United States
Department of
Agriculture

Forest Service

Colorado
National Forests

May 2012

Rulemaking for Colorado Roadless Areas

Volume II

Final Environmental Impact Statement

Colorado national forests with roadless areas include:
Arapaho and Roosevelt; Grand Mesa, Uncompahgre, and Gunnison; Manti-La Sal (portion in Colorado); Pike and San Isabel; Rio Grande; Routt; San Juan; and White River National Forests

Commonly Used Acronyms

AR – Arapaho Roosevelt National Forests
BLM – Bureau of Land Management
CDNST – Continental Divide National Scenic Trail
CDPA – Congressional Designated Protection Area
CDPW – Colorado Division of Parks and Wildlife
CFR – Code of Federal Regulations
CFS – Colorado State Forest Service
CPZs – Community Protection Zones
CRAs – Colorado Roadless Areas
CWPP – Community Wildfire Protection Plan
DEIS – Draft Environmental Impact Statement
DNR – Department of Natural Resources
ESA – Endangered Species Act
FEIS – Final Environmental Impact Statement
FR – Federal Register
FSM – Forest Service Manual
GMUG – Grand Mesa, Uncompahgre, and Gunnison National Forest
IRAs– Inventoried Roadless Areas
LCZs – Linear Construction Zones
MIS – Management Indicator Species
NEPA – National Environmental Policy Act
NFMA – National Forest Management Act
NFS – National Forest System
NSO – No Surface Occupancy
OHV – Off Highway Vehicle
PSI – Pike San Isabel National Forests
RDEIS – Revised Draft Environmental Impact Statement
RFD – Regional Forester Determination
RFD(s) – Reasonable Foreseeable Development Scenarios
RG – Rio Grande National Forest
SJ – San Juan National Forest
TEPS – Threatened, Endangered, Proposed and Sensitive Species
USDA – United States Department of Agriculture
USDI – United States Department of Interior
USFWS – U.S. Fish and Wildlife Service
WR – White River National Forest

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Final Environmental Impact Statement

Lead Agency: USDA Forest Service

Cooperating Agency: State of Colorado

Responsible Official: Secretary of Agriculture

For Information, Contact:
Ken Tu
USDA Forest Service
Colorado Roadless Rule
(303) 275 – 5156
www.roadless.fs.fed.us

Abstract:

The U.S. Department of Agriculture, Forest Service, in cooperation with the State of Colorado, proposes to promulgate a state-specific rule to manage and conserve roadless area characteristics on approximately 4.2 million acres of National Forest System (NFS) lands in Colorado. The proposal responds to a recognized need to balance local, State, and national interests in providing management direction for Colorado roadless areas. This Environmental Impact Statement (EIS) analyzes and displays expected physical, biological, and social-economic consequences of four alternatives. Alternative 1 (the 2001 Roadless Rule) is the No Action Alternative, and would not establish a state-specific roadless rule for Colorado. Alternative 1 would continue management of the roadless areas on NFS lands under the 2001 Roadless Rule. Alternative 2 (proposed Colorado Roadless Rule), would establish a contemporary state-specific roadless rule for Colorado that would establish prohibitions on activities in roadless areas, while allowing management options for wildlife protection, local economic interests, and other activities important to the State of Colorado. In addition, Alternative 2 designates 1,219,200 acres of roadless areas as upper tier areas, which are subject to additional management restrictions. Alternative 3 (provisions of the Forest Plans) would establish a state-specific roadless rule for Colorado that would exempt roadless areas on NFS lands in Colorado from the 2001 Roadless Rule. Alternative 4 (provisions of Alternative 2 with public proposed upper tier) would establish a state-specific roadless rule for Colorado with the same provisions as Alternative 2, but would include 2,614,200 acres designated as upper tier.

Contents

Chapter 1 Purpose of and Need for Action

The Forest Service has prepared this environmental impact statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal laws and regulations. This EIS discloses the potential environmental consequences that may result from the proposed action and alternatives.

Document Structure

This EIS document is organized into an executive summary (volume I) and Final Environmental Impact Statement (FEIS) (volume II), followed by appendices (volume III) and related documentation:

- **Chapter 1: Purpose of and Need for Action.** Chapter 1 presents the background information, purpose and need, and summary of the proposed action. This chapter also summarizes how the Forest Service informed and involved the public.
- **Chapter 2: Alternatives, Including the Proposed Action.** Chapter 2 describes the proposed action and alternatives to the proposal, including the no-action alternative. This chapter ends with two summary tables: one displays the features of alternatives considered in detail, and the other shows the environmental consequences associated with each alternative.
- **Chapter 3: Affected Environment and Environmental Consequences.** Chapter 3 describes the resources that could be affected by the proposed action or alternatives, as well as the potential environmental consequences that could result from each alternative.
- **Chapter 4: Preparers and EIS Distribution.** Chapter 4 provides a list of preparers and a list of agencies, organizations, and persons to whom copies of the statement are sent.
- **Chapter 5: References Cited.** Chapter 5 contains an alphabetized list of references used in the preparation of this EIS.
- **Index.** The index provides page numbers for finding key topics in the EIS.
- **Appendices:** The appendices are found in Volume III, and provide supplemental information for the information in the FEIS. These appendices contain the following information:
  - *Appendix A, Comparison of CRAs to IRAs:* Explains the difference between IRAs and CRAs, and provides tables showing the differences in acreage between the two.
  - *Appendix B, Upper Tier Acres for Alternatives 2 and 4:* Provides tables comparing the acreage for upper tier acres identified in the two alternatives.
  - *Appendix C, Forest Plan Management Direction in Roadless Areas:* Explains the management direction and decision-making process for the forest plans (Alternative 3).
  - *Appendix D, Ski Areas within Roadless Areas:* Provides maps of the major ski areas in Colorado, showing the roadless areas near each.
  - *Appendix E, Maps of Demographics in Colorado:* Provides spatial information for demographic data in Colorado.
  - *Appendix F, Temporary Road Requirements for Alternatives 2 and 3:* Provides the text of the Forest Service requirements for temporary roads.

- *Appendix G, Biological Assessment:* Provides the complete text of the biological assessment report, which is the basis for the analysis in Chapter 3 of the FEIS.
- *Appendix H, Response to Comments:* Lists public comments and responses by category.
- *Appendix I, Text of the 2001 Roadless Rule:* Provides the complete text of the 2001 Roadless Rule.

Additional supporting documents for this EIS are found in the EIS record, which is located at the Forest Service's Rocky Mountain Regional Office, 740 Simms Street, Lakewood, Colorado. Some supporting documents, including Colorado Roadless Area (CRA) profiles and national forest maps showing roadless area locations, are available on the Internet at www.fs.usda.gov/goto/coroadlessrule.

Background

The Forest Service administers approximately 14,520,000 acres of public lands in Colorado, which are distributed among eight national forests and two national grasslands. These national forests and grasslands are characterized by a diverse array of landscapes, ecosystems, natural resources, and land use activities. Management of each national forest and grassland is directed by a forest plan, along with numerous land management laws, regulations, policies, and agency directives. Laws and regulations take precedence over management direction in the forest plans, if conflicts exist. There are no roadless areas on the two national grasslands in the state.

In January 2001, the Roadless Area Conservation Rule (2001 Roadless Rule) was adopted into regulations at Title 36 of the Code of Federal Regulations Part 294 (36 CFR 294), Subpart B (66 FR 3244). The 2001 Roadless Rule identified approximately 4.43 million acres, or about 31 percent, of the National Forest System (NFS) lands in Colorado, as "inventoried roadless areas" (IRAs), based on the existing inventories of roadless areas (Maps are available on the Internet at www.fs.usda.gov/goto/coroadlessrule). The IRAs contained generally undeveloped areas that were typically 5,000 acres or greater in size. They could be smaller if they were adjacent to Congressionally designated wilderness. As shown in Table 1-1, inventories for four national forests were conducted in 1979. The other four national forest inventories were finalized in 1996, 1997, 1998, and 2002, when forest plans were revised. The 2001 Roadless Rule applies nationwide (except Idaho) and incorporates these inventories, conducted from 1979 to 2002. It provides management direction for 49.2 million acres[1] of national forests (about 30% of total national forest lands) by prohibiting road construction and reconstruction and timber cutting, sale, or removal in IRAs, with certain exceptions.

Since its promulgation, the 2001 Roadless Rule has been through extensive litigation. In response to a court ruling, the State Petitions Rule was promulgated in May 2005; wherein governors had until November 13, 2006 to petition the Secretary of Agriculture to propose state-specific direction for managing roadless areas within their state. Ongoing uncertainty about the future of the 2001 Roadless Rule was a key factor that influenced Colorado Governor Bill Owens to initiate a state-specific petition to manage roadless areas in Colorado in 2005. The Colorado State Legislature passed Senate Bill 05-243 (C.R.S. 36-7-302) to form a 13-person, bipartisan task force to recommend management direction of roadless areas in Colorado. This task force was informed by a comprehensive public

[1] *Approximately 9.3 million acres of roadless areas in Alaska's Tongass National Forest was exempted from the 2001 Roadless Rule until the District Court for the District of Alaska vacated the exemption in March 2011. Therefore, the 2001 Roadless Rule applied to 49.2 million acres of NFS land when it was promulgated.*

participation process that included nine public meetings throughout Colorado. The task force received more than 40,000 comments regarding development of a formal petition to the Secretary of Agriculture for a state-based, roadless rule.

On September 20, 2006, the United States District Court for the Northern District of California set aside the 2005 State Petition Rule and reinstated the 2001 Roadless Rule. However, the Forest Service determined that new regulations based on state petitions could be developed under the Administrative Procedures Act. In November 2006, Colorado Governor Bill Owens used the task force's recommendations as the basis for petitioning the Secretary of Agriculture to undertake state-specific roadless rulemaking for Colorado. The State's petition was considered for rulemaking by the Secretary of Agriculture, in accordance with the Administrative Procedures Act, section 553(e) and the U.S. Department of Agriculture's (Department) rulemaking procedures in 7 CFR 1.28.

After Governor Bill Owens submitted the State's petition to the Department, Bill Ritter, Jr. was elected Governor of Colorado. In April 2007, Governor Ritter resubmitted the petition with minor modifications. The State's petition requested the rulemaking process do the following:

- Update roadless area boundaries to include additional roadless areas.
- Exclude Congressionally designated lands and private lands.
- Exclude roadless acres that have been substantially altered.

In June 2007, the State and the Forest Service presented this petition to the Department's Roadless Area Conservation National Advisory Committee (RACNAC). Based on the advisory committee's review and report (USDA RACNAC 2007a), the Secretary of Agriculture accepted the State's petition in August 2007. The Secretary of Agriculture directed the Forest Service to work in cooperation with the State of Colorado to initiate rulemaking. In January 2008, the Forest Service granted cooperating agency status to the State of Colorado. The Forest Service published a proposed rule and Draft Environmental Impact Statement (DEIS) to establish direction for conserving roadless areas on NFS land in Colorado on July 25, 2008 (73 FR 43544). The no-action alternative considered in that DEIS assumed the 2001 Roadless Rule would remain in effect in Colorado if a state-specific rule was not adopted.

However, the no-action alternative was impacted by further litigation developments. In August 2008, after the DEIS was released, the Wyoming District Court set aside and enjoined the 2001 Roadless Rule. Thus, the assumption that the 2001 Roadless Rule would remain in effect in Colorado absent a state-specific rule changed. Accordingly, the February 2011 Revised DEIS (RDEIS) evaluated continued management under existing forest plans as the likely scenario in the event that no state-specific rule was adopted (the so called no-action alternative).

In response to the proposed rule and DEIS, the Department, State, and Forest Service repeatedly heard public comment requesting changes to the proposed exceptions for road construction and tree cutting. Based on the public comments, the State asked the USDA to postpone further rulemaking efforts until the State considered revision of its petition.

The State revised their petition and held a comment period from August 3 to October 3, 2009. The State received approximately 22,000 comments, most of which were form letters. The result was a revised petition submitted to the Secretary of Agriculture on April 6, 2010. Based on the April 6, 2010 petition, the State and the Forest Service developed regulatory language for a proposed

Colorado Roadless Rule (proposed rule) that would govern management of roadless areas on NFS lands in Colorado. Because of the changes in the proposed rule, the Secretary of Agriculture initiated another public comment period on the revised proposed rule and the RDEIS. The revised proposed rule and RDEIS were published in April 15, 2011 and public comments were accepted on the proposal until July 14, 2011; about 56,000 comments were received. This FEIS considers all of the approximately 312,000 comments received throughout the analysis process.

The legal status quo was changed again by ongoing litigation on October 21, 2011, when the Tenth Circuit reversed the District Court's decision and remanded the case back the District Court to vacate the permanent injunction. The Tenth Circuit has since issued a mandate effectuating the October 21, 2011 opinion and requiring the injunction of the 2001 Roadless Rule to be vacated. Currently, the 2001 Roadless Rule is in effect nationwide, except in Idaho, which has its own state-specific roadless rule.

Roadless Area Characteristics

Nine roadless area characteristics were identified in the 2001 Roadless Rule preamble (66 FR 3245). They are resources or features that are often present in, or characterize roadless areas. These nine roadless area characteristics are described for Colorado:

- **High quality or undisturbed soil, water, or air**. These three key resources are the foundation upon which other resource values and outputs depend. Healthy watersheds provide clean water for domestic, agricultural, and industrial uses; help maintain abundant and healthy fish and wildlife populations; and are the basis for many forms of outdoor recreation.
- **Sources of public drinking water.** National forests contain watersheds that are important sources of public drinking water. Careful management of these watersheds is crucial in maintaining the flow of clean water to a growing population.
- **Diversity of plant and animal communities**. Roadless areas are more likely than roaded areas to support greater ecosystem health, including a diversity of native and desired non-native plant and animal communities, due to the absence of disturbances caused by roads and accompanying activities. Roadless areas also may conserve native biodiversity by serving as a bulwark against the spread of nonnative invasive species.
- **Habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land.** Roadless areas function as biological strongholds and refuges for many species, including terrestrial and aquatic plant and animal species. Many of the nation's species currently listed as threatened, endangered, or proposed for listing under the Endangered Species Act, and those listed by the Forest Service as sensitive, might have habitat within roadless areas.
- **Primitive, semi-primitive, non-motorized, and semi-primitive, motorized classes of dispersed recreation.** These types of dispersed recreation often occur in roadless areas, providing opportunities for hiking, camping, wildlife viewing, hunting, fishing, and cross-country skiing. Although roadless areas with these recreation opportunities could have many wilderness-like attributes, they often allow the use of mountain bikes and other mechanized and motorized means of travel, in contrast to designated wilderness areas. Primitive, semi-primitive non-motorized, and semi-primitive motorized areas can also take pressure off heavily used

wilderness areas by providing additional solitude and quiet, and dispersed recreation opportunities.

- **Reference landscapes.** The body of knowledge about the effects of management activities over long periods of time and on large landscapes is very limited. Reference landscapes can provide comparison areas for evaluation and monitoring. These areas provide a natural setting that may be useful as a comparison to study the effects of more intensely managed areas.
- **Natural-appearing landscapes with high scenic quality.** High quality scenery, especially scenery with natural-appearing landscapes, is a primary reason that people choose to recreate in or around an area. Quality scenery contributes directly to real estate values in neighboring communities and residential areas.
- **Traditional cultural properties and sacred sites**. Roadless areas may contain traditional cultural properties and sacred sites. Traditional cultural properties are places, sites, structures, districts, or objects that are historically significant in the beliefs, customs, and practices of a community. Sacred sites are places that are determined sacred by virtue of their established religious significance to or ceremonial use by a Native American religion. Federal agencies are to accommodate access to and ceremonial use of Native American sacred sites by Native American religious practitioners, and are to avoid adversely affecting traditional cultural properties and sacred sites, when practicable.
- **Other locally identified unique characteristics.** Roadless areas can offer unique characteristics that are not covered by the other categories. Examples include uncommon geological formations, which are valued for their scientific and scenic qualities, or unique wetland complexes. Unique social, cultural, or historical characteristics could depend on the roadless character of the landscape. Examples include places for local events, areas prized for collection of non-timber forest products, or exceptional hunting and fishing opportunities.

Purpose of and Need for Action

The Department, the Forest Service, and the State of Colorado agree that a need exists to provide management direction for conserving roadless area characteristics within roadless areas in Colorado. In its petition to the Secretary of Agriculture, the State of Colorado indicated a need to develop state-specific regulations for the management of Colorado's roadless areas for the following reasons:

- Roadless areas are important because they are, among other things, sources of drinking water, important fish and wildlife habitat, semi-primitive or primitive recreation areas, including motorized and non-motorized recreation opportunities, and naturally appearing landscapes. A need exists to provide for the conservation and management of roadless area characteristics.
- The Department, the Forest Service, and the State of Colorado recognize that timber cutting, sale, or removal and road construction/reconstruction have the greatest likelihood of altering and fragmenting landscapes, resulting in immediate, long-term loss of roadless area characteristics. Therefore, there is a need to generally prohibit these activities in roadless areas. Some have argued that linear construction zones (LCZs) also need to be restricted.
- A need exists to accommodate state-specific situations and concerns in Colorado's roadless areas. These include the following:
  - reducing the risk of wildfire to communities and municipal water supply systems

- facilitating exploration and development of coal resources in the North Fork coal mining area
- permitting construction and maintenance of water conveyance structures
- restricting LCZs, while permitting access to current and future electrical power lines
- accommodating existing permitted or allocated ski areas

- There is a need to ensure that CRAs are accurately mapped.

Proposed Action

The Department, in cooperation with the State of Colorado, proposes to promulgate a state-specific rule to manage roadless areas and to conserve roadless area characteristics on NFS lands in Colorado. The proposed rule would establish a system of CRAs with management direction to conserve roadless area characteristics. These areas would replace the IRAs for national forests in Colorado. The proposed rule conserves roadless area characteristics by prohibiting tree cutting, sale, or removal; road construction and reconstruction; and LCZs, with some limited exceptions.

In addition, the proposed rule establishes a system of upper tier acres within CRAs where additional restrictions apply, further limiting exceptions to the prohibitions. Chapter 2 describes these concepts in more detail.

The proposed CRAs encompass approximately 4.19 million acres of NFS land in Colorado, distributed among 363 separate roadless areas (Appendix A). The proposed rule provides for future adjustments to be made to CRA boundaries (Map Packet, Map 3), subject to a public review and comment period, and applicable NEPA or other requirements. In addition, the proposed rule provides for administrative corrections (defined as adjustments to remedy clerical and mapping errors) to upper tier boundaries, subject to a public review and comment period.

The proposed rule adjusted roadless area boundaries from the 2001 inventory in the following ways:

- correcting mapping errors that primarily resulted from improvements in inventory data and mapping technology
- excluding private land
- excluding land substantially altered by road construction and timber harvest activities
- excluding ski areas under permit or lands allocated in forest plans to ski area development
- excluding Congressionally designated lands, such as wilderness and other designations, that take legal precedence over roadless area regulations
- including unroaded areas outside IRAs that contain roadless area characteristics.

Official CRA and upper tier locations are contained in a set of maps at the Forest Service national headquarters. The Forest Service national headquarters office would maintain the official map of CRAs, including records of adjustments to such maps, pursuant to the final proposed rule. These maps will be available to the public.

Scope and Applicability

Scope is the extent of actions and impacts which are considered relevant in this EIS. Applicability is the lands subject to this EIS. This section explains what is, and is not included, in this EIS, and defines which lands are affected by the proposed rule.

Scope of the EIS

The scope of this EIS consists of the range of actions, alternatives, and impacts that are considered relevant to the proposed action. The proposed action is geographically limited to proposed CRAs and existing IRAs, or the "analysis area" within the State of Colorado (see Chapter 3 for a further discussion of the analysis area). The proposed action is primarily focused on the prohibitions and exceptions for tree cutting, sale, or removal; road construction and reconstruction; and LCZs within roadless areas. The proposed rule would not suspend, revoke, or modify land-use permits, contracts, or other legal instruments issued before the effective date of the proposed rule.

The proposed rule is programmatic and is intended to guide development of future site-specific actions within CRAs. This proposed rule would not authorize implementing any ground-disturbing activities, but rather it describes exceptions under which certain activities might be allowed within roadless areas. Before authorizing a land-use activity in roadless areas, the Forest Service must complete a more detailed and site-specific environmental analysis, pursuant to the NEPA and its implementing regulations. When a specific project or activity is proposed on NFS land, site-specific effects are analyzed and decisions are made regarding specific projects and other activities.

Applicability

The lands subject to this rulemaking are NFS lands in Colorado that contain roadless areas under any of the alternatives. Eight national forest administrative units in Colorado are subject to this rulemaking EIS (see Table 1-1). The table provides information about each national forest administrative unit and the date of its last approved forest plan.

Table 1-1. *National Forest Administrative Units in Colorado & Forest Plan Approval Date*

National Forests in Colorado	*Date of Approved Forest Plan*
Arapaho-Roosevelt National Forests	1997
Grand Mesa, Uncompahgre, and Gunnison National Forests	1983
Manti-La Sal National Forest	1986
Pike-San Isabel National Forests	1984
Rio Grande National Forest	1996
Routt National Forest	1998
San Juan National Forest[1]	1983
White River National Forest	2002

1) Revision in progress; draft revised plan 2007

The proposed rule, like other regulations, would work in conjunction with forest plan direction. Thus, tree cutting, sale, or removal; road construction or reconstruction; and/or use of LCZs would be prohibited in roadless areas, unless they meet specific exceptions described in the proposed rule. However, for the exception to apply, the activities must still comply with applicable standards and guidelines identified in forest land management plans.

Incorporation by Reference

In order to focus on the issues and streamline this FEIS, the following documents are incorporated by reference:

- The Land and Resource Management Plans (forest plans) and accompanying environmental impact statements for the Arapaho and Roosevelt; Grand Mesa, Uncompahgre and Gunnison (GMUG); Manti-La Sal; Pike-San Isabel; Rio Grande; Routt; San Juan National Forest; and White River National Forests.
- Forest Service Roadless Area Conservation Final Environmental Impact Statement.
- The project record for this EIS, including specialists' reports used to complete this document.
- The previous proposed actions, as described in the multiple petitions and DEIS, which have evolved incrementally into the current Alternative 2 as provided by 36 CFR 220.5(e)(1).

Decision Framework

The Secretary of Agriculture will decide whether to promulgate the proposed rule as proposed, one of the other alternatives, or a combination of the alternatives analyzed in this EIS. Promulgation of a rule involves establishing regulations, which would be issued under 36 CFR Part 294 Subpart D. The decision to be made involves a choice among the four alternatives analyzed in detail in this EIS, which means determining whether to do one of the following:

1. Take no action. No state-specific roadless rule would be promulgated. Inventoried roadless areas (IRAs) in Colorado would be managed according to the 2001 Roadless Rule (Alternative 1).
2. Promulgate a state-specific rule to manage Colorado's CRAs based on the State's petition (Alternative 2) with portions of the CRAs identified as CRA upper tier acres.
3. Promulgate a state-specific roadless rule to exempt Colorado from the 2001 Roadless Rule. IRAs and CRAs in Colorado would be managed in accordance with provisions of the forest plans in the eight national forests (Alternative 3).
4. Promulgate a state-specific rule to manage Colorado's CRAs, based on the State's petition with portions of, or entire CRAs, identified as CRA upper tier acres different from those identified under Alternative 2 (Alternative 4).
5. Some combination of the provisions and inventories in the above four alternatives.

Public Involvement

The Forest Service and the State of Colorado have solicited public involvement and comments on the development of a proposed rule. Between the Forest Service and State efforts, five formal public involvement processes have occurred. These processes have resulted in approximately 312,000 public comments. Public involvement efforts of the Forest Service and the State of Colorado included the following:

- Senate Bill 05–243, which was signed into Colorado law on June 8, 2005, created and identified a 13-member, bipartisan task force. The task force held nine public meetings throughout the State, held six deliberative meetings that were open to the public, and reviewed and considered over 40,000 public comments.

- On December 27, 2007, the Forest Service published a notice of intent in the Federal Register to prepare an EIS on roadless area conservation on NFS lands in Colorado (72 FR 72982). The Forest Service also solicited comments from interested parties on the notice of intent from December 27, 2007 through February 25, 2008. Approximately 88,000 comments were received.
- On July 25, 2008, the Forest Service published a proposed rule to establish state-specific management direction for conserving roadless areas in Colorado (73 FR 43544). A notice of availability for the DEIS was published in the Federal Register (73 FR 44991). The availability of the regulatory risk assessment for the proposed rule was published in the Federal Register on September 18, 2008 (73 FR 54125). Nine public meetings were held in Washington, DC and throughout Colorado. All comment periods closed on October 23, 2008. In total, approximately 106,000 comments were received.
- The State of Colorado held a comment period from August 3 to October 3, 2009 on a State-modified version of the July 2008 proposed rule. Approximately 22,000 comments were received.
- On April 15, 2011, the Forest Service published a revised proposed rule (76 FR 21272). A notice of availability for the Revised DEIS was published in the Federal Register (76 FR 24021) on April 29, 2011. Nine public meetings were held around the State and in Washington D.C. during the comment period. Comment periods closed on July 14, 2011. Approximately 56,000 comments were received.

In addition to the five formal comment periods, the Forest Service and State participated in RACNAC meetings in Washington, D.C. in June of 2007, and January, July, and November of 2008. Also, a RACNAC meeting was held in Salt Lake City, Utah in October 2008. Public comments were accepted at these meetings, which helped the RACNAC develop its December 5, 2008 recommendations to the Secretary of Agriculture.

Tribal Consultation

Two resident Tribes live in Colorado, Ute Mountain Ute and Southern Ute, who retain some of their traditional land base as reservations. These two tribes retain specific hunting rights and other aboriginal rights throughout their traditional territory, including portions of the roadless areas in Colorado. Over a dozen other tribes located outside Colorado maintain tribal interests, including aboriginal and ceded territories, and inherent aboriginal rights within Colorado. In 1874, Congress approved an agreement between the United States and certain Ute Tribes in Colorado, known as the "Brunot Agreement". Under this agreement, the Utes ceded certain land to the United States, but reserved a right to hunt on those lands. These lands are primarily on the San Juan National Forest.

The Forest Service has consulted with Colorado-affiliated Tribes regarding this proposed rulemaking action and analysis process. Information on the proposed Colorado Roadless Rule was provided to the Ute Mountain Ute and Southern Ute Indian Tribes before the release of the Notice of Intent (NOI). The San Juan National Forest staff held meetings with both Tribes to discuss the proposed rule, as well as other Forest issues. In addition, an introductory letter and the NOI, along with background information on the proposed Colorado Roadless Rule and an offer for additional information or meetings, was sent to 25 Tribes based on their current proximity to Colorado, their current use of lands in Colorado, and their historic use of lands within Colorado.

The 2008 Proposed Rule and DEIS were sent to each of these Tribes and each was contacted by phone to determine its level of interest in meeting or obtaining information. The Tribes did not request additional government-to-government involvement, and no formal comments from any of the Tribes were received. A letter was sent to each Tribe outlining the key points of this revised proposed rule and the Forest Service met with those Tribes requesting further consultation.

