demand for affordable housing in Garfield County, where housing vacancies are low and concentrated BLM oil and gas activity is likely. A decrease in housing availability could disproportionately affect low-income families if housing costs (such as property taxes and rents) rise as a share of their income more than the rest of the population. In addition, travel time to work for low-income families could increase if they are displaced as a result of increased costs of housing. Consequently, disparate effects on environmental justice populations are possible. These effects are contingent on oil and gas activity and its effect on housing markets, which cannot be accurately projected.

Although additional drilling could have health effects associated with exposure to the hazardous chemicals involved in oil and gas extraction, these effects would be distributed among all segment of the population. Consequently, there is no evidence to suggest that minority or low-income populations would be disproportionately affected by the potential health effects.

Alternative B (Proposed RMP), Alternative C, and Alternative D

Impacts on environmental justice populations would be similar to or the same as those under Alternative A. There is no evidence to suggest that minority or low-income populations would be disproportionately affected by decisions in these alternatives.

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 planning area is not irreversible or irretrievable; however, committed actions that consume PSD increments would use up available PSD increments for other proposed sources. For this Final EIS, there are no actions by BLM that would require PSD permitting.

Soil erosion, loss of productivity, and soil structure might be considered an irreversible commitment of resources. Although new soil can develop, soil development is a slow process. Surface-disturbing activities that remove too much vegetation would accelerate erosion that would contribute to irreversible soil loss. However, if management actions and BMPs are applied to surface-disturbing activities, the magnitude of these impacts would be greatly reduced. Rehabilitation and reclamation would restore most all of the soil and vegetation lost.

Also, surface-disturbing activities could impact areas of high cultural sensitivity or areas containing vertebrate or scientifically significant fossil resources. Such destruction of paleontological and cultural resources could be irreversible and irretrievable.

Surface disturbing activities such as construction of roads, utility corridors, various mining operations, and fuels treatment projects, as well as construction of facilities, whether associated with developed recreation, livestock grazing, mineral development, or other activities, generally contribute to increased visual obtrusions on the landscape. Although the BLM gives greater emphasis to visual resources through management of the VRM classification system, these types of activities constitute a commitment for the given use for the duration that the infrastructure and facilities exist. When these various uses cease, reclamation efforts could generally restore visual resources to at least their current quality.

Fire suppression has led to the accumulation of fuels and makes these forests more susceptible to stand-replacing fires. The loss of forest products from stand-replacing fires is considered an irreversible, and in some instances, irretrievable commitment of resources if an extremely hot fire burns over a long time. Also, if aspen continues to decline in the lands managed by CRVFO, the species could become rare to non-existent in some watersheds and might not be able to be restored.

The extraction and development of nonrenewable fossil fuels (e.g., oil, gas, and coal), locatable minerals, and mineral materials would occur from development over the next 20 years. The impacts would be irretrievable and irreversible because, once extracted, the mineral resource cannot be used again, nor can it be replaced in the foreseeable future. BLM Handbook H-1624-1, "Planning for Fluid Mineral Resources," acknowledges leasing of oil and gas resources as an irreversible commitment.

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 lands within the planning area.

Land management directed at meeting non-market values (e.g., social and ecological values, resource protection, recreation settings and experiences) may decreases resource development opportunities and outputs (e.g., right-of-way avoidance areas, closed to salable mineral development).

Activities planned would produce some level of air emissions even with mitigation; however, none of the activities proposed in this Final EIS would produce adverse impacts on the air quality resource.

Surface-disturbing 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, mineral and energy development, or OHV use, would increase erosion and decrease 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. Areas of high oil and gas potential also coincide with critical habitat of special status species fish and fish-bearing streams within the planning area. Unavoidable adverse impacts on fish and other aquatic wildlife would occur through erosion and sedimentation. These activities would also introduce intrusions, which could affect the visual landscape.

Unavoidable water quality impacts would include temporary increases in suspended loads in flowing streams as a result of culvert installation, vehicle use at low-water crossings, livestock use of streambanks and wetlands, and permitted channel fills resulting from construction of oil and gas pads, roads, and pipelines. Water quantity would be reduced by such activities as water withdrawals for livestock use, oil and gas resource development, and watering of roads for dust mitigation.

Unavoidable soil impacts would occur from activities associated with oil and gas development, including compaction from increased vehicle traffic displacement of soils from the construction pipelines and roads, and erosion.

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 on 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 on the resource.

Wildlife and livestock 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 planning area would affect livestock and wildlife. Some level of competition for forage among the species, although mitigated to the extent possible, would be unavoidable. Instances of displacement, harassment, and injury could also occur.

Recreational activities, development of energy and mineral resources, and general use of the planning area would introduce additional potential ignition sources into the planning area, which would increase the probability of human caused fires 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.

Increases in recreation use of BLM lands could create unavoidable conflicts between recreation activity types sharing the same BLM lands. In areas where non-recreational land use activities occur there is a potential to displaced visitors. As recreation use increases, conflicts between recreational use and natural resources management could also occur.

Numerous land use restrictions imposed to protect sensitive resources and other important values, by their nature, affect the ability of operators, individuals, and groups who use the BLM 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 by 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.

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 continued.

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 by removing components of these habitats 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. Long-term productivity, survivorship, and health could be impaired by the long-term use of big game winter range, birthing areas, and migratory corridors, and by long-term use activities located near water bodies containing special status species, for energy and minerals, ROWs, and cross-country OHV use. This could occur by displacing animals in areas permanently open to recreational uses and areas permanently altered. Actions associated with specific leases lasting longer than 5 years, but within the life of this RMP, could affect the long-term sustainability of special status species known to occur in the planning area.

Across all alternatives, the use of management prescriptions, stipulations, COAs, and BMPs are intended to minimize the effects of short-term or long-term land uses.