In October 2010, the Forest Service met with Tribal members of the Ute Mountain Utes and Southern Utes to obtain information. In April 2011, the Proposed Rule was sent to 25 Tribes based on their current proximity to Colorado and their current and historic use of lands within Colorado to determine their interest in meeting or obtaining information. Follow-up phone calls were made to each of the 25 Tribes. Additional information was sent to Tribes as requested. The Tribes did not request additional government-to-government involvement, and no formal comments from any of the Tribes were received.

Issues

The NEPA implementing regulations (40 CFR 1501.2) require federal agencies to develop and evaluate alternatives to recommended courses of action in any proposal that involves unresolved conflict concerning alternative uses of available resources. Public involvement was used to identify points of disagreement about the proposed rule and to identify issues to use as a basis for developing and evaluating alternatives.

Comments that support the purpose and need of the proposed action are not listed below as "issues," but are evaluated in this EIS. Alternatives are evaluated for the degree to which they meet the stated purpose and the need to conserve roadless area characteristics within the context of Colorado-specific situations and concerns.

NEPA regulations require the agency to identify and eliminate from detailed study those issues that are not significant or that have been covered by prior environmental review, to narrow the scope of the analysis. Reasons for eliminating issues from detailed study include when the issues are related to the following:

- General opinions or position statements not specific to the proposed action
- Items addressed by other laws, regulations, or policies
- Items not relevant to the potential effects of the proposed action, or otherwise outside the scope of this analysis.

The following issues were eliminated from detailed study in this EIS because they are outside the scope of the decision to be made by the Secretary of Agriculture on the proposed rule relative to other alternatives analyzed in this EIS (refer to sections on Decision Framework and Scope and Applicability of the Rule):

- National Park Service management issues
- General conditions of public lands
- Conditions of roads and facilities on national forests
- Political motivations or integrity of government officials
- Public participation processes or procedures

- Funding priorities and government expenditures
- Alternative energy on national forests
- Wilderness protection or recommendations for wilderness designation
- Motorized vehicle use and routes or other travel management topics
- Access associated with livestock grazing permits and allotment management
- How the proposed rule may set a precedent for managing roadless areas in other states.

The following issues were carried through the analysis process to evaluate differences in the consequences among the alternatives.

- **Potential effects to opportunities for community wildfire protection.** Prohibiting tree cutting, sale, or removal and road construction and reconstruction can influence the effectiveness of efforts to reduce wildfire impacts to communities and water supply systems.
- **Potential loss of roadless area characteristics.** The exceptions, in which tree cutting, sale, or removal; road construction and reconstruction; and LCZs, could result in a loss of roadless area characteristics. However, some of the exceptions (e.g., tree cutting to reduce hazardous fuels to an at-risk community) could prevent a loss of roadless area characteristics.
- **Potential loss of opportunities to explore and develop oil and gas resources.** Prohibiting road construction and reconstruction for oil and gas development in roadless areas that have not been leased before this proposed rule could result in a loss of opportunities to explore and develop these resources in roadless areas.
- **Potential loss of opportunities to explore and develop coal resources outside the North Fork coal mining area.** Prohibiting construction/reconstruction of roads to access coal reserves in areas that have not been leased (before the effective date of rulemaking) and/or are located outside the North Fork coal mining area could result in a loss of opportunities to explore and develop coal resources in roadless areas.
- **Potential loss of opportunity to feasibly transport oil and gas resources using pipelines.** Prohibiting oil and gas pipelines from going through roadless areas from lands outside roadless areas could result in a loss of opportunity to feasibly extract and transport oil and gas resources.
- **Potential reduction in native species diversity.** The exceptions, under which tree cutting, sale, or removal; road construction or reconstruction; use of LCZs; and some other activities might occur in roadless areas under the proposed rule, could affect populations of wildlife, fish, and plants, including the potential for the following:
  - An increase in the prevalence of invasive plants, animals, and other organisms that can out-compete and dominate diverse native plant and animal communities
  - A loss or reduction of wildlife or fish habitat or population viability, resulting from reductions in unfragmented interior habitat, migration corridor connections, and security and quality of habitat for some “at risk" species or important game species
  - A loss or reduction of threatened, endangered, or sensitive plant species habitat or populations
  - A reduction in opportunities to conduct wildlife habitat improvement projects that require tree cuttings, sale and/or removal.

- **Potential reduction in soil and water quality.** Reduced opportunities for fuel treatment projects due to proposed rule prohibitions could result in greater wildfire impacts. Such impacts could adversely affect soil and water quality. However, the exceptions in which tree cutting, sale, or removal; road construction and reconstruction; and LCZs could result in less risk of adverse impacts to soil or water quality.
- **Potential reduction in semi-primitive recreation and related values.** The exceptions in which tree cutting, sale, or removal; road construction or reconstruction; use of LCZs; and some other activities might occur in roadless areas under the proposed rule could reduce semi-primitive recreation opportunities away from the sights and sounds of human activities and built environments, including the potential for the following:
  - reduced opportunities for solitude
  - reduced scenic quality
  - reduced scientific and heritage benefits that might be derived from preserving the undeveloped nature of roadless areas for future generations.
- **Potential reduction in opportunities to efficiently manage public water supplies.** Prohibiting construction/reconstruction of roads to develop and maintain water facilities could impact the quantity and quality of the public water supply and infrastructure. Water facilities are needed to provide reliable year round supplies of water.

Chapter 2 Alternatives, Including the Proposed Action

This chapter describes the four alternatives considered in detail in this final environmental impact statement (FEIS). Maps associated with each alternative are located in the map packet. This chapter also compares alternatives and describes alternatives dismissed from detailed study. The range of alternatives is designed to address the purpose and need, as well as the issues described in Chapter 1.

Each alternative offers a different approach to roadless area management, by providing a different mix of prohibitions on tree cutting, sale, and removal; road construction and reconstruction; use of LCZs; exceptions to prohibitions; and different circumstances for the exceptions. Alternative comparison tables at the end of this chapter summarize the differences in each alternative, as well as differences in the environmental consequences, or effects of each alternative. These comparisons are based on the detailed analysis of environmental consequences contained in Chapter 3.

The following four alternatives are analyzed in detail:

- **Alternative 1: No Action, the 2001 Roadless Area Conservation Rule (2001 Roadless Rule)[2].** This alternative does not establish a state-specific roadless rule for Colorado, and all IRAs[3] in Colorado would be managed according to the 2001 Roadless Rule.
- **Alternative 2: Proposed Action, Preferred Alternative.** This alternative establishes a state-specific roadless rule for Colorado. It modifies Alternative 2 from the DEIS and RDEIS, based on public comments. It is based on the provisions of the 2001 Roadless Rule, but provides prohibitions and specific exceptions relevant to the State of Colorado. There are 1,219,200 acres identified as CRA upper tier under this alternative. Upper tier acres have fewer exceptions to the prohibitions than non-upper tier acres. If this alternative is selected, it would not revoke, suspend, or modify any permit, contract, or other legal instrument authorizing the occupancy and use of NFS lands issued before the date of the final rule. Appendices A and B show acre comparisons between IRAs and CRAs and a listing of the upper tier acres.
- **Alternative 3: Forest Plan Direction.** This alternative establishes a state-specific roadless rule for Colorado that exempts Colorado from the 2001 Roadless Rule. All IRAs and CRAs would be managed according to the provisions of the forest plans. For information purposes, this alternative uses the boundaries of the roadless areas in the most recent forest plans, which are the same IRAs as those used for Alternative 1.
- **Alternative 4: Proposed Rule with Additional Upper Tier Restrictions.** This alternative establishes a state-specific roadless rule for Colorado and provides the same prohibitions and exceptions as Alternative 2. The difference is that 2,614,200 acres are identified as CRAs upper tier acres in this alternative (almost 1.4 million more acres in upper tier than Alternative 2). If this alternative is selected, it would not revoke, suspend, or modify any permit, contract, or other legal instrument authorizing the occupancy and use of NFS lands issued before the date of the final rule.

[2] "2001 Roadless Rule" is described in the Federal Register, January 12, 2001, Vol. 66, No 9, pages 3244 - 3273. The IRA boundaries are those inventoried roadless areas identified in the November 2000 Roadless Area Conservation FEIS.

[3] Congressionally designated acres, as well as mapping errors associated with private lands and Wilderness, have been eliminated from the IRA boundaries.

Alternatives Considered but Eliminated from Detailed Study

NEPA regulations require Federal agencies to explore and evaluate all reasonable alternatives to a proposed action and to briefly discuss the reasons for eliminating alternatives from detailed study (40 CFR 1502.14). The deciding official reviewed and weighed the following alternatives during the analysis process. Therefore, the eliminated alternatives contribute to the range of reasonable alternatives and a reasoned choice, even though they were eliminated from detailed study. The following list describes the alternatives considered but eliminated from detailed study and the reason(s) why these alternatives were eliminated from detailed study:

- **2001 Roadless Rule with CRA boundaries.** This alternative would use the 2001 Roadless Rule provisions from Alternative 1, together with the CRA boundaries from Alternative 2. This option is essentially represented in Alternative 1 because the 2001 Roadless Rule allows for updating IRA maps[4]. In addition, this alternative could be selected as Alternative 1-modified because it falls within the range of the alternatives analyzed in this EIS. This alternative was eliminated from detailed study to eliminate redundancy in the analysis.
- **Increased commercial use.** This alternative would allow for more commercial use, such as increased timber harvesting and mining development. This alternative is represented in Alternative 3, which allows for increased levels of commercial use. Another alternative that allows for more commercial use than Alternative 2, but less than Alternative 3, while meeting the purpose and need of conserving roadless area characteristics and accommodating Colorado specific concerns, would result in differences that cannot be meaningfully analyzed; therefore this alternative was eliminated from detailed study.
- **Reduced road densities.** This alternative would offer reduced road densities, creation of new roadless areas, and more restrictive management than any of the alternatives analyzed in the DEIS or RDEIS. Reducing road densities is outside the scope of this rulemaking and decision framework and is best decided during travel management analysis. In addition, all alternatives allow additions to roadless areas, if needed. Alternatives 2 and 4, in response to public comments, have identified CRAs, or portions of CRAs, that are proposed to be managed as upper tier. Upper tier acres have very limited exceptions to tree cutting and road construction prohibitions. Additional protections would not meet the purpose and need to accommodate state-specific situations and concerns.
- **Proposed Colorado Roadless Rule without upper tier.** This alternative was not analyzed in detail because it is similar to the Proposed Action. It was previously analyzed in 2008, and the differences between the Proposed Action in this FEIS and Alternative 2 in 2008 are not great enough to warrant a separate alternative (i.e. the 2008 Alternative 2 would involve minor changes to the Proposed Action).
- **Proposed Colorado Roadless Rule with a variety of upper tier acreage.** Alternatives with upper tier acreage of 257,000; 743,000; 1,000,000; 1,500,000; 1,750,000; and 2,000,000 acres were considered. The 257,000 acre option was not analyzed in detail because it was based on existing forest plan direction that prohibited road construction, and essentially was represented

[4] In 36 CFR 294.11 Definition for Inventoried Roadless Areas: "Areas identified in a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000, which are held at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps."

in Alternative 2 of the 2008 DEIS. However, two forest plans (San Juan National Forest and GMUG National Forests) are in development and have updated proposed direction. Alternative 2 presented in the RDEIS used this updated proposed direction for a total of 562,200 acres in upper tier. Between draft and final, Alternative 2 was changed to consider 1,219,200 acres of upper tier. Alternative 4 considered 2,614,200 acres of upper tier. All six of these upper tier options fall within the range of the alternatives analyzed in this EIS and were eliminated from detailed study because the intermediate steps were unnecessary to sharply define differences between alternatives.

- **Prohibition of roads on leases issued after the 2001 Roadless Rule was promulgated.** Once leases are issued by the BLM, they grant exclusive rights to drill for, extract, remove and dispose of all the oil and gas from the lease, subject to terms and stipulations made as part of a lease. A regulation cannot unilaterally change the development rights of existing leases, as it would give rise to regulatory taking claims under the Fifth Amendment.

Features Common to All Alternatives

This section describes the features that are common to all alternatives analyzed in detail in this EIS.

Congressional Designations

Nine Congressionally designated areas, such as wilderness areas, overlap portions of IRAs, totaling about 185,000 acres. These areas are excluded from the roadless areas analyzed in this EIS. Those areas are not subject to state-specific rulemaking because statutory provisions supersede rule (regulatory) provisions.

Federal and State Requirements

Management of NFS lands in Colorado are governed by a variety of federal statutes, regulations, executive orders, and the Forest Service directive system (manuals and handbooks). In addition, some state laws and regulations apply on NFS lands within the State. The selection of any of the alternatives in this EIS would not affect the applicability of any federal or state requirements.

Forest Plans

The National Forest Management Act (NFMA) and its implementing regulations at 36 CFR 219, obligate the Forest Service to develop, amend, or revise plans for each national forest. Forest plans provide guidance for management activities on a national forest; including establishing forest-wide management requirements and direction applicable to the entire forest or to specific management areas. When guidance in a forest plan is more restrictive than direction described under the alternatives, actions must be consistent with the more restrictive direction. For example, if a forest plan standard prohibits road construction where it is allowed under a roadless rule alternative, road construction cannot occur.

None of the alternatives compel the Forest Service to amend or revise any forest plan. In addition, none of the alternatives limit the authority of a responsible official to amend or revise a forest plan. However, a responsible official would not be able to modify or reduce the restrictions of the adopted rule through a forest plan amendment or revision.

Project-Specific Environmental Analysis

None of the alternatives authorize any projects or other ground-disturbing activities to occur. Specific projects that include proposals for tree cutting, road construction and reconstruction, or LCZs must undergo site-specific environmental analysis required by NEPA.

Reserved and Outstanding Rights

Under all alternatives, the reasonable exercise of reserved or outstanding rights for access, occupancy, and use of NFS lands within roadless areas would not be affected. The rights include those that exist by law, by treaty, or by other authority. They include, but are not limited to, the right to provide reasonable access across NFS lands for access to private property, mining claims for locatable minerals under the 1872 Mining Law, and land uses protected by Native American treaty rights.

In 1874, Congress approved an agreement between the United States and certain Ute Tribes in Colorado, known as the "Brunot Agreement." Under this agreement, the Utes ceded certain land to the United States but reserved a right to hunt and gather on those lands. The lands are primarily on the San Juan National Forest. (Map 7 in the Map Packet displays the Brunot Agreement lands.)

Existing Land Use Authorizations

"Authorizations" refer to land uses allowed under a special use permit, contract, or similar legal instrument. Numerous types of lands and recreation-related authorizations are issued for occupancy and use of NFS lands. For example, the Bureau of Land Management issues oil, gas, and coal leases on NFS lands. All of the alternatives allow for the continuation, transfer, or renewal of existing land use authorizations for activities in roadless areas. "Existing authorizations" are those that are issued before the effective date of the final rule. Private recreational activities do not require an authorization and are not affected by any alternative.

Examples of land use authorizations not specifically prohibited or restricted under any alternative include, but are not limited to, the following:

- Outfitting and guiding for hunting, fishing, camping, horseback riding, rafting, etc.
- Commercial filming
- Temporary events
- Tribal and noncommercial group use
- Agricultural improvements such as fences
- Range facilities such as corrals, pens, fences, water developments, etc.
- Research, training and surveys
- Communication sites

Other Forest Activities

Activities that are otherwise not prohibited under the alternatives (other than tree cutting, sale, or removal; road construction and reconstruction; and use of LCZs) are permissible in roadless areas, if not restricted by other law, regulations, and policies. These activities include, but are not limited to, the following:

- Motorized and non-motorized trail construction or maintenance

- Public hunting, fishing, camping, or other dispersed recreational uses
- Use of a motorized vehicle on a trail open to motorized use
- Mountain biking on a trail open to mechanized use
- Prescribed burning, including tree cutting for fireline construction to manage a prescribed fire
- Livestock grazing

Key Definitions

For this EIS, Table 2-1 provides the specific definitions used for these terms.

Table 2-1. *Definitions of Forest Road, Temporary Road, & LCZ Terms.*

Term	*Definition*
Forest road	Generally refers to a road determined to be necessary for the long-term protection, administration, and use of NFS land or resources, and is managed as part of the national forest transportation system. Previously called "system" or permanent, roads.
Temporary road	A road necessary for emergency operations, or authorized by contract, permit, or other authorization that is not a forest road and that is not included on the forest transportation atlas.
Linear construction zone	A temporary linear area of surface disturbance over 50-inches wide that is used for motorized transport by vehicles or construction equipment to install or maintain a linear facility. It is not used as a motor vehicle route and is not engineered to road specifications. Linear facilities include pipelines, electrical power lines, telecommunication lines, ditches, canals, and reservoirs.

Roadless Inventory and Acres in Alternatives

Alternatives 2, 3, and 4 each provide for a state-specific roadless rule; however, the provisions of each alternative apply to different roadless inventories. Alternatives 1 and 3 use the inventory of the 2001 Roadless Rule IRAs. For Alternatives 2 and 4, the Forest Service re-examined the inventory from the 2001 Roadless Rule and considered other National Forest System lands for inclusion. From this, the Forest Service identified portions of the 2001 Roadless Rule inventory that had roadless characteristics that were substantially altered, including areas with road construction and other ground-disturbing activities. In addition, the Forest Service identified areas outside the 2001 Roadless Rule inventory that met the criteria for roadless character. Together, the exclusion of the substantially altered lands and inclusion of additional roadless areas became the CRAs inventory for Alternatives 2 and 4.

Table 2-2 compares the IRA inventory in Alternatives 1 and 3 and the CRA inventory in Alternatives 2 and 4. Overall, the CRAs have a net loss of 58,000 acres in roadless from the IRA acres.

Table 2-2. *Net Change in Roadless Acreage by Forest (From IRAs To CRAs)*

	2001 Roadless Rule Total IRA Acres [1]	*Corrected CO IRA Acres[2] (Alternatives 1 & 3)*	*Substantially Altered Acres Removed from CRAs[3]*	*Roadless acres added to CRAs*	*Total CRA Acres (Alternatives 2 and 4)*	*Proposed Net Change*
Arapaho-Roosevelt	391,000 (1997)	352,500	10,800	5,400	347,100	(5,400)

	2001 Roadless Rule Total IRA Acres [1]	*Corrected CO IRA Acres*[2] *(Alternatives 1 & 3)*	*Substantially Altered Acres Removed from CRAs*[3]	*Roadless acres added to CRAs*	*Total CRA Acres (Alternatives 2 and 4)*	*Proposed Net Change*
GMUG	1,127,000 (1979)	1,058,300	281,500	124,200	901,100	(157,200)
Manti La Sal	11,000 (1979)	11,000	3,800	500	7,700	(3,300)
Pike San Isabel	688,000 (1979)	667,300	62,900	170,300	774,700	107,400
Rio Grande	530,000 (1996)	529,000	14,200	3,800	518,600	(10,400)
Routt	442,000 (1998)	442,300	10,400	1,700	433,600	(8,800)
San Juan	604,000 (1979)	543,600	76,500	98,900	566,100	22,500
White River	640,000 (2002)	639,500	7,400	4,700	636,700	(2,800)
Total, State of Colorado	***4,433,000***	***4,243,600***	***467,400***	***409,500***	***4,185,600***	***(58,000)***

Column 1 acres rounded to nearest 1,000 acres; others rounded to nearest 100 acres. Acres do not add due to rounding

1) The 2001 Roadless Rule used the IRAs from the forest plans that were in effect when the 2001 Roadless Rule was developed, or a roadless inventory that had undergone public involvement. The date of each National Forest's inventory used for the 2001 Roadless Rule is shown here. Acreages are from the 2000 Roadless Rule FEIS.

2) The acres used for the rulemaking analysis differ from the acres reported in the RACR FEIS because some Wilderness, private, and Special Areas were included in the 2001 roadless inventory. Examples of specific mapping errors in the 2001 Roadless Rule inventory are James Peak and Spanish Peak Wildernesses, the Indian Peaks Wilderness, Bowen Gulch and James Peak Protection Areas, Roubideau and Tabeguache Special Areas, Fossil Ridge Recreation Management Area, and the Piedra Special Management Unit.

3)) 459,100 substantially altered acres were removed; 8,300 ski area acres were removed.

Implications of Ongoing Litigation

On October 21, 2011, the U.S. Tenth Circuit Court of Appeals reversed the Wyoming District Court's decision to set aside the 2001 Roadless Rule and remanded the case back to the District Court to vacate the permanent injunction. On December 5, 2011, the plaintiff and intervenor requested a rehearing by the full Tenth Circuit (en banc review) of the October 2011 opinion. This request was subsequently denied on February 16, 2012. On February 24, 2012, the Tenth Circuit issued a mandate effectuating the October 21, 2011 opinion and requiring the injunction of the 2001 Roadless Rule to be vacated.

Due to these recent judicial rulings, the 2001 Roadless Rule is in effect nationwide, except in Idaho, which has its own state-specific roadless rule. These rulings also change which alternative is considered the no action alternative in this FEIS. In the 2011 RDEIS, the no action alternative was Alternative 3, the Forest Plans. The no action alternative, or continuation of current management, is now Alternative 1, the 2001 Roadless Rule, which is now the environmental baseline from which to compare the environmental impacts of the other action alternatives to, as required by NEPA.

Alternative 1: The 2001 Roadless Rule

This alternative in the no action alternative as required by NEPA, and reflects continuation of current management. This alternative would continue general prohibitions on tree cutting, sale, and removal and road construction/reconstruction within IRAs, with some of those activities permitted under certain exceptions. This alternative does not include any prohibitions on LCZs, and does not include an upper tier category.

Inventoried Roadless Areas (IRAs)

Under this alternative, the roadless areas consist of IRAs identified in the 2001 Roadless Rule with modifications as described in the Roadless Inventory section. These IRAs encompass approximately 4.24 million acres of national forests in Colorado. The IRAs are based on the roadless inventories from forest plans that either were in effect, or had undergone public comment, when the 2001 Roadless Rule was developed. For the GMUG, Manti-La Sal (within Colorado), Pike-San Isabel, and San Juan National Forests, the IRAs are composed of roadless area inventories completed (and manually mapped) in the 1970s, as part of the Roadless Area Review and Evaluation processes (commonly referred to as RARE II). For other national forests (the Rio Grande, Arapaho-Roosevelt, Routt, and White River National Forests), the IRAs adopted in the 2001 Roadless Rule consisted of the roadless area inventories completed during those forest plan revision processes (approximately 1996 to 2002). Congressionally Designated Areas, private land, and wilderness were removed from IRAs for this analysis.

The IRAs under this alternative do not include additional acres with roadless area characteristics identified under Alternatives 2 and 4 that are located outside the IRAs. Under this alternative, those acres would be managed according to their respective forest plans.

Management of IRAs

With certain exceptions, this alternative prohibits two main types of activities: tree cutting and road construction.

Tree cutting, Sale, or Removal

This alternative generally prohibits tree cutting, but provides five exceptions to this prohibition:

- The cutting, sale, or removal of generally small-diameter timber may occur in IRAs where it is needed to maintain or improve threatened, endangered, proposed, or sensitive species habitat, consistent with maintaining or improving roadless area characteristics defined in the definitions section of the proposed rule.
- The cutting, sale, or removal of generally small-diameter timber may occur in IRAs where it is needed to maintain or restore the characteristics of ecosystem composition and structure, such as reducing the risk of uncharacteristic wildland fire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period, and consistent with maintaining or improving roadless area characteristics defined in the definitions section of the proposed rule.
- The cutting, sale, or removal of timber may occur in IRAs where it is incidental to implementing a management activity not otherwise prohibited.

- The cutting, sale, or removal of timber may occur in IRAs where it is needed for personal or administrative uses provided for in 36 CFR 223.
- The cutting, sale, or removal of timber may occur within portions of IRAs where roadless area characteristics have been substantially altered by the construction of a NFS road and subsequent timber harvest. Both the road construction and timber harvest must have occurred after the IRAs were designated and before the effective date of rulemaking.

Road Construction and Reconstruction

This alternative generally prohibits road construction and reconstruction, but provides seven exceptions to this prohibition. This alternative does not distinguish between forest (permanent) and temporary roads. Road maintenance is permissible within IRAs. Road maintenance refers to the ongoing upkeep of a road necessary to retain or restore the road to the approved road management objectives (see Forest Service Manual 7705). The following exceptions would allow road construction and reconstruction in the IRAs under this alternative:

- Where a road is needed to protect public health and safety in cases of imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property.
- Where a road is needed to conduct a response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or to conduct a natural resource restoration action under CERCLA, Section 311 of the Clean Water Act, or the Oil Pollution Act.
- Where a road is needed pursuant to reserved or outstanding rights, or as provided by statute or treaty.
- Where road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a NFS road that cannot be mitigated by road maintenance. Road realignment may occur only if the road is deemed essential for administrative or public access, public health and safety, or other authorized use.
- Where road reconstruction is needed to implement a road-safety improvement project on a forest road determined to be hazardous on the basis of accident experience or accident potential on that road.
- Where the Secretary of Agriculture determines that a Federal Aid Highway project, authorized pursuant to Title 23 of the United States Code, is in the public interest or is consistent with the purposes for which the land was reserved or acquired, and no other reasonable and prudent alternative exists.
- Where a road is needed in conjunction with the continuation, extension, or renewal of a mineral lease issued before the effective date of rulemaking, and includes any new lease issued immediately upon expiration of an existing lease. Such road construction or reconstruction must be conducted in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface disturbance, and complies with all applicable forest plan direction, regulations, and laws. These roads must be obliterated when no longer needed for the purposes of the lease or upon termination or expiration of the lease, whichever is sooner.

Linear Construction Zones (LCZs)

Alternative 1 has no specific restriction on the use of LCZs.

Effective Date and Additional Information

If the no action alternative is selected, the 2001 Roadless Rule would remain effective in Colorado, and no Colorado Roadless Rule would be promulgated.

The 2001 Roadless Rule prohibited road construction to access mineral leases issued after the promulgation of the rule (January 12, 2001). Since 2001, the 2001 Roadless Rule has been subject to legal challenges, and leases have been issued in areas now identified as Colorado Roadless Areas. Leases have been issued within roadless areas during these periods where the 2001 Rule was not in effect. These leases, including any associated road construction, are part of the environmental baseline and the continuation of current management.

Alternative 2: The Colorado Roadless Rule (Preferred Alternative)

Alternative 2 is the proposed action and preferred alternative. Alternative 2 is based on the revised petition submitted by the State of Colorado to the Secretary of Agriculture. The proposed rule establishes general prohibitions on tree cutting, sale, or removal; road construction and reconstruction; and LCZs, within CRAs, while permitting those activities under certain exceptions to address needs specific to Colorado (see rule text in Appendix I).

Changes

Based on public comments, the following changes were made on the proposed rule between the RDEIS and this FEIS:

- The number of upper tier acres was increased from 562,200 acres in the RDEIS to 1,219,200 acres. Generally, areas within 0.5 to1.5 miles of a community at risk (described as a community protection zone or CPZ) were removed from the upper tier designation to ensure communities could conduct hazardous fuel reduction projects for community protection. Additional acres were added to upper tier based on public comments.
- The North Fork coal mining area was changed from 19,600 acres in the RDEIS to 19,100 acres. Two small areas totaling about 500 acres were dropped because they were incorrectly mapped and contain no recoverable coal. Comments were received to include the Currant Creek area in the North Fork coal mining area. The Forest Service considered the presence and mineability of coal resources for this area as well other public input, economic factors, geologic information and wildlifre resources. Currant Creek was not added to the North Fork coal mining area because the presence of high-priority habitat was identified by the Colorado Division of Parks and Wildlife, the juxtaposition of these habitats to adjacent important habitat, and the need to maintain contiguous areas insulated from roads and fragmentation.
- An exception to allow for temporary road construction in upper tier acres was added to account for public health and safety in cases of imminent threat of flood, fire, or other potential catastrophic event that without intervention, would cause the loss of life or property. This could include a situation in which a dam within upper tier that, without intervention, could fail, may be allowed access with a temporary road for reconstruction activities.

- The use of LCZs in the upper tier was further limited to only two circumstances: 1) pursuant to reserved or outstanding rights or as provided by statute or treaty, and 2) for authorized water conveyance structures operated pursuant to a pre-existing water court decree.
- In Alternative 2 from the RDEIS, administrative corrections and modifications could only be made to the CRA boundary and not the upper tier boundary. The ability to make administrative corrections to upper tier boundaries was added to account for clerical errors, mapping errors, or changes in mapping technologies.
- A provision requiring future oil and gas leases in upper tier acres to have a no surface occupancy (NSO) stipulation has been added. This provision was added to further restrict activities within the upper tier that have the potential to adversely impact roadless area characteristics.
- The definition of a pre-existing water court decree was changed to address initial applications filed before the promulgation of the proposed rule. This change was made in recognition that many water rights may take multiple years to adjudicate.
- A provision was added requiring that water conservation practices (WCP) be applied for all road and LCZ activities occurring in occupied cutthroat trout habitat. This provision was added to highlight that, while some activities might appear disruptive to trout habitat and resources in the short-term, over the long-term, WCP techniques and methods are used to ensure that impact to trout habitat is minimized.

Colorado Roadless Areas (CRAs)

Under this alternative, approximately 4.19 million acres of NFS lands in Colorado would be identified as CRAs[5]. The CRAs in this alternative exclude the Congressionally designated areas that overlap portions of the original 2001 Roadless Rule IRAs. Further, this alternative incorporates updated roadless area information from the four national forests that are, or will be, working on land management plan revisions (GMUG; Manti-La Sal; Pike-San Isabel; and San Juan National Forests). This alternative also eliminated mapping errors on the four national forests in Colorado that completed roadless inventories from 1996-2002 as part of their revised land management plans (Arapaho-Roosevelt; Rio Grande; Routt, and White River).

The inventory was reviewed by the Colorado Department of Natural Resources and the Division of Parks and Wildlife, as well as the public during the initial DEIS and revised DEIS public comment period. Changes to the Colorado roadless areas were identified during this process.

The CRAs in this alternative do not include 467,400 acres identified in the 2001 Roadless Rule. This includes 459,100 acres of substantially altered land and 8,300 acres within existing ski permits or ski area development allocations in the forest plans. Substantially altered lands are those lands that do not have roadless area characteristics, primarily because of road construction and timber harvest activities that have occurred in the area. The 8,300 acres of ski area terrain not included in CRAs include 6,600 acres in ski areas under existing permits[6] and 1,700 acres outside permit boundaries but within forest plan allocations for future ski area development (see Developed Ski Areas section in Chapter 3).

[5] *Colorado Roadless Areas refer to areas identified in a set of maps maintained at the national headquarters office of the Forest Service, including records regarding any corrections or modifications to such maps.*

[6] *For the 6,600 acres under permit, development can occur under any alternative after environmental analysis is complete.*

Under this alternative, all of the acres eliminated from the CRAs would be managed according to their respective forest plans.

The CRAs under this alternative include approximately 409,500 acres of unroaded NFS lands that were not identified in the 2001 Roadless Rule. These acres contain roadless area characteristics and were identified during forest plan revision processes and public comments received in this rulemaking process, as well as recommendations from forests based on site-specific knowledge of ground conditions.

Management of Colorado Roadless Areas

Like Alternative 1, this alternative prohibits tree cutting, sale, or removal, and road construction and reconstruction while providing for specific exceptions to the prohibitions. In addition this alternative also prohibits LCZs within roadless areas with certain exceptions. It also provides specific exceptions for exploration and development of the North Fork coal mining area.

Figures 2-1 and 2-2 summarize the proposed rule provisions in a graphic form to facilitate understanding of this alternative. The specific provision language in these figures is summarized to provide a broad understanding of the proposed rule and should not be relied on as a complete description of the individual provision.

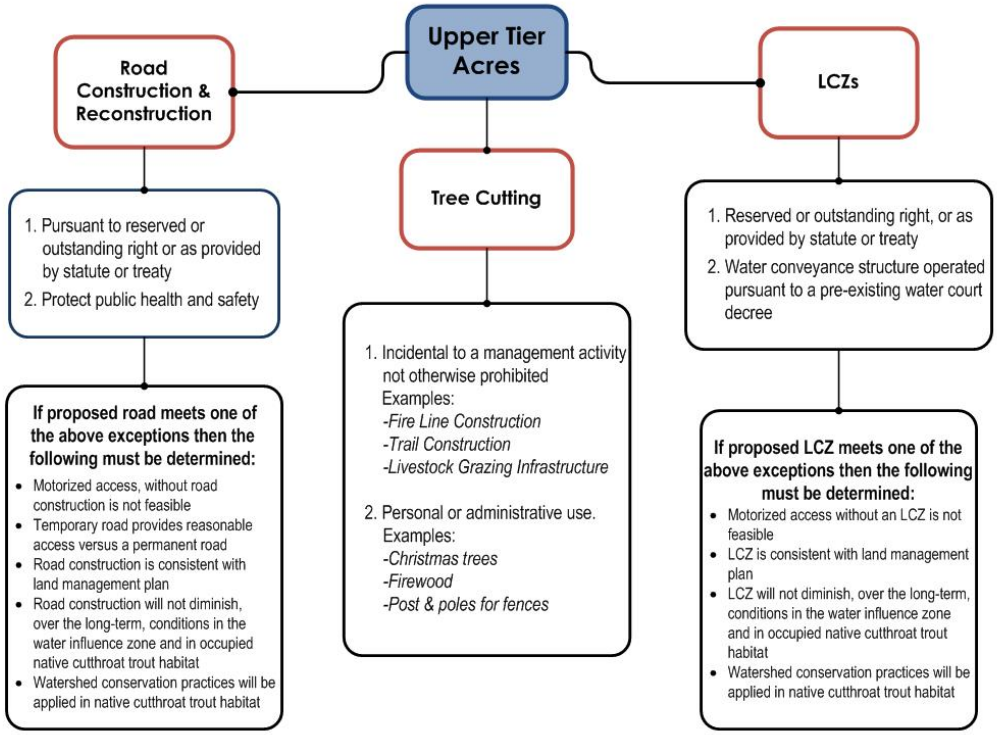

Figure 2-1. *Upper Tier Exceptions*

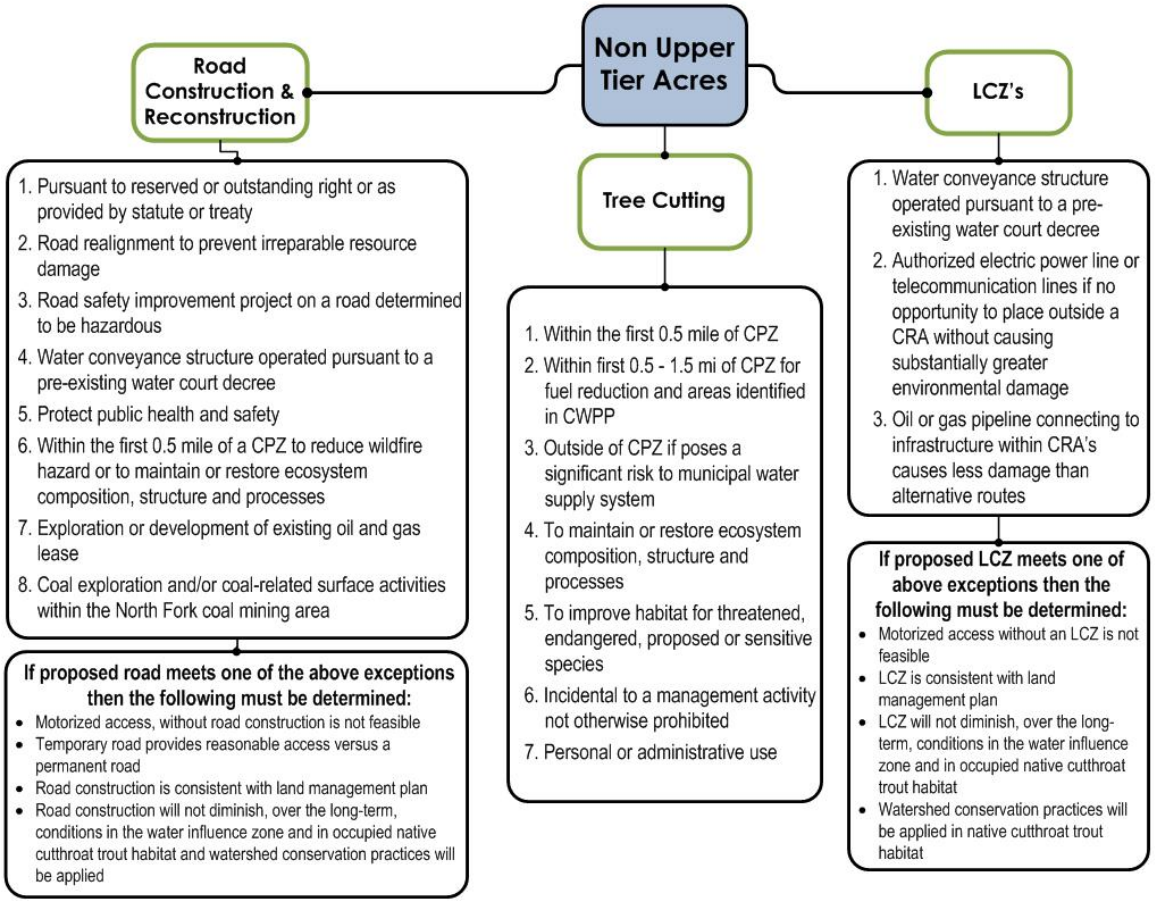

***Figure 2-2**. Non-Upper Tier Exceptions*

Upper Tier

Upper tier acres[7] are a subset of CRAs that have limited exceptions to provide a high-level of protection for these areas. Alternative 2 in the RDEIS designated 562,200 acres as upper tier. This quantity of upper tier acres was based on roadless areas with existing forest plan direction that prohibits road construction and reconstruction for all national forests, except for the GMUG and San Juan National Forests. For the GMUG and San Juan National Forests, upper tier acres were defined by examining proposed forest plan direction and selecting lands where road construction and reconstruction within roadless areas was prohibited. This approach was used to build on the previous collaborative public input processes, which helped to develop the existing and revised forest plans. Generally, the forest planning process determined that roadless areas with forest plan direction prohibiting road construction and reconstruction are high value roadless areas, and this is the basis for the upper tier.

Based on public comments on the RDEIS, the number of upper tier acres has been changed from the RDEIS, with both subtractions and additions, for a net increase of about 657,000 acres and a total of

[7] *Colorado Roadless Areas upper tier areas are identified in a set of maps maintained at the national headquarters office of the Forest Service, including records regarding any adjustments or modifications to such maps. Further detail on the upper tier acres are found in Appendix B and on Map 4 in the map packet.*

1,219,200 acres in this FEIS. Some acres in CPZs[8] were removed from the upper tier (about 130,000 acres) to provide more opportunity to protect communities from potential wildfire. Other acres were removed where there were potential conflicts with existing oil/gas leases, existing water structures, or other uses.

Acres were added to upper tier after considering areas in Alternative 4 and public comments on the RDEIS. The largest increase was the Pike-San Isabel and Rio Grande National Forests, which had few or no upper tier acres in the RDEIS. For most forests, the RDEIS upper tier was based on recent forest plan direction that was more restrictive than the proposed rule. However, the Pike-San Isabel Forest Plan has not been revised since 1984, and no initial proposed revised forest plan was available (unlike the GMUG and San Juan National Forests). For the current proposal, a preliminary draft analysis of areas that might be considered for recommended wilderness in the upcoming revision of the Pike-San Isabel Forest Plan was used to identify additional upper tier acres. The direction in the 1996 Rio Grande Forest Plan was more flexible in backcountry areas than other forest plans, so very few upper tier acres were included in the RDEIS. For this alternative, backcountry areas in the 1996 Forest Plan were considered for additional upper tier acres.

Further detail on these upper tier acres are found in Appendix B. Table 2-3 lists each forest's CRA acres, including upper tier acres, as well as the year of the latest forest plan revision.

Table 2-3. *CRA Upper Tier Acres by National Forest under Alternative 2*

Forest	*Revision Completed-/ Year of Forest Plan*	*Total CRA Acres*	*Upper Tier Acres*	*% of Forest CRA Acres*
Arapaho-Roosevelt	Yes-1997	347,100	134,800	39%
GMUG	No-1983	901,100	130,300	14%
Manti-La Sal	No-1986	7,700	7,700	100%
Pike-San Isabel	No-1984	774,700	149,900	19%
Rio Grande	Yes-1996	518,600	340,300	66%
Routt	Yes-1998	433,600	172,100	40%
San Juan	No-1983	566,100	153,200	27%
White River	Yes-2002	636,700	131,000	21%
Total, Colorado[1]		***4,185,600***	***1,219,200***	***29%***

1) Numbers do not add up due to rounding.

Exceptions to the prohibitions on tree cutting, sale, or removal; road construction and reconstruction; and LCZs are very limited in upper tier. The following exceptions would apply to these prohibitions in upper tier acres.

[8] *Most, but not all, of the acres within 1.5 miles of a CPZ were removed. In some cases, areas that were not a fuels concern, such as meadows, rock screes, etc., and areas recommended for wilderness were not removed from upper tier.*

Tree cutting, sale, or removal exceptions in the upper tier

- Tree cutting, sale, or removal is incidental to implementing a management activity that is not otherwise prohibited by the proposed rule.
- Tree cutting, sale, or removal is needed and appropriate for personal or administrative use, as provided for in 36 CFR 223.

Road construction and reconstruction exceptions in the upper tier

- A road is needed pursuant to reserved or outstanding rights, or as provided for by statutes or treaties.
- A temporary road is needed for public health and safety in cases of imminent threat of flood, fire, or other potential catastrophic event that, without intervention, would cause the loss of life or property.

Linear Construction Zones (LCZs)

Alternative 2 generally prohibits LCZs within CRAs, but it does provide for limited exceptions to this prohibition. The following exceptions exist under which LCZs would be allowed upper tier acres:

- Is needed pursuant to reserved or outstanding rights, or as provided for by statutes or treaties.
- The construction, reconstruction, or maintenance of water conveyance structures operated pursuant to a pre-existing water court decree issued by the Colorado Water Courts before the final rule effective date adjudicated as the point of a diversion or the place of use a location within a CRA.

Non-Upper Tier

The following exceptions would apply to non-upper tier acres:

Tree cutting, sale or removal exceptions in the non-upper tier:

- Tree cutting is needed to reduce the wildfire hazard to an at-risk community or municipal water supply system within the first 0.5 mile of the CPZ, or within the next 1 mile of the CPZ, where proposed projects are within an area identified in a Community Wildfire Protection Plan (CWPP). For the CPZ to extend beyond the first 0.5 mile and up to an additional 1 mile, the land must exhibit one of the following characteristics:
  - a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community
  - has a geographic feature that aids in creating an effective fire break, such as a road or a ridge top
  - is in condition class 3 as defined by Healthy Forests Restoration Act (Pub. L. 108–148).

  If no CWPP exists, tree cutting for this purpose would not be allowed beyond the first 0.5 mile. Projects would focus on small-diameter trees to create strategic fuel breaks that modify fire behavior, while retaining large trees to the maximum extent practical, as appropriate to the forest type.
- The Regional Forester determines a significant risk exists that a wildland fire disturbance event could adversely affect a municipal water supply system or the maintenance of the system. A significant risk exists where the history of fire occurrence and fire hazard indicate a serious

likelihood that a wildland fire event would have adverse effects on a municipal water supply system.

- Where needed to maintain or restore the characteristics of ecosystem composition, structure, and processes.
- Where needed to improve threatened, endangered, proposed, or sensitive species habitat in coordination with the Colorado Department of Natural Resources, including the Colorado Division of Parks and Wildlife.
- Where it is incidental to implementing a management activity not otherwise prohibited by the proposed rule.
- Where needed and appropriate for personal or administrative use, as provided for in 36 CFR 223.

Road construction and reconstruction exceptions in non-upper tier:

- Where a road is needed pursuant to reserved or outstanding rights, or as provided for by statutes or treaties.
- Where the Regional Forester determines a temporary road is needed to facilitate tree cutting, sale, or removal to reduce the wildfire hazard to an at-risk community or municipal water supply system within the first 0.5 mile of a CPZ.
- Where the Regional Forester determines a temporary road is needed to facilitate tree cutting for maintaining and restoring the characteristics of ecosystem composition, structure, and processes within the first 0.5 mile of the CPZ.
- Where road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a NFS road that cannot be mitigated by road maintenance. Road realignment may occur only if the road is deemed essential for administrative or public access, public health and safety, or other authorized use.
- Where road reconstruction is needed to implement a road-safety improvement project on a forest road determined to be hazardous, based on accident experience or accident potential on that road.
- The Regional Forester determines a road is needed to allow for the construction, reconstruction, or maintenance of an authorized water conveyance structure that is operated pursuant to a pre-existing water court decree. The use of the road is limited to that use associated with the water right as identified in the pre-existing water court decree.
- Where a temporary road is needed for public health and safety in cases of threat of flood, fire, or other potential catastrophic event that, without intervention, would cause the loss of life or property.
- Where a temporary road is needed in conjunction with exploration or development of an existing oil and gas lease that otherwise does not prohibit road construction or reconstruction, including construction of infrastructure necessary to transport the product on NFS lands, under an existing lease as of the effective date of this proposed rule.
- Road maintenance is allowed within CRAs.

Linear Construction Zones

The following exceptions exist for LCZs in non-upper tier acres:

- The construction, reconstruction, or maintenance of water conveyance structures operated pursuant to a pre-existing water court decree issued by the Colorado Water Courts before the final rule's effective date adjudicated as the point of a diversion or the place of use a location within a CRA.
- The construction, reconstruction, or maintenance of existing or future authorized electrical power lines or telecommunication lines. Authorize electrical power lines or telecommunication lines within CRAs only if there is no opportunity for the project to be implemented outside of a CRA without causing substantially greater environmental damage.
- The construction or reconstruction of a pipeline associated with an oil and gas lease that allows surface use within a CRA or the construction or reconstruction of a pipeline needed to connect to infrastructure within a CRA from outside a CRA where such a connection would cause substantially less environmental damage than alternative routes. The construction of pipelines for transporting oil or natural gas through a CRA, where the source(s) and destination(s) of the pipeline are located exclusively outside of a CRA, shall not be authorized.

Required Findings Before Road Construction/Reconstruction or LCZ

Before allowing any type of road construction/reconstruction or LCZ development under any of the exceptions in a CRA, the following required findings must be made, through a site-specific project analysis:

- The action is consistent with forest plan direction.
- Motorized access for the project without road construction or an LCZ is not feasible.
- If the action occurs within native cutthroat trout catchments or identified recovery watersheds, conditions within the water influence zone and occupied, native cutthroat trout habitat would not be diminished over the long-term.
- Watershed conservation practices are applied to native cutthroat trout habitat.
- For a proposed forest road, a temporary road would not provide reasonable access.

Road Construction/Reconstruction and LCZ Considerations

This alternative would require that specific considerations be incorporated into any road construction/ reconstruction, or LCZ project implemented within CRAs:

- All road construction in a CRA must be conducted in a manner that reduces, to the extent practicable, effects on surface resources and prevents unnecessary or unreasonable surface disturbance.
- All roads constructed in CRAs under all exceptions would prohibit public motor vehicle use (including off-highway vehicles), unless specifically allowed as the purpose for which the road was established (e.g., Federal Highways). Nothing in the proposed rule would prohibit the following: .
    - the use of motor vehicles for administrative use by the Forest Service

- motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulation
- motor vehicle use by any fire, emergency, or law enforcement personnel.

When any road constructed under the exceptions is no longer needed for the established purpose, or upon termination or expiration of a contract, authorization, or permit, whichever is sooner, all roads shall be decommissioned and the affected landscape restored. A road decommissioning provision shall be required in all such contracts or permits. Decommissioning would be designed to stabilize, restore, and revegetate unneeded roads to a more natural state to protect resources and to enhance roadless area characteristics.

When an LCZ is constructed in a CRA, the linear facility would be installed in a way that minimizes ground disturbance, including placement within existing right-of-ways where feasible. When the LCZ is no longer needed for the installation of the linear facility, any ground disturbance associated with the LCZ and the affected landscape would be restored. A restoration provision is required in all LCZ contracts or permits and would not be waived.

North Fork Coal Mining Area

This alternative designates 19,100 acres of CRAs on the GMUG National Forests as the North Fork coal mining area. Temporary road construction and reconstruction for activities associated with coal mining would be allowed on these lands (Map 13 in map packet). Such roads also may be used for collecting and transporting methane gas from coal mines. Buried infrastructure, including pipelines, needed for the capture, collection, and use of coal mine methane would be located within the rights-of-way of temporary roads that are otherwise necessary for coal-related surface activities, including the installation and operation of methane venting wells. No upper tier acres are designated in the North Fork coal mining area under this alternative.

Regional Forester Determinations

In specific cases, the Regional Forester determines if an activity fits within an exception to ensure consistent application of the exceptions. This determination is not a NEPA decision. The responsible official (Forest Service officer with the authority and responsibility for a specific decision) would make the formal NEPA decision, but would be required to seek a Regional Forester determination as to the applicability of the exception. Any final decision would need to be consistent with the determination. Table 2-4 describes the exceptions that would need a Regional Forester determination.

Table 2-4. *Regional Forester Determination*

Activity	*Upper Tier*	*Non-Upper Tier*
Tree cutting, sale or removal		
• Reduce wildfire hazard w/in CPZ	n/a[1]	Reg. Forester
• Sig. wildfire risk outside CPZ	n/a	Reg. Forester
• Ecosystem composition, structure and processes	n/a	No[2]
• Improve habitat for federally listed species	n/a	No
• Incidental tree removal	No	No
• Personal or administrative use	No	No
Road construction/Reconstruction		

Activity	*Upper Tier*	*Non-Upper Tier*
• Reserved or outstanding rights	No	No
• Road safety improvement	n/a	No
• Water conveyance structure	n/a	Reg. Forester
• Protect public health and safety	No	No
• Reduce wildfire hazard w/in 0.5 mile CPZ	n/a	Reg. Forester
• Ecosystem composition, structure and processes w/in 0.5 mile CPZ	n/a	Reg. Forester
• Existing oil & gas lease	n/a	No
• North Fork coal mining roads	n/a	No
Linear Construction Zone		
• Water conveyance structure	Reg. Forester	Reg. Forester
• Electrical power lines & telecommunication lines	n/a	Reg. Forester
• Oil & gas pipeline	n/a	Reg. Forester

1) n/a = not allowed

2) No = Regional Forester determination not needed

Additional Provisions

Alternative 2 has additional provisions for managing CRAs.

Oil and Gas Leasing

Oil and gas leases issued within upper tier acres after the promulgation of the proposed rule would require a no-surface-occupancy stipulation. The Forest Service would not authorize the Bureau of Land Management to grant any request for a waiver, exception, or modification to any oil or gas lease, if doing so would result in surface occupancy within an upper tier area.

Each review of proposed oil and gas operations shall consider eight listed items in determining conditions for inclusion in approved *Surface Use Plans of Operation*. These considerations apply to operations conducted on both existing oil and gas leases, under which some roads would be allowed, and future oil and gas leases under which no roads would be allowed:

1. Locate roads, well sites, and facilities on pre-existing areas of surface disturbance and minimize the amount of necessary temporary road construction or reconstruction.
2. Consider an alternative for proposed operations that addresses directional drilling on multi-well sites on pre-existing disturbance.
3. Restrict road construction for leases partially within CRAs to portions of the lease outside of CRAs, except when doing so would be substantially more environmentally damaging, compromise safety standards, or is unfeasible due to topography or surface conditions.
4. Perform reclamation of surface disturbances incrementally to minimize the total area of disturbance at any given point in time during the exploration or development of a lease.
5. Design temporary roads and facilities to blend with the terrain to minimize visual impacts and to facilitate restoration when the road is no longer needed.
6. Co-locate power lines, flow lines, and pipelines within the right-of-way of roads to minimize the area of surface disturbance.

7. Consider new and developing low-impact techniques and technologies, and either dismiss or apply with justification.
8. Consider the best available technology to minimize noise and air emissions.

Administrative Corrections or Modifications of Colorado Roadless Areas

This alternative allows the Chief of the Forest Service to make administrative corrections to CRA and upper tier boundaries after a public notice and 30-day comment period. Administrative corrections include clerical and mapping errors or improvements in mapping technology. The Chief of the Forest Service may modify the CRA after public notice and a 90-day comment period. The construction of temporary roads or tree cutting, sale, or removal within CRAs cannot be the cause for a boundary modification.

Alternative 3: Forest Plan Direction

Alternative 3 would promulgate a state-specific roadless rule that exempts Colorado from the 2001 Roadless Rule. Forest plan direction would apply to all IRAs as well as the remainder of the analysis area. Roadless inventories would be addressed during forest plan revisions.

Roadless area management in the forest plans includes goals (desired conditions), objectives, standards and guidelines, and descriptions of suitable uses. In each forest plan, roadless areas overlap a number of different land management allocations. Therefore, roadless areas managed under this alternative would be based on a mix of forest plan direction.

As previously described in the section "Features Common to All Alternatives", forest plans may be updated through an amendment or revision process to reflect changed conditions, or specific public or management needs. The NFMA requires forest plans to be revised at least every 15 years. Project-level amendments to forest plans may be made to make the forest plan consistent with a specific project, if warranted. Subsequent forest plan amendments and revisions could result in changes to roadless area management direction under this alternative. These areas could be subject to, or affected by, subsequent reinstatement, reconsideration, revision, or revocation of the 2001 Roadless Rule.

Forest Plan Revisions and Roadless Areas

No specific direction for roadless areas is proposed in Alternative 3; rather, this alternative accepts management direction set forth in each forest plan. Some forest plans have been revised more recently than others. The Arapaho-Roosevelt, Rio Grande, Routt, and White River National Forests have completed forest plan revisions. The GMUG, , and Pike-San Isabel National Forests are expected to revise their forest plans in the next five years. The forest plan for San Juan National Forest is currently being revised. In the past few years, the trend has been to allocate more roadless areas to management prescriptions that protect roadless area characteristics.

Tree Cutting, Sale, or Removal

Under Alternative 3, no general prohibition exists on tree cutting, sale, or removal within the IRAs. Therefore, tree cutting, sale, or removal would be allowed in IRAs anywhere those activities are not specifically prohibited or limited by forest-wide or management area direction in the applicable forest plan.

Forest plan direction for tree cutting, sale, or removal generally falls into one of four categories:

- **Tree cutting, sale, or removal is generally prohibited**, except where needed for reserved and outstanding rights, or for other exemptions mandated by law, regulation, or policy. Examples of exemptions mandated by law, regulation, or policy include tree cutting to maintain roads or trails for safety purposes; removal of hazard trees; fire-line construction for wildland fire suppression or control of prescribed fire; tree cutting allowed under existing authorizations, such as for developing ski runs or utility corridors; and others.
- **Tree cutting, sale, or removal is generally restricted** based on desired conditions or guidelines and not based on mandatory direction.
- **Tree cutting, sale, or removal is generally not restricted**, except under some specific exceptions based on the purpose and need of the project or for the protection of specific resources. Examples include situations in which tree cutting is limited to certain locations or conditions, such as to reduce wildland fire hazard or improve wildlife habitat.
- **Tree cutting, sale, or removal is generally allowed** as needed to meet multiple-use management purposes.

Although management direction in the forest plans regarding tree cutting differs by national forest, some direction is common among plans. Common to all forest plans, tree cutting for hazardous fuel reduction or wildlife habitat improvement may occur on NFS lands that are considered unsuitable for timber production. Also common to all forest plans, tree cutting for primarily timber production purposes is limited to NFS land identified as suitable for timber production.

Road Construction and Reconstruction

Alternative 3 follows forest plan direction and Forest Service directives and regulations for road construction and reconstruction. These directives encourage use of temporary roads when permanent forest roads are not necessary. In addition, 16 USC 1608 requires that roads shall be temporary and must be put to bed within 10 years unless determined to be necessary. The necessity for a permanent road is set forth in the road system plan for forest development.

Forest plan direction for road construction and reconstruction generally falls into one of four categories:

- **Road construction/reconstruction is generally prohibited**, except where needed for reserved and outstanding rights or other exemptions mandated by law, regulation, or policy.
- **Road construction/reconstruction is generally restricted** based on a desired condition or guideline and not a mandatory restriction.
- **Road construction/reconstruction is generally not restricted**, except under some specific exceptions based on the purpose of and need for the road, or road density limitations, or protection of natural resource values.
- **Road construction/reconstruction is generally allowed** for any multiple-use management need, where consistent with law, regulation, or policy.

Alternative 3 differs from the other three alternatives in that it does not include a general prohibition on road construction or reconstruction. Road construction in these roadless areas would be prohibited or limited only where there is specific forest plan direction. Map 5 in the map packet shows Alternative 3 with management direction for road construction, reconstruction, and tree cutting activities.

Linear Construction Zones (LCZs)

Forest plans typically do not address LCZs, but certain management areas prescriptions may limit the placement of LCZ by restricting tree cutting, ground disturbing, and other activities.

Alternative 4: The Proposed Rule with Public Proposed Upper Tier

Alternative 4 reflects the same substantive management direction as examined in Alternative 2, but would apply the more protective, upper tier restrictions to a much higher percentage of CRA lands. Alternative 4 has the same general prohibitions and exceptions as Alternative 2 on tree cutting, sale, or removal; road construction and reconstruction; and LCZs within CRAs, (see Tables 2-5 through 2-10). As with Alternative 2, substantially altered acres have been removed from the CRAs.

The only difference between Alternative 4 and Alternative 2 is that Alternative 4 designates 2,614,200 acres as CRA upper tier[9]. Some, but not all, of the Alternative 2 upper tier acres are upper tier acres in Alternative 4.

Under this alternative, some lands covered by existing oil and gas leases that do not expressly prohibit roads are included as CRA upper tier acres (see 2-5), and road construction on these acres would be allowed under this alternative, as well as the other three alternatives being considered. The upper tier acres included in Alternative 4 also contain areas adjacent to communities at risk from wildfire. See the Fire and Fuels section in Chapter 3 for details on the upper tier acres within the 0.5 mile CPZ and within the possible 1.5 mile CPZ.

Table 2-5. *CRA Upper Tier Acres by Forest Designated under Alternative 4*

Forest	*Upper Tier Acres*	*% of Forest CRA Acres*
Arapaho-Roosevelt	198,500	57%
GMUG	544,900	60%
Manti-La Sal	7,700	100%
Pike-San Isabel	312,900	40%
Rio Grande	323,500	62%
Routt	362,000	83%
San Juan	482,000	85%
White River	382,700	60%
Colorado	***2,614,200***	***62%***

Numbers might not add due to rounding.

Comparison of Alternatives

This section provides a comparative summary of each alternative from two perspectives. Table 2-6 compares each alternative by key elements of the proposed rule. Because the management direction in Alternative 2 and 4 are the same, the table refers to both in the same column. Management direction related to tree cutting and road construction is more restrictive within CRA upper tier acres in Alternatives 2 and 4, and the differences are noted within the column. Table 2-7 compares the estimated consequences of each alternative, summarized from the environmental consequences described in detail in Chapter 3. The comparison tables focus on the key differences among the

[9] *Further details on the CRA upper tier acres in Alternative 4 are found in Appendix B and Map 6 in the map packet.*

alternatives and their most likely consequences. Because the rulemaking and its alternatives are broad and programmatic, and do not involve any proposed site-specific actions, the consequences are appropriately broad and qualitative rather than quantitative. In the few places where Alternatives 2 and 4 differ, it is noted. All other management direction in these two alternatives is the same in the CRAs, whether in the upper tier acres or not.

Table 2-6. *Comparison of Alternatives*

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
Overview and Where Alternative Applies			
Roadless area management direction	The management of roadless areas on NFS lands in Colorado is governed by prohibitions and exceptions comparable to the 2001 Roadless Rule and by any additional limitations imposed by forest plans.	Management of roadless areas on NFS lands in Colorado would be governed by provisions of the proposed rule and by any additional limitations imposed by forest plans.	Management of roadless areas on NFS lands in Colorado would be governed exclusively by the applicable management direction in forest plans.
Roadless areas	4.24 million acres of IRAs, excluding 185,000 acres of wilderness and other Congressionally designated acres, as well as correcting mapping errors to remove areas identified as wilderness or private land from the inventory.	4.19 million acres of CRAs, excluding 185,000 acres of wilderness and other Congressionally designated acres, and modified by correcting map errors and updating NFS land boundaries. Removing 8,300 acres of allocated ski areas and 459,100 substantially altered areas Adding 409,500 acres of unroaded lands meeting roadless area criteria. Designating 1,219,200 acres as upper tier in Alternative 2. Designating 2,614,200 as upper tier in Alternative 4	4.24 million acres of IRAs are managed according to forest plan direction.
Changes to roadless area boundaries	No process provided for the Forest Service to make future changes to IRA boundaries.	Provides a process for the Forest Service to make changes to CRA boundaries. Changes are subject to public review and comment.	Roadless inventories completed during forest plan revision process, subject to public review and comment, and other NFMA and NEPA regulations.
Comparison of Tree cutting, Sale, or Removal by Alternative			
General tree cutting, sale, and removal provisions	Tree cutting, sale, or removal, is generally prohibited in roadless areas, with some exceptions (see below). In some IRAs forest plans add more	Similar to the general prohibition in Alternative 1, although more exceptions exist under this alternative (see below). An additional limitation is that the	In some IRAs tree cutting is prohibited or limited to protect resource values. Forest plans in Colorado generally

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
	restrictions related to conducting this activity, to protect other resource values, and the activity must be consistent with the forest plan. Tree cutting for all exceptions is expected to be infrequent.	Responsible Official must determine the activity is consistent with the forest plan. In some CRAs, forest plans add more restrictions related to conducting this activity to protect other resource values, and the activity must be consistent with the forest plan.	allow tree cutting for non-timber purposes on any NFS lands, subject to specific resource management direction. Forest plans identify lands suitable for timber harvest for timber production purposes.
Tree cutting, sale, or removal for incidental, personal, administrative uses	This activity is allowed in IRAs where it is incidental to other management activities (e.g., road or trail construction or maintenance, minerals operations, and other authorized uses). For personal or administrative uses, as provided for in 36 CFR 223 (e.g., firewood, Christmas trees).	This activity is allowed in CRAs, including upper tier acres where it is incidental to other management activities (e.g., road or trail construction or maintenance, minerals operations, and other authorized uses). For personal or administrative uses, as provided for in 36 CFR 223 (e.g., firewood, Christmas trees).	This activity is allowed in inventoried roadless areas (IRAs): Where incidental to other management activities (e.g., road or trail construction or maintenance, minerals operations, and other authorized uses). For personal or administrative uses, as provided for in 36 CFR 223 (e.g., firewood, Christmas trees).
Tree cutting, sale, or removal in substantially altered areas	This activity is not rule-limited in substantially altered areas that are the result of classified road construction and subsequent timber harvesting in IRAs and is only limited by applicable management direction in forest plans.	Substantially altered acres have been removed from CRAs and are only limited by applicable management direction in forest plans.	This activity is only limited by applicable management direction in forest plans.
Tree cutting to maintain or restore ecosystem composition and structure within the range of variability expected to occur under natural disturbance regimes of the current climatic period	An example of this activity given in the proposed rule is to reduce the risk of wildfire effects but could have other purposes. Generally small-diameter trees and would maintain or improve one or more roadless area characteristics. This exception can also include treatments for prevention or suppression of insect and diseases in	Not allowed within CRA upper tier acres Language simplified and updated to take into account climate change: “to maintain or restore characteristics of ecosystem composition, structure and processes”. These are infrequent and one or more of the roadless area characteristics would be maintained or improved over the long-term. This exception can also include	Tree cutting is only limited by applicable management direction in forest plans.

Descriptor	Alternative 1: 2001 Roadless Rule	Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier	Alternative 3: Provisions of Forest Plans
	order to maintain or restore ecosystem characteristics.	treatments for prevention or suppression of insect and diseases in order to maintain or restore ecosystem characteristics. Not limited to generally small diameter trees.	
Tree cutting, sale, or removal for habitat improvement	This activity is allowed in IRAs to improve habitat for threatened, endangered, proposed, or sensitive species, and to maintain or improve roadless area characteristics. Limited to generally small-diameter trees and would maintain or improve one or more roadless area characteristics	Not allowed within CRA upper tier acres. This activity is allowed in CRAs to improve habitat for threatened, endangered, proposed, or Agency designated sensitive species in coordination with the Colorado Department of Natural Resources including the Colorado Division of Parks and Wildlife. Not limited to generally small diameter trees. One or more of the roadless area characteristics would be maintained or improved over the long-term	Forest plans generally allow tree cutting in IRAs to improve habitat for all species including threatened, endangered, proposed, Regionally designated sensitive species or other species.
Tree cutting, sale, or removal to reduce wildland fire hazard	This activity is allowed in IRAs, to maintain or restore ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildland fire effects, within the range of variability expected to occur under natural disturbance regimes of the current climatic period, and would maintain or improve roadless area characteristics. Limited to generally small-diameter trees and prohibits associated road construction/reconstruction.	This activity is not allowed on upper tier acres within CRAs. On acres within CRAs that are not upper tier, this activity is allowed where the Regional Forester determines it is needed to reduce wildland fire hazard to an at-risk community or municipal water supply system within the first 0.5 mile of the CPZ. The CPZ can extend beyond the first 0.5 mile up to an additional 1 mile, if the land exhibits one of the following characteristics: a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; has a geographic feature	Forest plans allow tree cutting in most IRAs for purposes described in Alternatives 1 or 2, with exceptions in some specific management areas. Not limited to generally small-diameter trees, and does not preclude associated road construction/ reconstruction, except as precluded by specific forest plan direction. Forest plan direction provides the basis for activities allowed within roadless areas.

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
		that aids in creating an effective fire break, such as a road or a ridge top; or is in condition class 3 as defined by Healthy Forests Restoration Act (Pub. L. 108–148). Where the CPZ extends up to an additional mile, the activity is allowed if within the area of a CWPP. If no CWPP exists, no projects using this exception would be proposed in this next one-mile. On acres within CRAs outside of the CPZ, this activity is allowed where the Regional Forester has determined there is a significant risk that a wildland fire disturbance event could affect a municipal water supply system or the maintenance of the system. A significant risk exists where the history of fire occurrence and fire hazard indicate a serious likelihood that a wildland fire disturbance event would have adverse effects to a municipal water supply system. Such projects would focus on small diameter trees to create strategic fuel breaks that modify fire behavior while large trees would be retained to the extent practical, as appropriate to the forest type. One or more of the roadless area characteristics would be maintained or improved over the long-term. Projects outside of the CPZ are expected to be infrequent.	

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
Tree cutting, sale or removal within newly designated roadless areas	These acres are not within the IRA inventory. No regulatory limitation on tree cutting, sale or removal.	These acres are within the CRA inventory. Tree cutting, sale or removal is subject to the prohibitions in the proposed rule.	These acres are not within the IRA inventory These acres remain subject to forest plan direction.
Comparison of Road Construction and Reconstruction by Alternative			
General road construction provisions	Generally prohibits road construction or reconstruction in IRAs. Exceptions do not distinguish between forest roads and temporary roads. Rule language does not include additional requirements for environmental analysis or NEPA documentation. Does not include specific provisions about decommissioning and closing roads. Does not include provisions about closing roads to public motorized use.	Generally prohibits road construction or reconstruction in CRAs, distinguishing between forest roads and temporary roads. Includes additional environmental analysis and determination requirements for road construction determining that motorized access without road construction is not feasible; within a native cutthroat trout catchment or identified recovery watershed, road construction would not diminish conditions in the water influence zone and in occupied native cutthroat habitat over the long-term; road construction is consistent with the applicable forest plan; when proposing to build a forest road, a temporary road would not provide reasonable access. Includes specific provisions about decommissioning and closing roads. Roads are closed to public motorized use.	Forest plans include some IRAs where roads are generally prohibited. Some forest plan direction distinguishes between temporary and forest roads, and provides other direction to follow to protect resource values when proposing road construction. Does not include additional environmental analysis requirements for road construction. Includes some specific direction about road decommissioning. Some plans include some direction about road closures to public use for protection of resource values in specific areas.
Road construction in ski areas	Road construction or reconstruction is limited to within ski area permit boundaries established before [the	Ski areas acres in permitted ski areas or forest-plan allocated ski areas are removed from CRAs (8,300 acres).	Road construction allowed in these management areas.

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
	effective date of this proposed rule] (~6,600 acres). The 8,300 acres of permitted and allocated to ski areas within IRAs remain within IRAs.	They are subject to forest plan direction.	
Roads construction in substantially altered lands (~459,100 acres)	Road construction or reconstruction on substantially altered lands in IRAs is prohibited. Substantially altered acres remain in the IRAs.	These acres are excluded from CRAs. No rule-related limitations on road construction or reconstruction on the substantially altered lands; remain subject to forest plan direction.	Generally road construction is allowed in these management areas.
Road construction in newly identified roadless acres (~409,500 acres)	These acres are not within the IRAs. No rule-related limitations on road construction or reconstruction on the newly identified roadless acres; remain subject to forest plan direction.	These acres are within the CRAs. Road construction or reconstruction on newly identified roadless acres is subject to provisions within the proposed rule.	These areas are not within the IRAs. Road construction direction varies based on management designations within these areas.
Road construction pursuant to reserved or outstanding rights or as provided by statute or treaty	Support actions covered by laws or treaties, including those for purposes of CERCLA, Federal Highway Projects (23 USC), and locatable mineral operations (General Mining Law of 1872, as amended).	Support actions covered by laws or treaties, including those for purposes of CERCLA, Federal Highway Projects (23 USC), and locatable mineral operations (General Mining Law of 1872, as amended) within CRAs and upper tier acres.	Support actions covered by laws or treaties, including those for purposes of CERCLA, Federal Highway Projects (23 USC), and locatable mineral operations (General Mining Law of 1872, as amended)
Road construction for public health & safety and resource protections	Road construction or reconstruction is allowed in IRAs where needed to: Prevent irreparable resource damage. Address road safety hazards. Protect public safety from imminent threat of flood, fire, and other catastrophic events that may threaten loss of life or property.	Same as Alternative 1 within both standard tier and upper tier. Additionally, only temporary roads may be constructed or reconstructed as needed for public health and safety in cases of imminent threat of flood, fire, and catastrophic events that, without intervention, might cause loss of life or property.	Road construction or reconstruction is allowed in IRAs where needed to prevent irreparable resource damage. Address road safety hazards. Protect public safety from imminent threat of flood, fire, and other catastrophic events that may threaten loss of life or property, per agency regulations and policy directives.
Road construction for leasable minerals operations, specifically oil and gas	Road construction or reconstruction in IRAs related to oil and gas exploration and development is limited to roads	Road construction or reconstruction in CRAs related to oil and gas exploration and development is limited	Leasing stipulations from oil and gas leasing decisions may constrain surface occupancy and use in IRAs to

Descriptor	Alternative 1: 2001 Roadless Rule	Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier	Alternative 3: Provisions of Forest Plans
	needed pursuant to rights granted under an existing lease (issued before the effective date of the Colorado Rule) where lease stipulations and other regulations allow. Forest or temporary roads could be constructed. Road construction is prohibited on leases within IRAs issued after (the effective date of the Colorado Rule)	to roads needed, pursuant to rights granted under an existing lease (issued before the effective date of the Colorado Rule) where lease stipulations and other regulations allow. Roads are temporary roads. Road construction is prohibited on leases within CRAs issued after (the effective date of the Colorado Rule) 8 conditions are to be considered for inclusion in approved Surface Use Plans of Operation. Alternative 2 has portions of 6 existing oil and gas leases within the upper tier acres. Alternative 4 upper tier acres include many existing current oil and gas leases where road construction could occur if allowed by lease terms and considering 8 conditions for inclusion in approved Surface Use Plans of Operation. Future oil and gas leases within upper tier acres will have a No Surface Occupancy provision.	protect resources, and include reclamation requirements and other resource protection measures. Future leases in IRAs are possible based on forest plans or oil and gas leasing decisions.
Roads for leasable coal operations	Road construction or reconstruction in IRAs for coal exploration and development are limited to areas under an existing lease (issued before the effective date of the Colorado Rule). This includes 5,900 acres currently leased within IRAs. No rule-related language on location of buried infrastructure needed for capture, collection, and use of coal	Road construction or reconstruction in CRAs is allowed for coal exploration and development in existing lease areas, and in future lease areas within the North Fork coal mining area (19,100 acres). This includes 4,000 acres currently leased in the North Fork coal mining area. Roads constructed or reconstructed for coal exploration or coal related	Current forest plan direction does not limit road construction in areas where coal resources exist. Forest plans include management direction for areas where coal resources exist to protect sensitive surface resources. Current forest plan direction does not limit location of buried infrastructure.

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
	mine methane. No regulatory prohibition on the use of roads constructed or reconstructed for purpose of collecting and transporting coal mine methane	surface activities may also be used for the purpose of collecting and transporting coal mine methane in the North Fork coal mining area when authorized under a gas lease. Roads are temporary roads. Buried infrastructure needed for capture, collection, and use of coal mine methane would be located within road rights-of-way No CRA upper tier acres in either alternative are located in the North Fork coal mining area.	
Road construction for water conveyance facilities	Road construction or reconstruction related to water conveyances is limited in IRAs to areas under an existing permit (issued before effective date of Colorado Rule). Road construction or reconstruction is not allowed for future water conveyance structures.	The Regional Forester determines road construction or reconstruction is needed related to authorized water conveyance structures operated pursuant to a pre-existing water court decree (filed before effective date of Colorado Rule). Water conveyances are defined as facilities associated with the transmission, storage, impoundment, and diversion of water on and across NFS lands. Not allowed within CRA upper tier acres.	Road construction/reconstruction activities in IRAs would be governed by forest plan direction. Forest plan direction includes areas where road construction is prohibited, limited, discouraged, or unrestricted.
Road construction for reducing wildland fire hazards	Construction or reconstruction of a road is not allowed in IRAs to reduce wildland fire hazard to at-risk communities.	Construction or reconstruction of a temporary road is allowed with Regional Forester determination to facilitate tree cutting, sale or removal within the first one-0.5 mile of the CPZ to reduce the wildfire hazard to an at-risk community or municipal water supply.	Road construction/reconstruction activities would be governed by forest plan direction, which varies by management area.

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
		Not allowed within CRA upper tier acres.	
Road construction to facilitate maintenance and restoration of ecosystem characteristics.	Construction or reconstruction of a road is not allowed in IRAs for maintenance and restoration of ecosystem characteristics.	Construction or reconstruction of a temporary road is allowed with Regional Forester determination to facilitate tree cutting, sale or removal within the first one-0.5 mile of the CPZ to maintain or restore ecosystem characteristics. Not allowed within CRA upper tier acres.	Road construction/reconstruction activities would be governed by forest plan direction, which varies by management area.
Comparison of Linear Construction Zones by Alternative			
General LCZ provisions	Does not include any prohibition on LCZs Does not include additional environmental analysis requirements for LCZs. Does not include specific provisions about decommissioning and closing LCZs.	Generally prohibits LCZs in CRAs. Includes additional environmental analysis and determination requirements for LCZs determining that: motorized access without LCZs is not technically feasible; within a native cutthroat trout catchment or identified recovery watershed, an LCZ would not diminish conditions in the water influence zone and in occupied native cutthroat habitat over the long-term; an LCZ is consistent with the applicable forest plan and use of watershed conservation practices. Includes specific provisions about decommissioning and closing LCZs. Standard and upper tier provisions are the same.	Some Forest plans provide direction to follow to protect resource values when proposing the use of an LCZ. Does not include additional environmental analysis requirements for LCZs. Does not include specific provisions about decommissioning and closing LCZs.
LCZs for water conveyance structures	No rule-related prohibition on LCZs.	The Regional Forester determines an LCZ is needed related to an authorized water conveyance structure operated pursuant to a pre-existing water court decree (filed before effective date of Colorado	Generally forest plan direction does not limit the use of LCZs.

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
		Rule). Water conveyances are defined as facilities associated with the transmission, storage, impoundment, and diversion of water on and across NFS lands.	
LCZs for electrical power lines and telecommunication lines	No rule-related prohibition on LCZs or location of electrical power lines or telecommunication lines.	Construction of an LCZ within non-upper tier acres, with Regional Forester determination, based on a site-specific NEPA analysis, is allowed for the construction, reconstruction, or maintenance of existing or future authorized electrical power lines and telecommunication lines where it has been determined such utility lines cannot be located outside of a CRA without causing substantially greater environmental damage. Not allowed in CRA upper tier acres.	Generally forest plan direction does not limit the use of LCZs or the location of electrical power lines or telecommunication lines.
Use of LCZs for construction or reconstruction of an oil and gas pipeline	There is no rule-related language prohibiting the use of an LCZ for this purpose.	Where the Regional Forester determines a LCZ is needed within non-upper tier acres to allow for the construction or reconstruction of a pipeline associated with an oil and gas lease that allows surface use within a CRA or the construction or reconstruction of a pipeline needed to connect to infrastructure within a CRA from outside a CRA where such a connection would cause substantially less environmental damage than alternative routes. Not allowed within CRA upper tier acres.	Generally forest plan direction does not limit the use of LCZs.

Descriptor	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action Colorado Roadless Rule Alternative 4: CO Roadless Rule w/ Public Proposed Upper Tier*	*Alternative 3: Provisions of Forest Plans*
Other Requirements for Management of Roadless Areas in Colorado			
Oil and gas pipelines where the source(s) and destination(s) of the oil and natural gas is not within the roadless area	No prohibition on oil or gas pipelines through IRAs from sources outside IRAs.	The construction of pipelines for the purposes of transporting oil or natural gas through non-upper tier acres where the source(s) and destination(s) of the pipeline are located exclusively outside of a CRA shall not be authorized.	Forest plans generally allow oil or gas pipelines through IRAs from sources outside IRAs

Table 2-7. *Comparison of Alternatives by Environmental Consequences (Refer to Chapter 3 for Details)*

Issue or Affected Resource	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action- Proposed Rule*	*Alternative 3: Provisions of Forest Plans*	*Alternative 4: Proposed Rule w/ Public Proposed Upper Tier*
Minerals and Energy Development	No roads for saleable mineral development in IRAs. No effect to the statutory right of reasonable access to prospect, explore, and develop locatable minerals. 5,900 acres of accessible coal resources in IRAs. Least total disturbance associated with oil and gas development estimated at 143 miles of road, 705 wells, and 146 well pads. No roads for development of geothermal resources.	No roads for saleable mineral development in CRAs. No effects to the statutory right of reasonable access to prospect, explore, and develop locatable minerals. 19,100 acres of accessible coal resources in CRAs in North Fork coal-mining area. Disturbance associated with oil and gas development estimated at 146 miles of road, 715 wells and 162 well pads. No roads for development of geothermal resources.	May allow for more saleable mineral development if road construction is allowed. No effects to the statutory right of reasonable access to prospect, explore, and develop locatable minerals. 36,400 acres of accessible coal resources in IRA. Disturbance associated with oil and gas development estimated at 159 miles of road, 787 wells and 160 well pads. Roads for geothermal development allowed.	No roads for saleable mineral development in CRAs. No effects to the statutory right of reasonable access to prospect, explore, and develop locatable minerals. 19,100 acres of accessible coal resources in CRAs in North Fork coal-mining area. Disturbance associated with oil and gas development estimated at 146 miles of road, 715 wells and 162 well pads. No roads for development of geothermal resources.
Soils	No major difference among alternatives related to the risk of soil impacts. Alternatives 1 and 4 would have the least risk of adverse effects, and Alternative 2 would have minimal risk, followed by Alternative 3. However, these differences are minimal because they would be small and spread over a wide geographic area. Most of the potential effects would be mitigated by site-specific mitigation measures. The risk of post-fire soil erosion may be higher under Alternative 1 and lowest under Alternative 3 as a result of projected levels of fuel treatments.			
Water Resources	Effects to water quality are expected to be small and of short duration. Alternative 1 would have little risk of impacts to water quality, quantity or stream flow and Alternative 3 would have the greatest potential for impacts. Alternatives 2 and 4 would have no risk within the upper tier and limited risk in the non-upper tier acres, with those risks focused in the CPZ and coal areas. Alternative 2 would have slightly more potential for impacts than Alternative 4.			
Air Resources	Differences in effects on air quality do not substantially differ between the alternatives. Atmospheric emissions within the analysis area are not expected to increase to a level that would be likely to exceed state or federal air quality standards. Alternative 1 has slightly greater chance of smoke related impact because of the limited flexibility to treat hazardous fuels and Alternative 3 has the least.			
Forest Vegetation, Forest Health and Timber Management	Opportunities across IRAs to use vegetation management actions to maintain and restore ecosystem characteristics, including to improve response to insect and disease outbreaks and climate-induced stressors, as long as tree cutting focuses on	No treatment in upper tier acres. Fewer opportunities than Alternatives 3, but more opportunities than Alternative 1 and 4, to use vegetation management actions to maintain and restore	Greatest opportunities to use vegetation management actions maintain and restore ecosystem characteristics, including resilience to insect and disease outbreaks and climate induced stressors.	Impact to treatments is similar to Alternative 2 within non-upper tier acres, but fewer opportunities exist for treatments with additional upper tier acres.

Issue or Affected Resource	Alternative 1: 2001 Roadless Rule	Alternative 2: Proposed Action- Proposed Rule	Alternative 3: Provisions of Forest Plans	Alternative 4: Proposed Rule w/ Public Proposed Upper Tier
	small-diameter trees to maintain one or more roadless area characteristics, and is used infrequently	ecosystem characteristics, including to improve response to insect and disease outbreaks and climate-induced stressors. In non-upper tier, tree cutting would be infrequent and maintain or restore one more roadless area characteristics.		
Flexibility to Conduct Hazardous Fuels Treatments	Least flexibility to conduct hazardous fuel reduction around at-risk communities and municipal water supply systems.	More flexibility than the 2001 Roadless Rule (and Alternative 4) to conduct hazardous fuel reduction and reduce fire risk to communities and municipal water supply systems. Less flexibility than forest plans. Tree cutting for hazardous fuels treatment prohibited in upper tier acres.	Greatest flexibility to conduct hazardous fuel reduction and reduce fire risk to communities and municipal water supply systems. A wide variety of options are available for fuel reduction which can include road construction as determined by forest plans if needed to facilitate treatment.	Impact for fuels treatments similar to Alternative 2 within non-upper tier CPZ acres, but with fewer opportunities for treatments where additional upper tier acres overlap with CPZs. Tree cutting for hazardous fuels treatments prohibited in upper tier acres.
Risk of Spread of Invasive Plants	Lowest risk of spread because of low projections of road construction or tree cutting. Projects would be concentrated where existing oil/gas and coal leases allow road construction.	No risk within upper tier acres. Low risk of spread within non-upper tier CRA acres. Projects would be focused within CPZs, where existing oil/gas leases allow road construction, and within the North Fork coal mining area.	Substantially greater risk of spread because of the greatest projections for road construction, tree cutting, fuels management, as well as future oil, gas, and coal activities, compared to other alternatives.	Similar risk to Alternative 2, but less risk overall with additional upper tier acres.
Threatened, Endangered, or Sensitive Plants	No adverse impacts to threatened or endangered plants because no road construction or tree cutting, sale or removal is projected to occur where threatened or endangered plants exist. Little impact to sensitive plants overall, but some risk in those areas where activities are	No adverse impacts to threatened or endangered plants because no road construction or tree cutting, sale or removal is projected to occur where threatened or endangered plants exist. No risk of adverse impacts to sensitive plants in the upper	No adverse impacts to threatened or endangered plants because no road construction or tree cutting, sale, or removal is projected to occur where threatened or endangered plants exist. Greatest risk of adverse impacts to sensitive plants	No adverse impacts to threatened or endangered plants because no road construction or tree cutting, sale, or removal is projected to occur where threatened or endangered plants exist. Risk to sensitive plants similar to Alternative 2, but less risk overall due to additional upper tier acres.

Issue or Affected Resource	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action- Proposed Rule*	*Alternative 3: Provisions of Forest Plans*	*Alternative 4: Proposed Rule w/ Public Proposed Upper Tier*
	focused on existing oil/gas and coal leases.	tier acres, and little risk in non-upper tier where activities are likely to be focused, CPZs, coal area, and existing oil and gas leases.	with additional activities.	
Aquatic Species and Habitat	No measurable declines are expected on threatened and endangered (T&E) species, sensitive species, and MIS population trends; downstream T&E species; or wetlands and riparian areas under any alternative. The assumption is that mitigation measures and best management practices would help avoid or minimize impacts from the projected activities.			
	High level of protection and some risk for adverse impacts with tree cutting, coal, and oil/gas activities. Provides protection level to cutthroat trout similar to Alternatives 2 and 4, but greater than Alternative 3.	Relatively high level of protection and a minimum risk of short-term impacts, especially in the CPZ, coal, and oil/gas areas. High level of protection with little to no activities within the upper tier acres, more protective than Alternative 1 or 3. Overall, provides greater protection for cutthroat trout compared to Alternative 3.	Least amount of protection and greatest potential for adverse impacts as compared to Alternatives 1, 2, and 4.	Similar impacts to Alternative 2, but additional acres of upper tier would provide greater protection with fewer fuels-related vegetation opportunities for activities on those acres.
Terrestrial Species and Habitat	For all alternatives, site-specific design criteria and mitigation measures are expected to avoid or minimize adverse effects from projected tree cutting and road construction. For all alternatives, projected activities are not likely to adversely affect federally listed species or designated critical habitat, or result in the loss of viability or cause a trend toward Federal listing for sensitive species. Given the large acreage afforded roadless protection under Alternatives 1, 2, and 4, any changes in population trends for MIS likely would be an increase above current Forest Plan projections.			
	Little risk to terrestrial species and habitat from projected tree cutting and road construction. Opportunities for tree cutting (when combined with prescribed fire) could improve habitat and reduce potential for adverse effects from severe wildfire.	Some increased risk to terrestrial species and habitat from projected tree cutting and road construction compared to Alternatives 1 and 4 within non-upper tier acres, mostly within CPZs (though effects are expected to be minimal and short-lived) and within the North Fork coal mining area. Less risk to terrestrial species and habitat in upper tier acres	Greatest risk to terrestrial species and habitat from projected tree cutting and road construction. Greatest opportunity for tree cutting (in combination with prescribed fire) to improve habitat and reduce adverse effects from severe wildfire.	Similar impacts to Alternative 2, but with additional upper tier acres, even less risk could be expected with little activity in those areas.

Issue or Affected Resource	Alternative 1: 2001 Roadless Rule	Alternative 2: Proposed Action- Proposed Rule	Alternative 3: Provisions of Forest Plans	Alternative 4: Proposed Rule w/ Public Proposed Upper Tier
		than Alternative 1. Opportunities for tree cutting (when combined with prescribed fire) could improve habitat and reduce potential for adverse effects from severe wildfire. Updated inventory of roadless areas provides higher quality portfolio of wildlife habitat within roadless areas.		
Livestock Management	None of the alternatives would be expected to have any substantial beneficial or adverse impacts on livestock management operations in roadless area livestock grazing allotments.			
Scenic Quality	Projected activity levels (e.g., tree cutting) occur on relatively small percentages of total roadless area under all alternatives.			
	Maintains the most IRA acreage at high to very high scenic integrity levels where it exists. However, many substantially altered areas would continue to exhibit low scenic integrity.	Retains most CRAs at high or very high integrity, including CRAs in upper tiers; the scenic integrity of some areas would be reduced by the roads and road-related activities projected as likely to occur in CRAs. New unroaded areas would add to areas protected for high scenic integrity. Tree cutting associated with treatments may result in high quality scenic levels in the long-term.	Highest risk to scenic integrity, as more IRA acres might shift to a moderate to low scenic integrity as a result of road and tree cutting activities projected. Greater opportunities for treatments may contribute more to high quality scenic levels in the long-term.	Similar to Alternative 2 within CRAs that are not upper tier. Greater assurances about preserving high quality scenic levels in upper tier acres, compared to Alternative 2.
Recreation	The substantially altered portion of the IRA inventory would continue to be inconsistent with primitive or semi-primitive settings (11% of IRA acres). Likely to retain a high proportion of acreage in primitive or semi-primitive settings on the	Likely to retain a high proportion of acreage in primitive or semi-primitive settings. However, some areas where road construction and tree cutting, sale, or removal is projected to occur could shift to less primitive settings.	Least likely to retain a high proportion of acreage in primitive or semi-primitive settings; especially where road construction and tree cutting, sale, or removal is projected to occur.	Likely to retain the greatest proportion of acreage in primitive or semi-primitive settings than other alternatives within the roadless areas. The exclusion of the substantially altered acreage and inclusion of new roadless acres would create a

Issue or Affected Resource	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action- Proposed Rule*	*Alternative 3: Provisions of Forest Plans*	*Alternative 4: Proposed Rule w/ Public Proposed Upper Tier*
	remaining 89% of IRA acres. The newly identified roadless acres (409,500 acres) where road construction and tree cutting, sale, or removal is projected to occur that are not within the IRAs could shift to less primitive settings.	The exclusion of the substantially altered acreage and inclusion of new roadless acres would create a more homogeneous primitive or semi-primitive recreation setting.		more homogeneous primitive or semi-primitive recreation setting.
Economics	Alternative 1 results in no increase of average annual production, employment or labor income. Jobs from energy development estimated at 2,100 annually. Federal mineral lease payments and tax revenues from oil and gas for are estimated to average $13.1 million annually. Revenue from coal for Alternative 1 is estimated at $15.7 million. Alternative 1 generally generates 85% of output, employment and labor as compared to Alternative 3. Alternative 1 places the highest priority on protection of non-market roadless area characteristics. This alternative offers the fewest opportunities for hazardous fuel treatments near at-risk communities, and treatments for forest health.	Alternative 2 results in increases in average annual production, employment and labor income. Jobs from energy development with Alternative 2 are estimated at 2,300 annually. Federal mineral lease payments and tax revenues from oil and gas are estimated at $13.1 million annually, the same as Alternative 1 and 4. Payments and tax revenue from coal is estimated at $18.1 million annually. Alternative 2 generally generates 95% of output, employment and labor, compared to Alternative 3. Alternative 2 places a high priority on protection of non-market roadless area characteristics, especially within the upper tier acres. This alternative offers focused opportunities for hazardous fuel treatments near at-risk communities, some water conveyances, and coal extraction.	Alternative 3 results in increases in average annual production, employment and labor income. Jobs from energy development with Alternative 3 are estimated at 2,400 annually. Federal mineral lease payments and tax revenues from oil and gas are estimated to be $14.5 million annually. Payments and tax revenue from coal are estimated to be $18.1 million annually, the same as Alternatives 2 and 4. Alternative 3 generates the highest level of outputs, employment and labor. This alternative includes the largest potential change to wildlife habitat along with the greatest opportunities for hazard fuel reduction for at-risk communities, forest health treatments, energy mineral development and	Alternative 4 results in increases in average annual production, employment and labor income. Revenue from oil and gas, and coal, outputs, employment and labor are the same as Alternative 2. Alternative 4 places a high priority on protection of non-market roadless area characteristics, especially within the upper tier acres. This alternative limits opportunities for hazardous fuel treatments near at-risk communities, some water conveyances, and coal extraction.

Issue or Affected Resource	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action- Proposed Rule*	*Alternative 3: Provisions of Forest Plans*	*Alternative 4: Proposed Rule w/ Public Proposed Upper Tier*
			production.	
Developed Ski Areas	Least opportunities for ski area development and expansion due to forest plan allocations for ski areas outside of existing permit areas (1,700 acres) would prohibit road construction. On the 6,600 acres within the IRA boundaries and under permit before the effective date of rulemaking for road construction and tree cutting, sale or removal would be allowed.	Greater opportunity for ski area development and expansion. Expansion and development can occur on the 8,300 acres removed from the CRAs, including the forest plan allocations for ski areas outside of existing permit areas (1,700 acres).	The greatest opportunity for ski area development and expansion can occur on the full 8,300 acres that is under a ski area permit and allocated to ski area development in forest plans. In addition, forest plans can be amended or revised to expand ski area allocations beyond the current allocation.	Same as Alternative 2.
Lands-Special Use Authorizations	Special use authorizations in IRAs would prohibit road construction. Road construction would be prohibited for the development of water resources. There would be no prohibition on the use of LCZs for future electrical power lines or telecommunication lines, water conveyance structures and oil and gas pipelines from sources outside of IRAs.	Special use authorizations in CRAs would prohibit road construction. Limited exceptions for the use of LCZ for future electrical power lines or telecommunication lines, water conveyance structures and oil and gas pipelines from sources outside of CRAs.	Current and future special use authorizations would generally allow for road construction; except where prohibited under forest plans. There would be no prohibition on the use of LCZs for future electrical power lines or telecommunication lines, water conveyance structures or oil and gas pipelines.	More limited than Alternative 2 within the upper tier, because Alternative 4 contains a higher proportion of upper tier acres, and fewer restrictions than Alternative 1.
Abandoned Mines and Public Safety	All alternatives allow construction or reconstruction of roads needed to conduct a response action under CERCLA or to conduct a natural resource restoration Sec. 311 of the Clean Water Act, or the Oil Pollution Act.			
Wilderness	Alternatives 1 and 2 have a low likelihood of affecting wilderness characteristics because tree cutting, sale, or removal and road construction are prohibited in Wilderness areas and projected activities within roadless areas are not expected to occur adjacent to wilderness area boundaries.		Higher risk of adverse effect to wilderness areas because of the higher potential for tree cutting, sale, or removal and road construction and a higher potential that these activities could occur adjacent to wilderness boundaries.	Same as Alternatives 1 and 2.

Issue or Affected Resource	*Alternative 1: 2001 Roadless Rule*	*Alternative 2: Proposed Action- Proposed Rule*	*Alternative 3: Provisions of Forest Plans*	*Alternative 4: Proposed Rule w/ Public Proposed Upper Tier*
Administratively and Congressionally Designated Areas	There are no differences between the alternatives to Congressionally designated areas. They have been removed from the IRA and CRA acreage as they are managed under Public Laws. None of the alternatives project tree cutting, sale, or removal, or road construction in administratively designated areas.			
Roadless Area Characteristics	Minimal effect to roadless area characteristics because there is little projected activity to occur. Substantially altered acres have reduced roadless area characteristics due to past road construction and tree cutting (11% of IRA acres). No consideration or regulatory protection of roadless area characteristics on 409,500 acres outside of IRA boundaries.	Minimal effect to roadless area characteristics because there is little projected activity to occur. Consideration and protection of roadless area characteristics on 409,500 acres within CRA boundaries.	More effect to roadless area characteristics because there is an increase in projected activities to occur compared to the other alternatives. Some risk of adverse effects to roadless area characteristics because there are no regulatory prohibitions on road construction, use of LCZs or tree cutting, sale or removal on any of the analysis area.	Minimal effect to roadless area characteristics because there is little projected activity to occur. Consideration and protection of roadless area characteristics on 409,500 acres within CRA boundaries.
Social Values	No disproportionate negative impact on minority or low-income groups as defined in the Bureau of the Census' Current Population Reports. Preference toward preservation of non-development social values.	No disproportionate negative impact on minority or low-income groups as defined in the Bureau of the Census' Current Population Reports. Preference toward non-development social values and some slight preference toward conservation.	No disproportionate negative impact on minority or low-income groups as defined in the Bureau of the Census' Current Population Reports. Less preference toward non-development social values than Alternatives 1, 2, and 4.	Similar to Alternative 2, but not preferred by conservation.

Chapter 3 Affected Environment and Environmental Consequences

This chapter summarizes the physical, biological, social, and economic environment of the project area and the potential effects of implementing each alternative on the environment. It also presents the programmatic analysis and comparison of alternatives presented in the previous chapter.

This analysis is structured around four alternatives that were described in detail in Chapter 2:

- **Alternative 1:** The 2001 Roadless Rule (No Action)
- **Alternative 2:** Colorado Roadless Rule (Proposed Action)
- **Alternative 3:** Provisions of Forest Plans
- **Alternative 4:** Colorado Roadless Rule with Public Proposed Upper Tier

For each resource, the description of the affected environment (current conditions and trends) is followed by a comparison of the environmental consequences (impacts or effects) associated with each alternative.

Alternative 1, the 2001 Roadless Rule, represents the no action alternative and the continuation of current management. Alternative 1 is also the environmental baseline for comparison of the potential impacts of the action alternatives. In addition, Alternative 3, Provisions of Forest Plans, as a baseline, offers a valuable comparison to fully understand potential impacts. Therefore, Alternative 3 is also used for comparision purposes.

Analysis Area

The analysis area for determining effects is limited to NFS lands determined to be roadless areas within the State of Colorado. Roadless areas in Colorado are generally undeveloped areas, typically exceeding 5,000 acres unless they are adjacent to an existing wilderness area or other Congressional designation. The IRAs were identified through a variety of assessments and inventories including, the Forest Service's Roadless Area Review and Evaluation (RARE II) processes, and forest planning. The CRAs are an update of the IRAs.

While the areas and acreages for each alternative are different, the analysis area for all of the alternatives is the same in order to compare the environmental effects of each alternative (see Map Packet). The analysis area is 4,653,100 acres and includes NFS lands within: (1) the CRAs; and (2) the 2001 IRAs, excluding proclaimed wilderness and other Congressionally designated areas. The alternatives differ in terms of which acres would be managed according to a roadless rule and forest plans, and which acres would be managed according to direction in the forest plan only. Table 3-1 displays the number of acres in the analysis area that would be managed according to both a roadless rule and forest plans, as well as the number of acres that would be managed according to the forest plans only under each alternative.

Table 3-1. *Management Provisions that Apply to Each Portion of the Analysis Area by Alternative*

Alternative	***Portion of the Analysis Area for Alternatives (Total analysis area = 4,653,100 acres)***		
	Roadless Acres in Common (IRAs & CRAs 3,776,200 acres)	***Substantially Altered & Ski Area Acres (IRAs only 467,400 acres)***	***New Roadless Acres (CRAs only 409,500 acres)***
Alternative 1: 2001 Roadless Rule (No Action)	inventoried roadless areas (IRAs): forest plan & 2001 Roadless Rule	inventoried roadless areas (IRAs): forest plan & 2001 Roadless Rule	forest plan
Alternative 2: Colorado Roadless Rule (Proposed Action)	CRAs: forest plan & CO Rule	forest plan	CRAs: forest plan & CO Rule
Alternative 3 :Provisions of Forest Plans	forest plan	forest plan	forest plan
Alternative 4: Colorado Roadless Rule with Public Proposed Upper Tier	CRAs: forest plan & CO Rule	forest plan	CRAs: forest plan & CO Rule

Totals might not add due to rounding.

Alternative 1 identifies 4.24 million acres that would be managed according to the provisions of forest plans and the 2001 Roadless Rule. The additional 409,500 acres within the analysis area that were not covered by the 2001 Roadless Rule and that were found to contain roadless area characteristics would be managed according to the respective forest plan.

Alternative 2 identifies 4.19 million acres (3,776,200 acres of the 2001 Roadless Rule IRAs and an additional 409,500 acres with roadless area characteristics) that would be managed according to forest plans and the Colorado Roadless Rule. The 467,400 acres outside the CRAs would be managed according to the respective forest plan and includes acres that have been substantially altered; acres permitted for ski areas; or acres that forest plans have currently allocated to ski areas. This alternative designates a total of 1,219,200 upper tier acres.

Alternative 3 would exempt Colorado from the requirements of the 2001 Roadless Rule, and all of the acres within the analysis area would be managed according to the respective forest plan.

Alternative 4 identifies 4.19 million acres (3,776,200 acres of the 2001 Roadless Rule IRAs and an additional 409,500 acres with roadless area characteristics) that would be managed according to the Colorado Roadless Rule and forest plans. The 467,400 acres that include permitted or forest plan allocated ski area acres and those that have been substantially altered would be managed according to the respective forest plan. This alternative has the same provisions as Alternative 2 and differs by the number of acres designated as upper tier. This alternative designates 2,614,200 acres as CRA upper tier acres.

Further details on the roadless inventory for each alternative are found in Chapter 2.

Analysis Framework

The scope of this analysis is programmatic in nature. The actions to be analyzed consist of establishing regulatory prohibitions with specific exceptions. There are no ground-disturbing activities proposed or authorized by any of the alternatives. All subsequent proposals for activities

would require the preparation of a separate site-specific analysis and decision, pursuant to the NEPA. The potential environmental consequences are based on projected probable actions and are primarily described in qualitative and comparative terms.

Prohibitions and exceptions apply to tree cutting, sale, or removal in roadless areas; road construction or reconstruction; and, in some alternatives, certain other activities, such as linear construction zones (LCZs), or construction of oil and gas pipelines, electrical power lines, telecommunication lines, and water conveyances. In order to display the differences in environmental consequences between the alternatives, this analysis uses assumptions and probable levels of three activities because they have the greatest likelihood of altering landscapes, thereby resulting in the loss of roadless area characteristics:

- tree cutting, sale, or removal
- road construction or reconstruction
- LCZs

In order to compare the alternatives, it was necessary to project what was likely to occur under each one. To make the forecast, project planners looked at past and projected needs on the ground, which provided information regarding the likelihood that tree cutting, sale, or removal; road construction or reconstruction; and LCZs would occur within the full analysis area over the next 15 years under the management direction contained in each alternative. This information was used to make projections on the number of acres of tree cutting, sale, or removal; the number of miles of road construction or reconstruction and the number of miles of linear construction zones that may occur under each alternative. The projections are only estimates and are not proposals for action.

Analysis Assumptions and Projections

This section lists the three activities and describes the assumptions and projections for each.

Tree Cutting, Sale, or Removal

Assumptions

The following assumptions were made for tree cutting, sale, or removal activities that are projected to occur within the analysis area under the alternatives:

- Budgets would continue to be flat. The primary focus for tree cutting, sale, or removal for the foreseeable future would be fuels reduction adjacent to at-risk communities.
- Under Alternative 1, tree cutting to maintain or restore the characteristics of ecosystem composition and structure would be used primarily in the ponderosa pine/Douglas-fir and pinyon-juniper forest-cover types. Lodgepole pine cover types rarely fit this exception. This exception is not specifically associated with at-risk communities or municipal water supply systems, but its use likely would be associated with these. With no corresponding road construction exception, tree cutting under this exception is limited for Alternative 1.
- Under Alternatives 2 and 4, tree cutting to maintain or restore ecosystem characteristics includes potential projects to reduce tree mortality from the spread of insects and diseases that would change ecosystem composition and structure. A temporary road is allowed for these treatments when they are within 0.5 mile of an at-risk community. These projects would be infrequent.

- Under Alternatives 2 and 4, most tree cutting, sale, or removal would occur for hazardous fuel reduction within 0.5 mile of at-risk communities where temporary roads can be used to remove the fuels. Activities are projected to occur in lodgepole pine, ponderosa pine/Douglas-fir, and pinyon-juniper forest cover.
- Even if it is allowed for in an alternative, it would be rare to cut and remove trees for hazardous fuel reduction where the average log-skidding distances to an existing or newly constructed temporary road exceed 1,000 feet. However, in some instances, log-forwarding equipment could be used to cut and remove trees when the average skid distance exceeds 1,000 feet, without the need for additional temporary roads. In other cases, machinery such as a masticator, could be used without additional road access to cut and treat trees and undergrowth on-site. Crews could be used to cut trees and treat the resulting slash on site by hand. Prescribed fire can be used in all alternatives and can include cutting trees for a fire break, which is considered incidental tree cutting to facilitate a management activity.
- Tree cutting would occur at historic levels in all alternatives when it is incidental to an otherwise permitted purpose; such as, removal of hazard trees adjacent to roads or trails for public health and safety reasons; fire line construction for wildland fire suppression or control of prescribed fire; survey and maintenance of property boundaries; mining operations, maintenance of power or water lines, or trail maintenance or construction.
- Tree cutting and removal for personal or administrative use would occur at the historic levels on these acres under all alternatives. Personal use includes activities, such as cutting Christmas trees and firewood. Administrative use includes such activities as construction of fences or footbridges.

Projections

Projections are based on the exceptions under each alternative that allow tree cutting, sale, and removal in roadless areas and on the assumptions described above. All projections for tree cutting, sale, or removal are annual averages and can be expected to vary from year to year. For every alternative, projected probable activities are those that would occur in the analysis area for the next 15 years. Table 3-2 displays the purpose for and number of acres where tree cutting, sale, or removal is projected to occur under the alternatives over the next 15 years. Alternative 3 has the greatest number of acres where tree cutting, sale, or removal is projected to occur followed by Alternatives 2, 4, and 1 respectively. More information about the likelihood of tree cutting, sale, or removal activities, including projected acreages is contained in the project record.

Table 3-2. *Distribution of Average Annual Tree Cutting, Sale, or Removal Projections in Analysis Area by Alternative and Purpose*

Purpose for Projected Tree Cutting, Sale, or Removal	Average Annual Tree Cutting, Sale, or Removal in Acres						
	Alternative 1		Alternative 2		Alternative 3	Alternative 4	
	IRA Roadless	Other Acres forest plan	CRA Roadless	Other Acres forest plan	All Acres, forest plan	CRA Roadless	Other Acres forest plan
	thousands of acres						
Hazardous fuels reduction treatments	30	860	4,900	610	13,350	1,390	610
Restore and maintain ecosystem	1,410	250	930	700	3,690	370	700
TEPS habitat improvement	50	0	60	0	80	10	0
Other[1]	20	40	90	40	260	30	40
Acres of Total Tree Cutting, Sale, or Removal[2]	***1,520***	***1,150***	***5,970***	***1,350***	***17,380***	***1,790***	***1,350***

Data source: *Forest Service Region 2, August 2011*

1) Other includes tree cutting that is incidental to the implementation of a management activity and tree cutting for personal or administrative use

2) Totals might not add due to rounding

Road Construction and Reconstruction

Approximately 1,200 miles of NFS and 42 miles of other authorized roads occur within substantially altered portions of IRAs, based on the Forest Service Region 2 INFRA GIS roads database (August 2011). Other authorized road miles include state, county, local, and private roads. No authorized roads occur in CRAs. Unauthorized or non-system roads are not included in the mileage. Inventories indicate that at least 45 miles of unauthorized roads exist in the IRAs and CRAs. Additional unauthorized roads likely exist in roadless areas but have not been identified. It is anticipated that, in most cases, the unauthorized roads, as well as some of the authorized roads within the analysis area would be decommissioned as budgets allow. Table 3-3 displays the miles of NFS roads and other authorized roads on NFS lands in roadless areas by alternative.

Table 3-3. *Miles of Existing Authorized Roads In Roadless Areas*

Type of Road	Roads in IRAs (Alternatives 1 and 3)	Roads in CRAs (Alternatives 2 and 4)
	total miles of road	
National Forest system roads	1,199	0
Other authorized roads	42	0
Total existing roads	1,241	0
Roads to be decommissioned	117	0

Data source: *Forest Service Region 2) INFRA-GIS roads databases, April 2011*

Assumptions

The following assumptions were made for road construction or reconstruction that could occur within the analysis area under the alternatives:

- Road construction or reconstruction would not likely increase in the foreseeable future because the appropriated budget is anticipated to be flat or declining. In addition, there is a backlog of road maintenance; therefore, there is no emphasis on constructing new roads that need to be maintained.
- All road construction/reconstruction would be conducted in accordance with road engineering design standards found in Forest Service Handbook 7709.59.
- In all alternatives, roads would be constructed to the minimum necessary level to accommodate access. Where a project, such as vegetative treatment, could be completed without road construction, this would usually be the chosen option. If road construction is needed for a project, a temporary road would be the first option, while a permanent road would usually be the last option if allowed by the alternative.
- Under Alternatives 2 and 4, the temporary road requirements found in Appendix F are followed. In addition, all road construction within CRAs are closed to public vehicle travel and decommissioned after their intended use. This is likely, but not required, to occur in the other alternatives.
- The roads projected in all of the alternatives were over the next 15 years. Table 3-4 displays these miles on a yearly basis. For existing oil and gas leases that allow road construction, projections are associated with reasonable foreseeable development of the leases over the next 15 years. Coal development is also projected for leases over the next 15 years. It is understood that future energy policies, prices, and development are highly uncertain.

Projections

All projections for road construction or reconstruction are annual averages and can be expected to vary from year to year. The purpose for and number of miles of road construction or reconstruction projected under the alternatives for the analysis area is identified in the project record. The projections are based on the exceptions for road construction or reconstruction that are allowed in roadless areas under each alternative, along with the assumptions described above.

Road construction and reconstruction for oil and gas development would occur almost exclusively on the GMUG and White River National Forests. Alternative 3 projects the greatest number of miles of road construction or reconstruction for oil and gas development because, under the other alternatives, all future oil and gas leases as of the date of the Colorado Rule would not allow road construction. Under Alternatives 2 and 4, roads allowed by existing oil and gas leases are only temporary and would not become forest or permanent roads. Under Alternatives 1 and 3, oil and gas roads are considered forest or administrative roads and could be made into permanent roads if deemed appropriate according to the forest plan.

Most projected coal-related temporary roads are for exploration or methane drainage purposes, and these would be on the landscape for two to five years. A small number of coal roads access ventilation shafts and monitoring facilities that are expected to be on the landscape for 30 years or more. The projections for roads associated with coal lease, exploration, and development were based on a 39,100-acre area, the only place on NFS lands in Colorado where economically viable coal

resources are presently being developed. There are 7,100 acres currently leased within the 39,100-acre area. Of the 7,100 acres leased, 5,900 acres are within IRAs and 4,025 acres are within CRAs. No additional roads for coal leases would be allowed within the IRAs under Alternative 1. Alternatives 2 and 4 allow roads associated with coal leasing in the CRAs only within the 19,100 acre North Fork coal mining area; where approximately 15,100 acres are not currently leased. Alternative 3 allows roads for coal leasing within the entire 39,100-acre area. All of the roads constructed for coal exploration and development under Alternatives 2 and 4 would be temporary and must be decommissioned. Under Alternatives 1 and 3, roads constructed could be converted to permanent roads, if deemed appropriate according to the forest plan.

The projections do not identify roads that might be needed in emergencies. The greatest number of road miles for all activities is projected to occur under Alternative 3 followed by Alternatives 2, 4, and 1, respectively. Most road construction or reconstruction would take place in areas previously leased for oil and gas development, in the North Fork coal mining area, and adjacent to communities for hazardous fuels reduction.

Table 3-4. *Distribution of Average Annual Road Construction and Reconstruction Projections in Analysis Area for Each Alternative, by General Purpose Roads*

	Average annual road construction and reconstruction						
	Alternative 1		Alternative 2		Alternative 3	Alternative 4	
Projected road construction or reconstruction for general purpose	IRA roadless	Non-IRA acres in analysis area*	CRA roadless	Non-CRA acres in analysis area*	All acres, forest plan	CRA roadless	Non-CRA acres in analysis area*
	- - - - - - - - - - - - - - - - - - average annual miles - - - - - - - - - - - - - - - - - -						
Oil and gas	9.5	0.9	9.7 [1]	0.7	11.9	9.7 [1]	0.7
Coal mining	0.5	0.6	3.3 [1]	0.1	4.9	3.3 [1]	0.1
All other purposes	1.4	0.9	3.9	2.0	9.0	2.1	2.0
Totals[2]	***11.4***	***2.4***	***16.9***	***2.8***	***25.8***	***15.1***	***2.8***

Data source: *Forest Service Region 2, August 2011.*

** Managed according to forest plan direction.*

1) *Can only be temporary roads under Alternatives 2) and 4) and would be restored after use.*

2) Totals might not add due to rounding.

Summary Road Construction/Reconstruction Projections

Table 3-5 displays a summary of the total average annual miles of road projected to be constructed or reconstructed for all activities under each alternative. Table 3-5 also displays the type of road (temporary or forest) that is projected to be constructed or reconstructed.

Table 3-5. *Average Annual Road Construction and Reconstruction Miles Projected by Alternative*

	Average annual road construction and reconstruction						
	Alternative 1		Alternative 2		Alternative 3	Alternative 4	
Type of projected road construction or reconstruction	IRA roadless	Other acres forest plan	CRA roadless	Other acres forest plan	All acres, forest plan	CRA roadless	Other acres forest plan
	- - - - - - - - - - - - - - - - - - average annual miles - - - - - - - - - - - - - - - - - -						
Temporary	11.2	2.4	16.6	2.6	24.1	14.9	2.7
Forest[1]	0.2	0	0.3	0.2	1.7	0.2	0.1
Total Construction[2] (nearest mile)	***11.4***	***2.4***	***16.9***	***2.8***	***25.8***	***15.1***	***2.8***

Data source: *Forest Service Region 2, August, 2011.*

1) These numbers represent the highest level of road construction, in some cases temporary roads might be used rather than a Forest road.
2) Totals might not add due to rounding and might not add to the totals in Table 3-3, Table 3-4, and Table 3-5 due to rounding.

Linear Construction Zones

An LCZ is a short-term construction area and equipment staging and movement area for constructing a linear feature when continued roaded facility operation and maintenance access is not needed.

Assumptions

Under Alternative 3, while forest plans are usually silent on the use of LCZs, a forest plan may restrict the construction of linear features within a particular management area, depending on management area direction.

Projections

Table 3-6 displays a summary of the average annual miles of LCZs projected to be constructed for all three of the above listed activities under each of the alternatives. Overall, Alternative 3 projects the greatest number of miles of LCZs, with the other three alternatives projecting identical miles.

Table 3-6. *Average Annual LCZ Miles Projected by Alternative*

	Average Annual LCZ Miles						
	Alternative 1 [1]		Alternative 2		Alternative 3	Alternative 4	
Type of projected LCZ	IRA roadless	Other acres forest plan	CRA roadless	Other acres forest plan	All acres forest plan	CRA roadless	Other acres forest plan
	- - - - - - - - - - - - - - - - - - average annual miles - - - - - - - - - - - - - - - - - -						
Water conveyance	0.5	0	0.5	0	0.5	0.5	0
Electrical power line or telecommunication line	2	0	1.0	1.0	2.0	1.0	1.0
Oil and gas pipeline	2.2	0	1.8	0.4	2.6	1.8	0.4
Total LCZ (nearest mile)[2]	***4.7***	***0***	***3.3***	***1.4***	***5.1***	***3.3***	***1.4***

1) Alternative 1 is silent on the use of LCZs within IRAs.

2) Totals might not add due to rounding.

Cumulative Effects Analyses

A cumulative effect refers to an impact on the environment that results from the incremental effect of the proposed action when added to the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions, taking place over a period of time (40 CFR §1508.7).

Reasonably foreseeable future actions, for purposes of this analysis, were deemed as those actions that are already authorized, contained in draft or final plans, or budgeted for implementation. They do not include highly speculative actions, such as proposed legislation, regulations that may not be approved, or projects for which resources have not been allocated.

Past and present actions have contributed to existing conditions and trends in Colorado's roadless areas, which includes ongoing management activities. These actions are reflected in the descriptions of affected environment for each resource topic in this chapter. Therefore, past and present actions are not itemized.

Table 3-7 lists reasonably foreseeable actions (including programs and regulations that permit or prohibit actions), which are likely to occur in roadless areas in Colorado or adjacent to roadless areas. The listed actions are those actions that the interdisciplinary team identified as possibly combining with the effects of the road construction, tree cutting, and other specific actions allowed or projected in roadless areas under each roadless area management alternative. In addition, the Table 3-7 summarizes the environmental effects that may have additive effects when considered together with the direct/indirect effects of the alternatives. These potential cumulative actions and their associated potential effects in roadless areas were used to evaluate the cumulative effects described in each section of this chapter.

Table 3-7. *Actions That Might Contribute to Cumulative Effects*

Reasonably Foreseeable Action	*Key Ongoing or Foreseeable Effects*
Ground-Disturbing Activities	
Increase in oil and gas operations	Increase in roads, decrease in air quality
Increase in coal mining operations	Increase in roads, decrease in air quality
Increase in locatable mineral development	Increase in roads
Increased recreation use, including hunting and fishing	Increase in invasive species; increase in human-caused wildfires; soil disturbance and sedimentation; disturbance to wildlife and plant habitat/species
Increase in water developments	Increase in LCZs and roads
I-70 Improvements	Increase in vehicle-miles, Increase in recreation use, decrease in air quality
Trends That Might Affect Roadless Areas	
Population growth: new homes and infrastructure on lands around National Forests	Increase in human-caused wildfires; fish and wildlife habitat/species disturbance and fragmentation; soil and water quality impacts; increase in roads to private property; decrease in scenic quality surrounding NFS lands; increase in invasive species; increase in need for water, reduced long-term water supply; increase in human developments and corresponding increase in the wildland urban interface/CPZs
Decrease in open space	Areas without development are important for maintaining resources (outdoor recreation, clean water and air, forest products, etc.)
Increase in invasive species	Limits effectiveness of habitat improvements or efforts for species recovery
Epidemic levels of insect and disease activity in Colorado	In 2010 in Colorado, over 3.1 million acres of pine forests were infested with mountain pine beetle; approximately 571,000 acres of spruce forest infested with spruce beetle; 306,000 acres infested with Douglas-fir beetle; 265,000 acres infested with western balsam bark beetle activity; 213,000 acres infested with western spruce budworm activity; and 190,000 acres of aspen damaged by aspen dieback and mortality. These acres are within and outside of roadless areas. Insect and disease activity results in accumulation of hazardous fuels and risk and severity of wildfire.
Programmatic Actions and/or Policies[1]	
Forest plans	Forest plan management area direction prescribes permissible activities within roadless areas.
Forest plan revisions	One of the 8 forest plans are in revision with 3 additional forest plans soon to be revised; increased restrictions on road construction and tree cutting may be imposed in future updated plans
Southern Rockies Lynx Amendment	This amendment affects all forests in Colorado, other than the Manti-La Sal. The Southern Rockies Lynx Amendment conserves and promotes recovery of Canada lynx, which could further restrict circumstances allowing road construction and tree cutting in roadless areas
Travel Management Rule	Designated roads, areas, and motorized trails as open or closed to motorized vehicles likely leading to fewer roads open for public use

Reasonably Foreseeable Action	Key Ongoing or Foreseeable Effects
Healthy Forest Restoration Act of 2003 (P.L. 108-148, HFRA)	Provisions expediting hazardous fuel reduction and forest restoration projects at the wildland-urban interface or on land under a community wildfire protection plan
Executive Order 13443- Facilitation of Hunting Heritage and Wildlife Conservation	Directs the agency to facilitate the expansion and enhancement of hunting opportunities where appropriate to address declining trends; actions taken to enhance game species and habitat may interact with roadless management alternatives
Energy Policy Act of 2005, and Western Energy Corridor ROD	Federal agencies prepared an EIS with proposed energy corridor designations (oil, gas, hydrogen pipelines, electricity transmission and distribution facilities) in the western United States; no proposed corridors pass through roadless areas in Colorado

1) Numerous other laws, regulations, executive orders, policies and initiatives can indirectly influence federal land management including roadless area management. Those selected in this table are considered the most relevant in terms of their potential cumulative effects in association with the alternatives that are the subject of this EIS.

Geological Resources and Paleontological Resources

Geologic processes such as landslides, earthquakes, or volcanic hazards, and naturally occurring hazards such as asbestos-bearing rock, affect peoples' lives. To manage these safety hazards, the Forest Service can control or restrict uses in these areas. To enhance public understanding and appreciation of geological special interest areas, the Forest Service may develop interpretive sites to highlight examples of unique or interesting geology.

The Paleontological Resources Preservation Act Title VI, subtitle D was passed by Congress on March 30, 2009. It states, "The Secretary shall manage and protect paleontological resources on Federal land using scientific principles and expertise. The Secretary shall develop appropriate plans for inventory, monitoring, and the scientific and educational use of paleontological resources …" Paleontological resources are recognized as important both for their scientific and natural resource values, and in terms of the active protection required in their management. Pre-existing policies regulate the collection and disposition of significant fossils until actual regulations are written for the management and protection of these resources. Vertebrate fossils are always considered significant, whereas invertebrate or plant fossils generally are not unless they are of unusual rarity or quality. The Paleontological Resources Preservation Act (PRPA) allows the casual collection without a permit of common invertebrate and plant fossils for personal use and enjoyment. All other collection of fossils from national forests requires a permit.

Affected Environment

Karst and cave geological resources most commonly occur on areas underlain by limestone or marble. Values associated with karst and cave resources include the following:

- their ability to store and transmit groundwater
- their importance as subterranean wildlife habitats
- their importance as cultural resource or paleontological sites
- their ability to provide interpretive sites or recreational opportunities for spelunkers or cavers.

They can also present hazards, such as sinkholes, to resource use and development.

NFS lands are available for collecting rocks and minerals under its 36 CFR 228 mineral regulations, except on lands withdrawn to prohibit these activities.

The Forest Service uses a Potential Fossil Yield Classification (PFYC) system to assist in managing fossil resources. PFYC is a planning tool wherein geological units, usually at the rock formation or member level, are classified according to the probability of yielding paleontological resources that are of concern to land managers. There are five potential levels, ranging from not likely to contain recognizable fossil remains (Class 1) to highly fossiliferous geologic units at low risk of degradation (Class 4) or at high risk of degradation (Class 5).

Forest Service data show highly fossiliferous Class 5 rock units in Colorado's roadless areas. (Class 4 units are not identified on a regional scale). While it is not possible to predict where significant fossils occur, the existence of Class 5 rock units within a given roadless area is an indicator of the potential for significant fossils to occur.

Based on Forest Service PFYC data that were created in 2006, the combined IRA and CRA acres, contain an estimated 1,332,800 acres of Class 5 rock units. Thus, 32 percent of the approximately 4,135,000 total acres of Class 5 rock units on NFS land in Colorado occur within lands subject to this analysis. Nearly two thirds of the affected PFYC Class 5 lands occur on just two of the Forests (GMUG with 433,200 acres and White River with 381, 300 acres). The IRA acres contain approximately 29 percent total Class 5 rock units while; the CRA acres also contain approximately 29 percent of total acres, but within a slightly different area than Alternative 1.

Environmental Consequences: All Alternatives

Management of the geologic and paleontological resources described above does not require road construction or tree cutting to implement, and therefore, is not predicted to result in any new road construction or reconstruction in roadless areas under any alternative. Accordingly, effects under any of the alternatives are expected to be the same.

For geological hazards, road construction most likely would have negative effects. Although unstable sites are avoided when locating roads, roads can lead to more landslides than would occur naturally. Tree cutting practices can also lead to more landslides if done improperly; however use of best management practices and conformance to forest plan standards and guidelines would minimize the potential. Also, roads constructed across rock formations that contain naturally occurring hazardous material, such as asbestos rock, would expose the public to this hazardous material.

For paleontological resources, road construction can have both positive and negative impacts. Roads constructed across highly fossiliferous rock units potentially could damage significant fossils. On the other hand, road construction could lead to finding significant fossil resources that otherwise would not have been discovered. Roads can also help facilitate the permitted collection and removal of fossil resources that can weigh hundreds of pounds, and which are not easily removed by backpacking. In isolated areas, large vertebrate fossils eroding from the bedrock may go unfound, or if found, left to continued natural destruction through erosion as collection would be difficult without some form of vehicular access.

Mineral Resource and Energy Development

A variety of mineral and energy resources occur on NFS lands in Colorado's roadless areas. Mineral resources can be classified into three categories: saleable minerals, locatable minerals, and leasable minerals. Leasable minerals include energy resources, such as oil, gas, coal, and geothermal.

Saleable Minerals

Saleable minerals are common mineral materials, such as sand, gravel, stone, cinders, and clay. Generally, they are of low value, and used primarily for construction, building, or landscaping materials. Their value depends on market factors, quality of the material, and transportation costs. Disposal of these resources is at the discretion of the Forest Service and is subject to the provisions of 36 CFR 228, subpart C. Under these regulations, the Forest Service may either: (1) sell material for commercial use; (2) allow free use of material to the public and to non-profit organizations for non-commercial purposes or for public projects by federal, state, or local agencies; or (3) use material itself for Forest Service projects on NFS lands. The regulations also require that disturbance associated with mineral material sites is approved by the Forest Service in an operating plan that includes provisions to protect the environment and reclaim the surface in a timely manner.

Affected Environment

Sources for mineral materials are abundant and widespread throughout Colorado. Suitable material can be derived from glacial moraines, alluvium, talus, river benches, and other natural sources of loose material; or it can be quarried from rock outcrop. Because of the high cost of transportation, which often represents most cost for the material delivered to the project site, the largest sources with the most production are close to highways and major markets. Private lands more often meet these conditions than do NFS lands, or at least sources on private lands are usually available, so that production from NFS lands is not necessary.

Two distinctly different markets drive the largest amount of mineral material use: developing communities and road and highway construction. Developing communities need these materials for building, construction, and landscaping materials. To meet these needs, typically one or more mineral material sites with large reserves are developed, usually around the periphery of the community. Sites next to already existing highways and railroads are preferable, but construction of transportation infrastructure solely for the purpose of developing good mineral material sites is not uncommon.

Construction and maintenance projects for roads and highways also provide a market for these mineral materials. In this situation, mineral material sites are developed alongside, and near, the road corridor. Sites are generally smaller in size, more numerous, and dispersed along the course of the road. In this case, mineral materials are developed as needed for the road rather than a road being constructed for the need of the mineral material deposit.

State-wide production of mineral materials in Colorado was reported at 83.88 million tons for the year 2006 (Cappa et al. 2007). In comparison, mineral material disposal from Colorado's national forests for 2006 totaled 525,800 tons for that same year (Forest Service annual production report for FY 2006). Thus, the total average annual production of mineral materials from NFS lands represents less than one percent of the total mineral material production for all of Colorado. Although a specific breakdown of amounts of mineral materials generated from IRAs is not available, mineral material contributions from roadless areas to the total NFS production is small and most likely used for public

road projects (free use) or local Forest Service use where roads already exist, or are being constructed for some purpose other than mineral material development. This lack of commercial interest is likely due to roadless areas being generally remote from where mineral materials are needed, terrain too rugged for developing such a low value commodity, and widespread availability of other mineral material sources outside of roadless areas.

Environmental Consequences

The environmental consequences for mineral and energy development vary, depending on the alternative selected. This section describes consequences for each alternative.

Alternative 1

The 2001 Roadless Rule does not withdraw IRAs from the development of mineral material sites. However, it would prohibit road construction or reconstruction associated with developing new mineral material sites within IRAs. This prohibition effectively precludes the sale and disposal of mineral materials from sites well within IRAs to develop nearby communities and infrastructure. Under this alternative, no roads would be constructed or reconstructed to develop saleable minerals in IRAs.

It is possible that new mineral material sites or expansion of existing sites could occur within IRAs to provide material for new road construction or reconstruction associated with the exceptions under the 2001 Roadless Rule. Such mineral material sites would have to be developed along an existing road or adjacent to a road being built pursuant to one of the exceptions to the prohibitions. Use of mineral material in these instances could occur in situations where it is not economically feasible or environmentally preferable to obtain material from a source outside of an IRA.

Because little interest likely exists in the use of mineral materials from IRAs in Colorado, the effects on the production of this resource in IRAs under the 2001 Roadless Rule should be minimal.

Alternative 2

Like the 2001 Roadless Rule, the Colorado Rule would not withdraw the roadless areas from the development of mineral material sites, but effectively precludes their sale and disposal by prohibiting the construction or reconstruction of roads for that purpose. Therefore, the effects from the Proposed Action are similar to those described for Alternative 1. No roads could be constructed or reconstructed to develop saleable minerals, and therefore, no new material sources from CRAs for nearby community needs is expected.

Alternative 3

This alternative would not have a wide-spread prohibition against new road construction or reconstruction in roadless areas. Permissibility of road construction depends on management area allocations that range from allowing no additional road construction to allowing road construction with no additional restrictions (temporary roads are encouraged, however). This alternative maintains flexibility for future mineral material development needs. If the need becomes great enough to develop mineral materials from a particular roadless area that does not allow additional road construction, an amendment to the plan can still be formulated to accommodate the need, if it is deemed to be in the public interest.

Even if some road construction is allowed for developing a mineral material resource in some roadless areas, the remoteness of roadless areas and the widespread availability of mineral material

sources outside of roadless areas create a reasonable expectation that only a minimal volume of mineral materials would come from the analysis area. Assuming the demand for mineral materials remains at current levels, low volumes of mineral materials would be produced from the analysis area; the principal uses being for Forest Service projects, or for the limited instances when roads are constructed. The only exception is that there might be a greater need for mineral materials to support the increased amount of road construction expected for oil and gas lease exploration and developments under this alternative than under the other alternatives.

Under this alternative, the effects on saleable mineral production would be less than they are under the other three alternatives.

Alternative 4
Under this alternative, the effects on saleable mineral production would be the same as Alternative 2.

Locatable Minerals

Locatable minerals fall into three categories:

- metals, such as gold, silver, lead, zinc, molybdenum, and uranium
- non-metallic minerals, such as fluorspar, feldspar, and gem stones
- uncommon varieties of sand, stone, gravel, pumice, pumicite, and cinders, such as high calcium limestone used for cement.

Locatable minerals are appropriated through the location of mining claims under the General Mining Law of 1872, as amended. This law and its amendments, also referred to as the U.S. Mining Laws, provide United States citizens a possessory right to these minerals, use of the surface for purposes reasonably incident to mining, and a right to reasonable access to these minerals across Federal land.

Developing roads for locatable mineral exploration or development and the right to timber from mining claims for mining purposes on those claims is part of the reasonable right of access provided under the 1872 Mining Law, as amended. Therefore, as these rights are granted by statute, they are not subject to the prohibitions contained in any of the alternatives. Thus, none of the alternatives differ in projections for developments associated with locatable minerals.

Affected Environment

Base and precious metals occur in varying proportions in Colorado deposits and include mainly gold, silver, lead, zinc, and molybdenum. Most major Colorado mining districts for these locatable minerals lie in a zone called the Colorado mineral belt, which extends from Boulder County southwest almost to the corner of the State (USDI Bureau of Mines, 1984). A few scattered, well known districts and mineral deposits occur to the southeast of the Colorado mineral belt, including Creede, Cripple Creek, and Summitville. Another important mineral belt is the Uravan mineral belt, which contains deposits of uranium and vanadium. It is an eastward convex mineral belt that occurs near the lower western border of Colorado.

Valuable deposits of locatable mineral resources potentially exist in Colorado's roadless areas. Mineral-related activities are occurring and would continue to occur in roadless areas where valuable deposits exist. While it is not possible to predict where and when development would occur, the existence of active mining claims within a given roadless area is an indicator of both potential for a valuable mineral deposit, and for future mineral-related activity.

Based on a point count of year 2005 mining claim data extracted by the USGS (Causey 2007) from BLM's LR2000 database, approximately 75 percent of the roadless areas (IRA and CRA combined) in Colorado do not contain active mining claims. Of the remaining 25 percent, an estimated 2,000 active mining claims exist to potentially valuable deposits of locatable minerals. This is 21 percent of the total 9,445 active mining claims in Colorado in 2005. Acres of interest where these mining claims occur represent only 2.2 percent of the total combined IRA and CRA area (102,000 acres out of 4,653,100 acres). Of those 2,000 active mining claims, about 30 percent occur within the Whetstone IRA (Whetstone CRA) on the GMUG, 17 percent in the Hoosier Ridge IRA (Hoosier Ridge CRA) on the White River, and 11 percent in the Hermosa IRA (Hermosa CRA) on the San Juan National Forest. The remaining 42 percent of active mining claims in roadless areas are less concentrated. The number of claims within roadless areas is not static, as new claims are staked and others are allowed to lapse. The existence of these claims in a roadless area indicates where there is some potential for roads and other development to occur.

Locatable mineral activity generally fluctuates with the rise and fall of metal prices. The recent rise in metal prices has resulted in increased interest in Colorado's mineral resources. However, most renewed development and production occurs in areas of past mineral production. These areas typically already contain roads and private patented land. Thus, a significant increase in locatable mineral development and production is not foreseen to occur beyond those roadless areas with existing mining claims in areas with past production.

One exception is the surface use of mill site claims in the Whetstone IRA (Whetstone CRA) to support the development of a nearby molybdenum deposit on patented land, although a proposal has not yet been submitted. If the price of metals continues to rise, a corresponding increase could occur in prospecting and exploration activity in roadless areas; however, an increase in prospecting and exploration does not necessarily result in a similar increase in development and production because most exploration efforts rarely result in the discovery of a mineable deposit. Furthermore, road construction and tree cutting are not as necessary for locatable mineral prospecting and exploration as they are for development and production.

Environmental Consequences: All Alternatives

Locatable mineral resource activities are non-discretionary. The public has a statutory right to enter public domain land to prospect, explore, and develop locatable mineral resources, and the Forest Service cannot prohibit this activity on these NFS lands, if it otherwise satisfies other applicable legal requirements. Therefore, none of the proposed alternatives would affect the statutory right of reasonable access to prospect, explore, and develop NFS lands open to mineral entry and location.

Rules and procedures for using the surface of NFS lands in connection with locatable mineral operations are provided in regulations found in 36 CFR 228, Subpart A. Construction or reconstruction of roads for locatable mineral exploration or development is part of the reasonable right of access provided under the General Mining Laws.

Under all alternatives, an estimated average of less than 0.25 mile per year of road construction or reconstruction is projected to occur in roadless areas during the next 15 years for all locatable mineral related activities.

Leasable Minerals

Leasable minerals are those minerals that can be explored for and developed under one of several federal mineral leasing acts. Leasable minerals in Colorado include energy mineral resources, such as coal, oil, gas, and geothermal. Moreover, for lands acquired or administered under the Weeks Act (PL 61-435) and the Bankhead-Jones Act (PL 75-210), the U.S. Mining Laws do not apply, and deposits of otherwise locatable minerals like gold and garnet are leasable.

The government's decision regarding whether to lease mineral resources is discretionary, meaning that leasing may not be allowed if analysis demonstrates it would violate other legal requirements or result in unacceptable environmental impacts. Barring such a finding, the Federal government's policy is to provide access to natural resources to meet the nation's economic, social, and environmental needs. A properly issued lease then becomes an irretrievable commitment of resource. The Bureau of Land Management (BLM) has the exclusive authority to dispose of leasable mineral resources on NFS lands. However, the BLM must have the consent of the Forest Service before it can lease oil, gas, or geothermal resources. A federal lease conveys to the holder the right to explore, develop, and remove the leased commodity, subject to lease terms, stipulations, and applicable regulations.

Although it varies by commodity, surface use associated with the exploration and development of leasable minerals requires access and haul roads, open pits, facilities, power lines, pipelines, and communication sites. Efficient exploration and development of leasable minerals is generally not possible without the ability to construct new roads or reconstruct existing roads where needed. In the case of oil, gas, and geothermal resources, directional drilling techniques are sometimes used to avoid disturbing sensitive surface resources.

Coal

This section presents information and effects on accessibility to coal resources on NFS lands subject to roadless rulemaking in Colorado. This analysis presents estimated projections of activities that might occur in the areas that would be managed for roadless area characteristics under each alternative (IRAs for Alternatives 1 and 3, and CRAs for Alternatives 2 and 4), as well as the activities that would occur outside of an alternative's roadless areas that are within the analysis area. Effects are framed in terms of accessibility to coal resources for national forest units on which coal resource development is likely to occur in the analysis timeframe of 15 years. The only unit for which coal resource development is anticipated is the Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forests.

Affected Environment

Only a small number of IRAs and corresponding proposed CRAs in Colorado have potential for occurrence of coal resources. A very small number have existing coal leases, and those all occur on the GMUG National Forests. Depending on the alternative, accessibility to federal coal resources could be limited based on the assumption that roads are necessary to satisfy regulatory requirements for exploration, monitoring, and to support underground mining. In addition, once the proposed Colorado Roadless Rule is in effect, limitations on road construction and reconstruction could curtail accessibility to the point that coal resources would be rendered unmineable.

General Information About the Federal Coal Program

The Forest Service participates with the USDI BLM on coal exploration and coal leasing activities, and with the USDI Office of Surface Mining Reclamation and Enforcement (OSM) and the State of Colorado Division of Reclamation Mining and Safety (DRMS) on coal mine permitting and surface activities on NFS lands in the state. The Forest Service acts under the authorities defined in the Mineral Leasing Act of 1920, as amended by the Federal Coal Leasing Amendments Act of 1976 for coal exploration licenses and coal leases. The Surface Mining Control and Reclamation Act of 1977 gives the Forest Service, as the surface managing agency (also referred to as the federal land management agency), a review and/or concurrence role in the OSM and DRMS coal-mine permitting process.

Coal Resource Occurrence

Coal resources occur in seven known coalfields or regions on five national forest units in Colorado: the Pike-San Isabel National Forest, the Routt National Forest, the San Juan National Forest, the White River National Forest and the GMUG National Forests (forest plans, various dates). These areas of coal resources in turn coincide with 21 CRAs, and 19 IRAs.

The USGS (2001) assessed the coal resources in Colorado as being potentially minable, or applicable for other uses. For the purposes of this analysis, only areas identified to have potentially minable coal resources were examined.

As of August 2011, there were about 14,200 acres of NFS lands under lease for coal development roadless lands in the Somerset Coalfield on the GMUG National Forests.

About 7,100 of the currently leased acres are either in IRA and/or CRAs. About 3,100 of the currently leased acres are in IRAs; about 2,800 acres of the currently leased acres are where IRA and proposed CRA overlap, and 1,200 acres in current leases fall into CRA only. No approved coal exploration licenses existed in roadless areas in August 2011. No leases or exploration licenses were in place on the Pike-San Isabel, Routt, San Juan National Forest, or White River National Forests.

Current Coal Development

Coal from the federal leases on the GMUG National Forests is extracted exclusively with underground mining methods from three underground mines (West Elk, Bowie #2, and Elk Creek). In recent years, the three existing mines collectively produced between 10 and 15 million tons of coal per year, which accounted for about 40 percent of the coal production in Colorado (Colorado Division of Reclamation, Mining and Safety, 2011).

The coal resources currently being mined meet the definition of compliant and super-compliant coal reserves according to the Clean Air Act. The coal has high energy value (Btu), low sulphur, ash, and mercury content, and is thus desirable for use in electric generation plants. Most of the coal is shipped to the Eastern U.S. (Carroll, 2005).

Since 2007, the Energy Information Administration (EIA) has projected an increase in demand for Western coal and currently expects an average annual growth rate of 1.1 percent through 2035, based on increases in coal use for electricity and production of synthetic liquids. Specific to Western coal resources, EIA expects demand to increase at a slower rate than in the past, and expects this coal to supply fuel needs at coal-fired power plants east of the Mississippi River.

Past and Current Road Construction
Coal-related road construction currently only occurs on the GMUG National Forests.

About 75 miles of roads have been constructed or reconstructed since the 1960s in IRAs and CRAs on the GMUG National Forests for coal exploration, surface uses (such as methane drainage), and monitoring activities. These roads are non-system temporary roads restricted to administrative use.

Decommissioning has occurred on about 55 of these miles. Decommissioning by obliteration has been effective in restoring disturbed lands to the post-mining land use (livestock grazing and wildlife habitat) according to Forest Service conditions brought forward to the DRMS for the mine permit. Based on experience in the West Elk IRA, the decommissioning and subsequent reclamation (revegetation) is well-established two to three years after reclamation (example photos in Colorado Roadless Rule EIS project record).

No active coal activity, and hence, no associated roads, are presently occurring on the Pike-San Isabel, Routt, San Juan National Forest or White River National Forests.

Projections for Coal Leases, Exploration Licenses and Development
No coal-related activity is foreseen on the Pike-San Isabel, Routt, San Juan National Forest, or White River National Forests in the 15-year analysis timeframe. However, coal exploration and development is expected to continue on the GMUG National Forests. It is expected that six or seven coal exploration licenses will be brought forward for lands with potentially mineable coal resources in the next 15 years. Similarly, it is expected that a leasing application would occur about every three to four years on these lands in the next 15 years, amounting to about four leasing actions. Estimations are based on the frequency of exploration license and lease applications submitted to BLM in the last decade.

Given the current leasing situation and production rate, the three existing mines have combined reserves that would support between 16 and 21 years of mining, with a range per mine between about 3 and 12 years (Personal Communications between D. Dyer (BLM) and L. Mattson (FS), July 2011).

Projections for Road Construction and Reconstruction
This analysis assumes that roads are necessary to satisfy coal reserve data requirements on exploration licenses, and are necessary to exercise the rights granted by a coal lease (whether existing or future)[10] to ensure safe and economic development of the coal resources. Road construction or reconstruction might be precluded on portions of coal leases or exploration licenses in roadless areas where lease stipulations or license conditions limit surface use for the protection of other resources. The projections are only pertinent to the GMUG National Forests.

Typical coal-related surface uses include exploration drilling and associated road construction, well drilling for methane drainage (vent) with associated access roads, ongoing resource monitoring facilities, and mine infrastructure facilities with associated access roads. Certain coal-related surface facilities and associated roads may exist on the landscape for many years (20- 30) in the case of ventilation shafts, monitoring or other facilities and life-of-mine roads, or may be of shorter term (less

[10] *Federal coal leases grant the lessee the right (subject to conditions of the lease) to "construct [w]orks, buildings, plants, structures, equipment and appliances, and the right to use such on-lease rights-of-way which may be necessary and convenient in the exercise of the rights and privileges granted"(BLM, 1988).*

than 2, or 3 to 5 years) in the case of exploration holes or methane drainage (vent) wells[11], and other short-term uses. All coal-related roads are considered temporary roads, which are decommissioned once they are no longer needed for purposes of the lease or license, following practices of contemporaneous reclamation.

Coal-related road construction/reconstruction is projected as shown in Table 3-8. Road type terminology (i.e., temporary or administrative) varies among the alternatives, as would be consistent with particular language in the applicable rule, or in the forest plan. It is important to note that these projections are estimates, and were made without benefit of mine designs or plans.

Table 3-8. *Projected Road Construction/Reconstruction and Methane Drainage Well Pads in IRA or CRA by Alternative[1].*

	Alternative 1	*Alternatives 2 & 4*	*Alternative 3*
	Road construction and reconstruction would be allowed in IRAs on coal leases in effect before effective date of rule, and in CRAs that are not within IRAs, according to forest plan management direction.	Road construction and reconstruction could occur in CRAs within the North Fork coal mining area, and in the IRAs that are not within the CRAs, according to forest plan management direction.	Road construction and reconstruction could occur in IRAs and CRAs, according to forest plan management direction.
IRA only	2 miles temporary roads	2 miles temporary roads	2 miles temporary roads
IRA/CRA in common	5 miles temporary roads	38 miles temporary road 6 miles temporary road	38 miles administrative road 24 miles temporary road
CRA only	9 miles temporary road (6 for methane drainage, and 3 for exploration)	6 miles temporary road	9 miles temporary road
Methane Drainage Well Pads in alternative's roadless areas (with estimated acres disturbance)	Up to 180 wells (up to 54 acres)	Up to 600 wells (up to 180 acres)	Up to 1,160 wells (up to 348 acres)
Total by Alternative	***7 mi. within IRAs*** ***16 total miles***	***50 mi. within CRAs*** ***52 total miles***	***64mi. within IRAs*** ***73 total miles***

1) It was assumed that 1.5 miles of road would be needed for exploration purposes per 640-acre section, and 3 miles of road per section for methane drainage wells.

Disturbance associated with temporary roads and methane drainage wells would not occur all at the same time, rather a portion of them could be in place at a given time. Some roads might remain on the landscape for the duration of mining in a particular area or lease, and could depend on mine plans and monitoring required in the State-approved mining permit.

Environmental Consequences

For this analysis, effects are based on overall 'accessibility' to coal resources, where 'accessibility' is linked to the ability to construct (or reconstruct) roads for exploration or lease development, which

[11] *Methane drainage wells are often part of a mine operator's Mining Safety and Health Administration (MSHA) – approved ventilation plan, and are needed to meet MSHA requirements for safe methane levels in underground mines to ensure worker safety.*

subsequently affects the accessibility to coal reserves. It was assumed that, where road construction or reconstruction would be prohibited, mining would be severely limited to the point that mining the reserves would become infeasible from a safety, technological, or productivity standpoint.

The analysis area for this resource is principally a 39,100-acre area on the GMUG National Forests where roadless lands overlap with areas of known coal resources, where existing coal leases and development presently occur, and where coal activity is reasonably projected to occur in the 15-year analysis timeframe. This area includes all or portions of the Springhouse Creek, West Elk and Priest Mountain IRAs, or all or portions of the Currant Creek, Flatirons, Pilot Knob, and Sunset proposed CRAs. This area is estimated to contain about 715 million tons of recoverable coal resources. As applicable to each alternative, effects to coal resources in IRAs and CRAs statewide are also included.

Alternative 1

For Alternative 1, road construction or reconstruction in IRAs would be limited to areas under lease before the effective date of the 2001 Roadless Rule, and on newly identified roadless acres (i.e., CRAs) that are not within IRAs, which would be managed according to forest plan direction. Road construction and reconstruction would not be permitted on IRA lands in leases let after that date.

As of August 2011, only the GMUG National Forests had any coal leases in place in IRAs. About 5,900 acres of the 14,200 acres currently under lease are in IRAs and substantially altered acres of IRAs. Coal resources on lands outside of IRAs would remain accessible according to forest plan direction, including 1,200 acres of leased coal resources in CRAs not in IRAs in the Somerset Coalfield, and 1,500 acres unleased coal resources in CRAs in the Grand Mesa Coalfield.

No coal resources in IRAs elsewhere on the GMUG National Forests (including Drift Creek, Raggeds, Beaver, Castle, Whetstone Mountain, Cimarron, and Priest Mountain IRAs), or on other forests would be accessible under this alternative.

Effects of Alternative 1 on accessibility to federal coal resources, including estimated projections of activities on the GMUG National Forests over the 15-year analysis period include the following:

- About 16 miles of temporary road construction is projected. About 7 miles of this temporary road construction are on the 5,900 acres of existing leases in IRAs, on which such activity would be allowed. About 9 miles of this temporary road construction are projected on newly identified roadless acres (i.e., CRAs) that are either currently leased or unleased. About 6 of these projected miles are on currently leased lands, and 3 miles are on unleased lands.
- Any road construction would be done in a manner that minimizes effects to surface resources, prevents unnecessary or unreasonable surface disturbance, and complies with lease stipulations, forest plan direction, regulations, and laws. Roads would be decommissioned by obliteration when no longer needed for the lease. Most roads would be in place for approximately three to five years, and would then be decommissioned.
- Up to 54 acres of temporary surface disturbance could result from installation of methane drainage wells needed for mine safety purposes.
- Continued access is needed to about 108 million tons of recoverable coal reserves in IRAs that are currently under lease. This accessible tonnage represents about 7 years of production, based on the current mining rates for the 3 mines currently producing coal from these leases.

- Access to about 2,700 acres of coal resources in newly identified roadless acres (i.e., CRAs that are not within IRAs). Of these acres, about 1,200 of them are currently under lease, and contain about 22 million tons of recoverable coal reserves. The remaining 1,500 acres are currently unleased. However, they would be accessible for exploration, and would provide access to an estimated 27 million tons of potential coal resources.
- At least 6 miles of road constructed in the 15 year analysis timeframe would be decommissioned and obliterated. Other roads likely would be constructed and decommissioned consistent with coal lease, license, or permit terms in this same timeframe.

Effects of road prohibitions on development of coal resources under Alternative 1 include the following:

- Restrictions on road construction would prohibit exploration and would, in turn, limit the ability of a coal lessee or licensee to meet BLM coal data requirements when coal lease applications in and outside of (adjacent to) IRAs are submitted to the BLM. This situation would then result in the following:
  - Lost opportunities for exploration and development, along with potentially bypassing economic federal coal resources on about 30,500 IRA acres on the GMUG National Forests, unless they are leased by the effective date of the Colorado Rule. This acreage contains an estimated 558 million tons of recoverable coal resources.
- Lost opportunities for exploration and development of federal coal resources on the Pike-San Isabel, Routt, San Juan National Forest, and White River National Forests. The extent of these coal resources is unknown. Therefore, the quantity of coal the road prohibitions might affect cannot be estimated.
- Limits on the overall longevity of the existing mines operating on leases on the GMUG National Forests, and bypassing of federal coal resources due to prohibitions on road construction that might be needed to support mining. Estimated effects on longevity of existing mining operations are discussed in the Economics section of this chapter.
- Limits on placing facilities to manage coal mine methane at existing mines. Methane capture opportunities could use existing coal mine roads, or new roads constructed on coal leases in place before the date of the rule. Use of existing coal roads for methane capture could result in the roads remaining on the landscape for a longer period of time.

Alternative 1 results in limiting access to federal coal resources in IRAs statewide, except those in the 5,900 acres subject to existing leases on the GMUG National Forests, and those resources that overlap with newly identified roadless acres on the five forests with potential for coal resources. An estimated 157 million tons of recoverable coal reserves on the GMUG National Forests could be accessed under this alternative in both IRAs, and in CRAs that are not in IRAs. Access to these federal coal resources under this alternative could result in 16 miles of temporary road construction and up to 54 acres of temporary surface disturbance related to methane drainage well installation. An estimated 558 million tons of recoverable federal coal resources GMUG National Forests would be inaccessible under this alternative, along with an undefined amount of coal resources on the Pike-San Isabel, Routt, San Juan National Forest, and White River National Forests.

Alternative 2

Under Alternative 2, road construction or reconstruction could be approved in CRAs pursuant to existing and future coal leases, and on future coal exploration licenses, only on 19,125 acres in the Flatirons, Sunset, and Pilot Knob CRAs within the designated North Fork coal mining area on the GMUG National Forests. No road construction or reconstruction for accessing coal resources within CRAs elsewhere on the GMUG National Forests (including Huntsman Ridge, Tomahawk, Munsey-Erikson, Castle and Whetstone, Cimarron Ridge, Currant Creek and Kannah Creek, Beckwiths, Flattops/Elk Park), or within CRAs on other forests with coal resources could be approved under this alternative. Thus, the only accessible coal resources in CRAs would be those in the North Fork coal mining area. In addition, coal resources outside CRAs, including those in substantially altered acres of IRAs would remain accessible according to individual forest plan direction.

About 4,025 acres of the CRA lands in the North Fork coal mining area are currently under lease, and about 15,100 acres are unleased. Coal-related road construction and reconstruction could occur on these acres, for combined access to about 19,100 acres of federal coal resources. In addition, about 5,000 acres of unleased coal resources in IRAs that are not in CRAs, 300 acres of coal reserves in IRAs that are not in CRAs within the North Fork coal mining area, and 3,100 acres of leased lands in IRAs that are not in CRAs on the GMUG National Forests would also be accessible.

Based on road construction and reconstruction allowed under this alternative, Alternative 2 would have the following effects on coal leasing and development over the 15-year analysis period:

- Continued access to existing leased coal reserves on the GMUG National Forests, which includes about 4,025 acres of CRAs in the North Fork coal mining area, and 3,100 acres in IRAs not in CRAs, with collective access to about 130 million tons of recoverable coal reserves.
- About 50 miles of coal-related temporary road construction and reconstruction within CRAs. It is projected that an additional 2 miles of coal-related temporary or administrative road construction and reconstruction could occur on substantially altered acres. This road construction primarily would be for coal exploration and/or methane drainage purposes. Roads would be constructed in a manner that minimizes effects to surface resources, prevents unnecessary or unreasonable surface disturbance, and complies with lease stipulations, forest plan direction, regulation and laws. These roads would be administrative only, closed to the public and open only to coal operators and their contractors, to the Forest Service and other Federal and State agencies with jurisdictional authority over mining, and emergency personnel. When no longer needed, these roads would be decommissioned by obliteration, and reclaimed and restored to natural conditions as specified in the applicable lease, license, or permit. Coal-mine permit conditions would call for reclaiming disturbed lands to support the post-mining land use, which would be based on forest plan direction.
- Up to 180 acres of temporary surface disturbance could result from installation of methane drainage wells needed for mine safety purposes.
- At least 6 miles of road decommissioning in the 15-year analysis timeframe. Other roads likely would be constructed and decommissioned consistent with coal lease, license, or permit terms in this same timeframe.

- Access to about 15,100 acres of unleased lands with an estimated 276 million tons of recoverable coal resources within CRAs in the North Fork coal mining area on the GMUG National Forests.
- Access to about 5,300 acres of unleased lands with about 97 million tons of recoverable coal resources that are in the substantially altered acres.
- Within CRAs, temporary roads used to access coal mine-related surface facilities such as methane drainage wells, may also be used for methane capture operations, which could result in the temporary roads being on the landscape for a longer period of time. Any coal-mine road no longer needed for its specific purpose would be decommissioned by obliteration and reclaimed and restored to natural conditions as specified in lease, license, or permit conditions. Permit conditions call for reclaiming disturbed lands to support the post-mining land use, which would be based on forest plan direction.
- Coal resources in substantially altered areas on any of the forest units with coal resources would be managed according to applicable forest plan direction under this alternative. Data are insufficient to estimate quantities of coal.
- Effects of road prohibitions on development of coal resources under Alternative 2 also include the following:
  - Lost opportunities to explore and develop, and potentially bypass economic federal coal resources on the GMUG National Forests not within the North Fork coal mining area, or not leased as of the effective date of the rule.
  - Areas affected include coal resources in CRAs not within the North Fork coal mining area (Huntsman Ridge, Tomahawk, Munsey-Erikson, Castle and Whetstone, Cimarron Ridge, Currant Creek, Kannah Creek, Beckwiths, and Flattops/Elk Park CRAs). Portions of the Currant Creek CRA and the Flatirons CRA lie within the 39,100-acre analysis area where federal coal resources are projected to occur, and are estimated to contain 162 million tons and 52 million tons of recoverable coal resources, respectively. Data are not available to estimate quantity of coal affects in the other CRAs.
  - Lost opportunities to explore and develop, and potentially bypass economic federal coal resources in CRAs on the Pike-San Isabel, Routt, San Juan National Forest, and White River National Forests. The extent of these coal resources is unknown. Therefore, the quantity of coal the road prohibitions might affect cannot be estimated.

In summary, Alternative 2 would result in limiting access to federal coal resources in certain CRAs statewide, except those in the 19, 100-acre North Fork coal mining area on the GMUG National Forests. In addition, coal resources that overlap with substantially altered areas of IRA would be accessible on all forest units with coal resources depending on the individual forest plan. An estimated 350 million tons of recoverable coal resources on the GMUG National Forests could be accessed under this alternative in CRAs, with an additional 154 million tons accessible in substantially altered areas. Access to these federal coal resources under this alternative could result in 52 miles of temporary road construction and up to 180 acres of temporary surface disturbance related to methane drainage well installation. An estimated 214 million tons of recoverable federal coal resources on the GMUG National Forests would be inaccessible under this alternative, along with an

undefined amount of coal resources on the Pike-San Isabel, Routt, San Juan National Forest, and White River National Forests.

Alternative 3

Under Alternative 3, road construction or reconstruction could be approved on existing and future coal leases and coal exploration licenses in IRAs on all forest units with coal resource potential according to management direction in existing forest plans. Each forest would review specific lands before leasing or exploratory activity for consistency with the applicable forest plan.

Effects of Alternative 3 on coal leasing and development in IRAs during the 15-year analysis period include the following:

- Ability to consider about 46,000 acres in IRAs and non-roadless lands in the Pagosa Springs coalfield on the San Juan National Forest for coal leasing, if applications are received. These lands are in a variety of management area prescriptions, all of which allow for leasing with protections for specific resources, and either allow road construction, limit or restrict road construction in some areas, or require no surface occupancy for leases that are in roadless areas.
- Ability to consider lands in IRAs in the Trinidad coalfield on the Pike-San Isabel National Forest for coal leasing, if applications are received. These lands would be accessible under current forest plan direction and road construction would be allowed.
- Ability to consider lands in IRAs in the Carbondale coalfield on the White River National Forest, if leasing applications are received. The lands in this coalfield are in a variety of management area designations, some of which allow road construction, and others that do not. There are also some management designations that restrict mineral development.
- Ability to consider lands in IRAs in the Green River coal region on the Routt National Forest for coal leasing, if interest is expressed. The lands in this coal region are in a variety of management area designations, some of which allow road construction, and others that do not. Some management designations also restrict mineral development.
- Various coal exploration and development activities on the GMUG National Forests, as follows:
    - Continued access to develop coal in existing leases, which includes about 5,900 acres of IRAs, and 1,200 acres of new CRAs, with collective access to about 130 million tons of recoverable coal reserves.
    - Approximately 64 miles of temporary road construction and reconstruction on about 30,500 acres of IRAs in the Somerset and Grand Mesa coalfields. About 9 miles of temporary or administrative road construction or reconstruction on about 2,700 acres of newly identified CRA lands. This road construction is expected to be needed principally for coal exploration and/or methane drainage for mining pursuant to a coal lease. These lands are in a variety of management area prescriptions that allow road construction. However, one management area specifically calls for obliterating temporary roads within one season after use, while another management area calls for minimizing mineral disturbance in riparian areas and timely reclamation to restore productivity comparable to that before disturbance. Roads would be constructed and decommissioned consistent with forest plan standards and

guidelines, and to support the post-mining land use, including, but not limited to the following:

- constructing the minimum standard road needed to support project traffic
- closing new roads to public motorized use
- decommissioning roads and returning the lands to resource production within one year of cessation of activities
- managing road use for wildlife habitat needs
- involving the state wildlife agency in planning road use in winter range areas.

- Access to an estimated 585 million tons of unleased recoverable coal resources in the analysis area, including 558 million tons in IRAs, and about 27 million tons in newly identified CRA acres.
- At least 6 miles of coal-related road decommissioning within the 15 year analysis timeframe. Other roads likely would be constructed and decommissioned consistent with coal lease, license, or permit terms in this same timeframe.
- Access to coal in the Carbondale, Crested Butte and Tongue Mesa coalfields. These lands are in a variety of management area prescriptions that allow road construction. However, one management area specifically calls for obliterating temporary roads within one season after use, and another calls for minimizing mineral disturbance in riparian areas and timely reclamation to restore productivity comparable to that before disturbance.

In summary, Alternative 3 would result in coal resources on the GMUG, Pike-San Isabel, Routt, San Juan National Forest, and White River National Forests in IRAs being accessible, consistent with individual forest plans. In addition, coal resources that overlap with newly identified CRA acres would also be accessible on these forest units, depending on the individual forest plan. An estimated 666 million tons of recoverable coal reserves in the Springhouse Creek, West Elk, and Priest Mountain IRAs on the GMUG National Forests could be accessed under this alternative, with an additional 49 million tons accessible in newly identified CRA acres. Access to these federal coal resources under this alternative could result in 73 miles of temporary or administrative road construction, and up to 348 acres of temporary surface disturbance related to methane drainage well installation. An undefined amount of recoverable federal coal resources in other IRAs on the GMUG National Forests, and in IRAs on Pike-San Isabel, Routt, San Juan National Forest, and White River National Forests would also be accessible.

Alternative 4

Effects on coal resources under Alternative 4 are the same as Alternative 2 because there are no upper tier acres in the North Fork coal mining area.

Cumulative Effects

Continued population growth will continue to drive demand for coal resources for electric power generation and other uses. Road prohibitions under the 2001 Roadless Rule will restrict access to known reserves of compliant and super-compliant coal, contributing to less overall availability of "clean" coal to meet demand. Under the 2001 Roadless Rule, coal production from existing mines could dissipate in about 20 years because remaining unleased reserves would be inaccessible for exploration and surface uses related to mining. Under Alternatives 2 and 4, roads allowed for

developing known coal reserves in the North Fork coal mining area and in substantially altered acres would facilitate an estimated potential 504 million tons of recoverable coal resources to be developed and contribute to supply needed to meet demand. However, road prohibitions in CRAs outside the North Fork coal mining area would contribute to an undetermined quantity of coal not being explored or developed, contributing to a known resource base being unavailable to meet demand. Under Alternative 3, access to leased coal reserves and other coal resources in roadless areas throughout the state would contribute to supply needed to meet demand. All alternatives would result in some level of road construction and surface disturbance related to underground coal mining. These surface effects are related to the amount of accessible acreage in each alternative, and thus, result in Alternative 1 projecting the least, and Alternative 3 projecting the most acreage available. All these disturbances would be temporary, would not occur simultaneously and would be reclaimed at the end of use. Table 3-9 summarizes the effects on coal.

Table 3-9. *Summary of Effects for Coal Resources*

National Forest	*Alternative 1*	*Alternatives 2 and 4*	*Alternative 3*	*Comments*
GMUG				
Estimated acres with known coal resources in IRA or CRA (currently unleased): 32,000 Acres currently under lease in roadless areas: 7,100 Total acres for analysis: 39,100				Includes projected coal resources in Somerset and Grand Mesa coalfields. About 3,100 leased acres are in IRAs only; about 2,800 acres are where IRA and CRA are in common, and 1,200 acres are in CRA only
Acres of accessible coal resources in alternative's roadless areas	5,900 (all currently leased)	19,100 in North Fork coal mining area (4,025 acres currently leased)	36,400 (5,900 acres are currently leased)	These are acres leased in IRA in Alternative 1; leased and unleased acres within CRAs in the North Fork coal mining area in Alternative 2; and leased and unleased acres in IRA for Alternative 3. For Alt. 1 Includes coal in existing leases in IRAs on GMUG with effective dates before date of Rule. No other coal resources in IRAs would be accessible. For Alt. 2 and 4, Includes leased and unleased coal resources in North Fork coal area on the GMUG only. No other coal resources in CRAs would be accessible. For Alt. 3, Includes accessibility to leased and unleased coal resources on GMUG, and five Forest units in CO, as allowed by forest plans within IRAs only.
Estimated accessible recoverable coal resources in roadless areas (tons)	108 million	350 million	666 million	
Estimated production time from accessible resources in roadless areas	7 years	23 years	44 years	Based on current production rate of 15 million tons per year from 3 mines.
Acres of accessible coal resources in analysis area not in the alternative's roadless areas	2,700 acres	8,405 acres (3,100 acres currently under lease)	2,700 acres	For Alternative 1 and 3, includes 1,200 acres of leased lands in CRA, and 1,500 acres unleased land in CRA. For Alternative 2, includes 3,100 acres of

National Forest	Alternative 1	Alternatives 2 and 4	Alternative 3	Comments
				leased and 5,305 acres unleased coal reserves in IRA but not in CRA.
Estimated accessible recoverable coal resources in analysis area not within the alternative's roadless areas (tons)	49 million	154 million	49 million	For Alternative 1, includes 22 million tons on the 1,200 acres of leased lands in CRA, and 27 million tons on the 1,500 acres unleased land in CRA.
Estimated production time from accessible resources in analysis area not within the alternative's roadless areas.	3 years	10 years	3 years	Based on current production rate of 15 million tons per year from 3 mines.
Estimated total coal resources accessible by alternative (tons)	***157 million***	***504 million***	***715 million***	
Estimated recoverable coal resources potentially rendered inaccessible in roadless areas because of rulemaking	30,500 acres 558 million tons	11,570 acres 214 million tons	None	Specific data available for Somerset and Grand Mesa coalfields. Insufficient data for remaining coalfields.
Projected Road construction in alternative	16 miles total; 7 within IRAs	52 miles total 50 within CRAs	73 miles total 64 within IRAs	
Roads closed to public (Y or N)	Y	Y	Y	
Decommissioned by obliteration?	Y	Y	Y	For Alt. 3. roads may be decommissioned to other use depending on project-specific decision.
Required involvement by State wildlife agency (Y or N)	Y	Y	Y	For Alt. 3, if roads in wildlife management prescription areas.
San Juan				
Coal resources in roadless areas accessible? (Y or N)	N	N	Y	Up to 46,000 acres of reserves (1.5 billion tons) estimated in the Pagosa Springs coalfield.
Pike-San Isabel, White River, Routt				
Lands with coal resources in roadless areas accessible? (Y or N)	N	N	Y	Quantities of coal resource not available

Oil and Gas

Oil and gas are integral to the current infrastructure and economy; this demand drives continued exploration and development of these resources.

Affected Environment

Development of natural gas and oil resources generally consists of road and well pad construction, drilling of wells, and installation of infrastructure necessary for production. Roads are considered necessary for exploration and development of oil and gas. Pipelines are often needed to transport produced fluids from producing wells to production facilities and/or market. Clearing of vegetation (i.e., tree cutting) and construction of well pads and rights-of-way for roads and pipelines are also necessary for developing oil and gas resources. Directional drilling, horizontal drilling, and/or multi-well sites could be used to minimize surface disturbance and access areas where occupancy of the surface is prohibited. However, directional or horizontal drilling have technical and economic limits and are not practical or feasible in many geologic environments. This is particularly true in relatively unexplored areas, where complex geology and the overall lack of geologic information greatly increase the financial risk of drilling. Roads are often the most practical, economic, and generally feasible means for lessees/operators to access leases and fulfill the rights granted by leases.

Development activity (initial road and pad construction and drilling of wells) usually occurs intensively over a few months, or sometimes a few years in the case of large fields. Once production has been established, subsequent activity generally consists of well and road maintenance and inspections by operators and agency personnel. These activities usually occur on a regular, though not intensive (e.g., once weekly), basis as long as wells are in production. Producing wells and associated facilities and roads are likely to exist on the landscape for more than 15 years. Exploration wells that are dry holes (incapable of producing in paying quantities) are plugged and abandoned, and the well pad and access road are reclaimed, unless they are needed for other purposes.

Domestic demand for natural gas is projected to increase 0.6 percent per year through 2035, while demand for oil is projected to remain steady through 2030. (Energy Information Administration, 2011) Production of natural gas and oil from NFS lands will contribute to supply needed to meet that demand. In 2009, Colorado's statewide gross natural gas production was 1,512 billion cubic feet (BCFG), about 7 percent of the nation's total; and its statewide oil production was 28.3 million barrels, about 1.5 percent of the nation's total.(Energy Information Administration, 2009)

All national forests in Colorado have some areas with at least minimal geologic potential for natural gas and/or oil occurrence. However, only three forests have sizable areas in major, proven, natural-gas-producing geologic basins, and consequently, have high potential for primarily natural gas occurrence and development. Most areas that have potential for oil and gas occurrence are available for leasing under existing leasing decisions and forest plans. Only a portion of lands available for leasing in roadless areas are considered in this analysis to have high potential for development, based on their position in an oil and gas-producing geologic basin, existing leases, stipulations on leases, as well as historical and existing exploration and development.

Fourteen (14) of the 327 IRAs and 16 of the 363 CRAs in Colorado overlap with areas of NFS lands that have both high oil and gas occurrence potential and high development potential in all or portions the involved roadless area. These roadless areas are in nationally significant natural gas-producing basins: the Piceance Basin (portions of the GMUG and White River National Forests) and the San

Juan Basin (a portion of the San Juan National Forest). Natural gas resources in these basins are being developed in and near roadless areas. In the past two to three years, natural gas development that has been growing rapidly adjacent to the forests has also increased on NFS lands, including in roadless areas. Natural gas production from these lands contributes to supply necessary to meet demand locally, regionally, and nationally.

Overall, out of 4.24 million acres in 327 IRAs, 305,780 acres in 14 IRAs have high potential for oil and gas development to occur somewhere in an IRA. Out of 4.19 million acres in 363 CRAs, 277,600 acres in 16 CRAs have high potential for oil and gas development to occur somewhere in a CRA. High development potential of a roadless area is based on the following:

- BLM projections of development
- approved development
- current leases
- lease terms that allow surface occupancy
- development activity in or adjacent to the roadless area.

Additional acreage in seven IRAs and nine CRAs have existing leases, but are projected to have low-to-moderate potential for development, based on lease terms prohibiting surface occupancy, or a low percentage of leased lands in roadless areas, a position in an oil and gas producing basin, and the distance from existing development. All other roadless areas are considered to have moderate-to-no potential for oil and gas occurrence, and low-to-no potential for development in the next 15 years, based on one or more of the following factors:

- geologic conditions not conducive to the generation or accumulation of oil or gas
- no leases and/or little to no expressed interest in leasing
- little to no nearby development
- historically low and/or unsuccessful exploration activity in or near the roadless areas.

Statewide, based on the number of roadless areas, about 4 percent of the roadless areas (14 of 327 IRAs; 16 of 363 CRAs) have substantive potential for oil and gas development. Statewide, based on acreage, about 7 percent of the roadless acres (305,800 acres out of 4.24 million IRA acres; 277,600 acres out of 4.19 million CRA acres) have high potential for oil and gas development. Of these acres, 156,400 acres are under lease in IRAs and 157,800 acres in CRAs, which constitutes about 4 percent of all roadless acres in Colorado.

The extent to which each roadless area is leased provides some indication of the extent to which the area might be developed.

In addition to leases, a few roadless areas also have existing oil and gas wells. Five wells exist, with road access, in the Clear Creek IRA (Clear Fork CRA) on the GMUG National Forests and four wells exist, with road access, in the HD Mountains roadless area on the San Juan National Forest.

Roadless areas with potential for oil and/or natural gas occurrence and relatively high levels of leasing have experienced slower development rates than adjacent lands, largely due to challenging accessibility and complex permitting procedures with a corresponding high cost of development. Despite having high, and in some cases, proven production potential, these areas are costlier to develop than lower elevation areas with less rugged terrain, milder weather, a higher level of pre-

existing access, and fewer environmental challenges. Consequently, the roadless areas with high oil and gas occurrence and development potential described in this report are in some of the few remaining onshore areas of the United States with substantial known energy resources left to be developed.

To compare the effects of the four alternatives on possible future roads and associated activities, it was necessary to estimate possible road miles that could occur in conjunction with oil and gas leases, including oil and gas development, in roadless areas. For each alternative, it was necessary to estimate possible future oil and gas wells in roadless areas in order to derive potential future road miles and to characterize the type and level of activity that could occur in roadless areas. It was necessary to estimate possible future production from projected wells to derive some estimate of the possible comparative magnitude of production of energy resources that could be affected by the proposed Colorado Roadless Rule (Alternative 2) and the three alternatives to the proposed rule. Estimating possible oil and gas activities and road miles was also necessary for analyzing the effects on other resources. :

Estimated projections of oil and gas wells, roads, and production are not predictions, because a very high level of uncertainty exists about whether or not wells might be drilled and where they might be drilled. Projections of wells and road miles are estimations based on current information and represent only what could happen, not what will happen, under the four alternatives being analyzed. Projections do not represent any kind of binding limit on the number of future wells, but represent a reasonable scenario for the foreseeable future.

Environmental Consequences

Alternative discussions below focus on the environmental consequences within the roadless areas for the alternative. Following the discussion of the individual alternatives, Table 3-11 provides a comparison of estimated projections of oil and gas development in the full analysis area across the alternatives.

Alternative 1

Under Alternative 1, road construction and reconstruction for oil and gas development would be allowed in IRAs only in conjunction with previously issued oil and gas leases whose terms allow surface occupancy. Oil and gas leasing after the effective date of the 2001 Roadless Rule would be allowed per forest plans and leasing availability decisions, but road construction and reconstruction in conjunction with those leases would be prohibited. Waivers, exceptions, or modifications to stipulations prohibiting surface occupancy on existing leases would be considered (not necessarily granted) when operations are proposed, if such are requested. Oil and gas development in IRAs in over the 15-year analysis timeframe is most likely to occur in IRAs on the GMUG, San Juan National Forest, and White River National Forests in conjunction with existing leases and where there currently is development and production in and/or adjacent to IRAs.

Table 3-10 lists IRAs with existing leases and illustrates the extent to which existing leases in IRAs allow surface occupancy, including roads, under Alternative 1 (No Action). The table provides the acreage of leases with terms allowing surface occupancy (including road construction and reconstruction) somewhere within the lease area, and leases with terms that prohibit surface occupancy (including roads) over the entire lease area. This distinction provides a general idea of which IRAs could have oil and gas roads and development activity. Oil and Gas Maps, available on

the Colorado Roadless Rule website and in the project record, illustrate the geographical relationships among IRAs, existing oil and gas leases, and existing oil and gas development (wells) on and in the vicinity of IRAs on the GMUG, San Juan National Forest, and White River National Forests.

Table 3-10. *Acres Leased in IRAs as of June 2011*[1]

Forest	*IRA*[2]	*Acres Leased*	*Leased Acres (Terms Allow Surface Occupancy)*	*Leased Acres (Terms Prohibit Surface Occupancy)*
GMUG	Battlement Mesa[3]	9,200	100	9,100
	Clear Creek[4]	21,500	21,500	0
	Drift Creek[4]	4,100	4,100	0
	Hightower[4]	1,900	1,900	0
	Priest Mountain[4]	4,000	4,000	0
	Raggeds[4]	2,100	2,100	0
	Salt Creek[4]	1,000	1,000	0
	Springhouse Creek[4]	17,600	17,600	0
Manti-La Sal	Roc Creek[5]	5,600	3,600	1,900
Routt	Pagota Peak[2]	200	200	0
Pike-San Isabel	Front Range	8,100	8,100	0
	5 RARE II [2,5]	<100	<100	0
San Juan	**HD Mountains**[4]	17,500	16,000	1,500
	South San Juan National Forest[5]	2,100	2,100	0
White River	**Baldy Mountain**[4]	6,000	6,000	0
	East Divide/Four Mile Park[4]	8,600	8,600	0
	East Willow[4]	4,600	4,600	0
	Housetop Mountain[3]	7,000	0	7,000
	Mamm Peak[4]	11,800	7,800	4,000
	Reno Mountain[4]	9,200	9,200	0
	Thompson Creek[4]	14,200	14,200	0
Totals		***156,400***	***132,800***	***23,600***

Numbers rounded to nearest 100; numbers might not add due to rounding

1) *Leased acres with terms allowing surface occupancy and road construction or reconstruction somewhere on lease and leased acres with terms prohibiting surface occupancy, including road construction or reconstruction over entire lease. IRAs in boldface are considered most likely to have oil and gas development and roads associated with existing leases issued before the Colorado Roadless Rule.*

2) IRAs with fewer than 640 acres under lease are considered to have such a small percentage of the roadless area leased that there would be essentially no potential for development and associated roads in the IRA.

3) IRAs with low development potential due to No Surface Occupancy stipulations on leases.

4) IRAs with high potential for oil and gas roads and development activity over the 15-year analysis timeframe.

5) IRAs with low development potential due to less favorable positions in oil and gas basins, relatively small lease areas, distance from proven production, and/or unsuccessful attempts at establishing production in or near the IRAs.

Twenty-one (21) IRAs containing 156,400 leased acres are on the GMUG, White River, San Juan, Manti-La Sal, Routt, and Pike-San Isabel (PSI) National Forests. Roads would be allowed in conjunction with leases covering 132,800 acres, and roads would be prohibited in conjunction with leases covering 23,600 acres.

For the purpose of analyzing the effects, 14 IRAs (Table 3-10, IRAs in boldface) are considered to have high potential for oil and gas roads and development activity over the 15-year analysis timeframe. Of the 21 listed IRAs with existing leases, five are considered to have low development potential:

- Roc Creek on the Manti-La Sal National Forest
- Front Range on the Pike-San Isabel National Forests
- 5 Rare2 on the Pike-San Isabel National Forests
- Pagoda Peak on the Routt National Forest
- South San Juan National Forest on the San Juan National Forest

Oil and gas wells and roads are not projected in these IRAs. However, projections are uncertain estimates, and it is possible that some level of activity could be associated with existing leases in these IRAs. Two additional IRAs (Battlement Mesa on the GMUG National Forests and Housetop Mountain on the White River National Forest) have high development potential, based on geologic factors, high level of leasing, and proximity to development. However, No Surface Occupancy lease stipulations will prohibit future surface disturbance in these IRAs.

Table 3-11 summarizes projections of oil and gas road miles, road acres, wells, well pads, pad acres, and production under Alternative 1, based on the following:

- BLM RFDs (Conrath and O'Mara, 2008; Fowler and Gallagher, 2004; Spencer, 2006)
- a pending development proposal on the GMUG National Forests
- existing development decisions (U.S. Department of Interior, Bureau of Land Management (BLM), San Juan National Forest Center and U.S. Department of Agriculture, Forest Service, San Juan National Forest, 2007)
- existing lease terms allowing surface occupancy
- prohibitions on road construction and reconstruction in conjunction with future leases.

In total, up to 705 wells on 146 pads (587 acres) with about 143 miles of road access are projected in conjunction with existing leases in IRAs with high oil and gas occurrence and development potential on the GMUG, San Juan National Forest, and White River National Forests. Possible production from these projected wells is estimated at up to 1,178 billion cubic feet of gas (BCFG) and up to 52,500 barrels of oil (BO) over 30 years of estimated average well life.

Table 3-11. Estimated Projections of Oil And Gas Road Miles, Road Acres, Wells, Pads, Pad Acres, and Production in IRAs under Alternative 1[1].

	GMUG[2]	*San Juan National Forest*[3]	*White River*[4]	***Total***
Miles of road	32 miles	11 miles	100 miles	***143 miles***
Acres of road disturbance[5]	128 road acres	44 road acres	400 road acres	***572 road acres***
Number of wells	89 wells	36 wells	580 wells	***705 wells***
Well pads	41 well pads	22 well pads	83 well pads	***146 well pads***
Pad acres	67 pad acres	22 pad acres	498 pad acres	***587 pad acres***
Total acres of disturbance	***195 acres***	***66 acres***	***898 acres***	***1,159 acres***
Estimated ultimate recovery[6] (BCFG = billion cubic feet of gas, BO = barrels of oil)	382 BCFG 52,500 BO	129.6 BCFG	667 BCFG	***1,178.6 BCFG, 52,500 BO***

1) *Road miles include assumed co-located pipelines. Projections are based on BLM RFDs, existing development decisions, existing lease terms allowing surface occupancy, and prohibitions on road construction and reconstruction in conjunction with future leases*

2) GMUG: 13) wells on single-well pads of 1) acre each, 30 wells on 6 well pads of 3.5 acres each, 46 wells on 22) pads of 1.5 acres each, average estimated ultimate per-well recovery of 0.8 BCFG and 3,500 BO from Mesa Verde sandstones and 5 BCFG from Mesa Verde coals.

3) San Juan National Forest: Some wells are on multi-well pads. Well and pad numbers and average estimated ultimate per-well recovery of 3.6 bcfg (Verified by Walt Brown, San Juan National Forest, May 14, 2008.)

4) White River National Forest: All wells on 7-well pads of 6 acres each, average estimated per-well recovery of 1.15 BCFG.

5) Road disturbance in acres is based on an estimated average disturbance of 4) acres/mile of road. Actual road miles and acres for an individual well could vary considerably from the average, depending on terrain and actual distance of the well from an existing road.

6) Estimated ultimate recovery (EUR) is the estimated amount of oil or natural gas the projected wells could produce during average well life, which for the purpose of this reported is considered to be 30 years.

The 306 IRAs that do not have existing leases are assumed to have low-to-moderate potential for oil and gas occurrence and low-to-no potential for development in the foreseeable future. The quantified extent of potential oil and gas production from these IRAs was not estimated for this analysis. Potential production from these IRAs is assumed to be considerably less than that projected for the IRAs identified as having high potential for oil and gas occurrence and development.

Estimated effects of roadless area designations and prohibitions on road construction and reconstruction on the development of oil and gas resources over the 15-year analysis timeframe under Alternative 1 include the following:

- Roads associated with oil and gas activity, along with drilling, development, and production, would not occur in the 306 IRAs that have no existing leases (no leases issued before the effective date of the 2001 Roadless Rule).
- Some portion of oil and gas resources from beneath roadless areas where roads or surface occupancy is prohibited could be recovered with directional or horizontal drilling techniques. This development would be limited to those hydrocarbons that can economically be recovered by drilling from adjacent locations where surface use is allowed. No reasonable estimate exists as to how many wells or how much resource would be recovered from roadless areas by this approach.

- Oil and gas leases currently exist in 21 IRAs. Projected oil and gas activity in conjunction with leases in 14 of those IRAs with high development potential could result in up to an estimated 143 miles of new road construction and reconstruction, along with up to an estimated 705 wells on 146 pads with 587 acres of disturbance.
- Though unlikely, some non-quantified low level of activity could occur, including roads, in conjunction with existing leases in IRAs with low development potential.
- Estimated disturbance from well pads and roads is projected at approximately 1,160 acres, which constitutes about 1 percent of the acres in the 14 IRAs projected to have oil and gas roads and development, or about 0.03 percent of total IRA acres in Colorado.
- Compared to Alternatives 2 and 4, under which access roads for development of oil and gas resources on lands in proposed CRAs and leased before the effective date of the Colorado Roadless Rule could occur, Alternative 1 would result in the following:
  - 3 fewer miles of oil and gas roads.
  - 16 fewer oil and gas well pads, with a corresponding 13 fewer acres of pad disturbance.
  - 27 acres less total pad and road disturbance.
  - 10 fewer oil and gas wells.
  - Estimated ultimate production of 19.2 BCF less gas and 3,500 more barrels of oil from wells in roadless areas.
- Compared to Alternative 3, under which access roads for development of oil and gas resources could occur where permissible on leased lands and on unleased lands that may be leased according to forest plans, Alternative 1 would result in the following:
  - 16 fewer miles of oil and gas roads in roadless areas.
  - 14 fewer oil and gas well pads, with a corresponding 72 fewer acres of pad disturbance in roadless areas.
  - 136 acres less total pad and road disturbance.
  - 82 fewer oil and gas wells in roadless areas.
  - Estimated ultimate production of 104.2 BCFG and 56,000 BO less from wells in roadless areas.
- Opportunities for exploration and development of oil and gas resources in all IRAs with potential for resource occurrence and not under lease before the effective date of the Colorado Roadless Rule largely would be foregone under this alternative.

Alternative 2

Under Alternative 2, road construction and reconstruction for oil and gas development would be allowed in CRAs only in conjunction with oil and gas leases that are issued before the effective date of the Colorado Roadless Rule and whose terms allow surface occupancy and roads. The 2001 Roadless Rule prohibited road construction to access mineral leases issued after the promulgation of the rule (January 12, 2001). Since 2001, the 2001 Roadless Rule has been subject to legal challenges, and leases have been issued in areas now identified as Colorado Roadless Areas. The Colorado Roadless Rule does not affect the terms or validity of leases existing prior to the promulgation date of the final rule. This rule preserves any surface development rights and limitations on surface

development rights existing at the time of adoption of this rule on all oil and gas leases. Future oil and gas leasing would be allowed per forest plans and leasing availability decisions, but road construction and reconstruction in conjunction with those leases would be prohibited. Leases issued in designated CRA upper tier acres after the effective date of the rule would have the added restriction of no surface occupancy per the Rule. In addition, waivers, exceptions, or modifications to stipulations that prohibit or restrict road construction or reconstruction, or otherwise prohibit surface occupancy would not be allowed. Oil and gas development in CRAs over the 15-year analysis timeframe is most likely to occur in CRAs on the GMUG, San Juan National Forest, and White River National Forests in conjunction with existing leases and where there currently is development and production in and/or adjacent to CRAs.

Table 3-12 lists CRAs with existing leases and illustrates the extent to which existing leases in CRAs allow surface occupancy, including roads, under Alternative 2. Table 3-12 also shows leased acreage with terms allowing surface occupancy and road construction and reconstruction somewhere on the lease, and leases with terms that prohibit surface occupancy, including roads, in conjunction over the entire lease area. This distinction provides a general idea which CRAs might have oil and gas roads and development activity. Oil and Gas Maps 7 and 8 (see project website or map packet RDEIS) illustrate the geographical relationships among CRAs, existing oil and gas leases, and existing oil and gas development (wells) on and near proposed CRAs on the GMUG, San Juan National Forest, and White River National Forests.

Table 3-12. *Acres Leased in CRAs as of June 2011[1].*

Forest	*CRA[2]*	*Acres Leased*	*Leased Acres (Terms Allow Surface Occupancy)*	*Leased Acres (Terms Prohibit Surface Occupancy)*
GMUG	Battlements[3]	4,600	0	4,600
	Clear Fork	13,400	13,400	0
	Currant Creek	800	800	0
	Electric Mountain[2]	100	100	0
	Flat Tops/Elk Park	1,300	1,300	0
	Hightower	1,300	1,300	0
	Horsefly Canyon	1,400	1,400	0
	Huntsman Ridge	5,200	5,200	0
	Kannah Creek[2]	100	100	0
	Pilot Knob	17,200	17,200	0
	Salt Creek[2]	200	200	0
	Sunnyside[3]	4,000	0	4,000
	Tomahawk	2,100	2,100	0
	Turner Creek	6,900	6,900	0
Manti-La Sal	Roc Creek[4]	3,700	1,900	1,800
Routt	Pagota Peak[2]	200	200	0
Pike-San Isabel	Rampart East[4]	10,400	10,400	0

Forest	*CRA*[2]	*Acres Leased*	*Leased Acres (Terms Allow Surface Occupancy)*	*Leased Acres (Terms Prohibit Surface Occupancy)*
San Juan	**HD Mountains**	22,000	18,900	3,100
	South San Juan National Forest Adjacent[2]	100	100	0
	Winter Hills/Serviceberry Mountain[2]	400	400	0
White River	**Baldy Mountain**	6,100	6,100	0
	East Divide/Four Mile Park	8,600	8,600	0
	East Willow	4,700	4,700	0
	Housetop Mountain[3]	7,000	0	7,000
	Mamm Peak	12,300	9,200	3,200
	Reno Mountain	9,200	9,200	0
	Thompson Creek	14,300	14,300	0
Totals		***157,800***	***134,000***	***23,800***

Numbers rounded to nearest 100 acres; totals might not add due to rounding.

1) Leased acres with terms allowing surface occupancy and road construction or reconstruction somewhere on lease and leased acres with terms prohibiting surface occupancy or road construction or reconstruction over entire lease. CRAs in boldface are considered most likely to have oil and gas development and roads associated with existing leases issued before the Colorado Roadless Rule.

2) CRAs with fewer than 640 acres under lease are considered to have such a small percentage of the roadless area leased that there would be essentially no potential for development and associated roads in the CRA.

3) CRAs have low development potential due to No Surface Occupancy stipulations on leases.

4) CRAs have low development potential due to less favorable positions in oil and gas basins, relatively small lease areas, distance from proven production, and/or unsuccessful attempts at establishing production in or near the IRAs.

There are 27 CRAs containing 157,800 leased acres on the GMUG, White River, San Juan National Forest, Manti-La Sal, Routt, and Pike-San Isabel National Forests. Roads would be allowed in conjunction with leases covering 134,000 acres, and roads would be prohibited in conjunction with leases covering 23,800 acres.

For the purpose of analyzing effects, 16 CRAs (Table 3-12, CRAs in boldface) are considered to have high potential for oil and gas roads and development activity in the next 15 years. Of the 27 listed CRAs with existing leases, eight are considered to have low development potential:

- Roc Creek on the Manti-La Sal National Forest
- Electric Mountain on the GMUG National Forests
- Kannah Creek on the GMUG National Forests
- Salt Creek on the GMUG National Forests
- Pagoda Peak on the Routt National Forest
- South San Juan National Forest Adjacent on the San Juan National Forest
- Winter Hills/Serviceberry Mountain on the San Juan National Forest

- Rampart East on the Pike-San Isabel National Forests

Oil and gas wells and roads are not projected in these CRAs. However, projections are uncertain estimates, and it is possible that some level of activity could occur that is associated with existing leases in these CRAs. Three additional CRAs (Battlements and Sunnyside on the GMUG National Forests and Housetop Mountain on the White River National Forest) have high development potential based on geologic factors, high level of leasing, and proximity to development. However, No Surface Occupancy lease stipulations will prohibit future surface disturbance in these CRAs (Table 3-12).

Table 3-13 summarizes projections of oil and gas road miles, road acres, wells, well pads, pad acres, and production under Alternative 2 based on the following:

- BLM RFDs (Conrath and O'Mara, 2008; Fowler and Gallagher, 2004; Spencer, 2006)
- a pending development proposal on the GMUG National Forests
- existing development decisions (U.S. Department of Interior, Bureau of Land Management (BLM), San Juan National Forest Center and U.S. Department of Agriculture, Forest Service, San Juan National Forest, 2007)
- existing lease terms allowing surface occupancy
- prohibitions on road construction and reconstruction
- no surface occupancy in CRA upper tier acres in conjunction with future leases.

In total, up to 715 wells on 162 pads (600 acres) with about 146 miles of road access are projected in conjunction with existing leases in CRAs with high oil and gas occurrence and development potential on the GMUG, San Juan, and White River National Forests. Possible production from these projected wells is estimated at up to 1,197.8 billion cubic feet of gas (BCFG) and up to 49,000 barrels of associated oil (BO) over 30 years of estimated average well life.

Table 3-13. *Estimated Projections of Oil and Gas Road Miles, Road Acres, Wells, Pads, Pad Acres, and Production in CRAs under Alternative 2*[1]

	GMUG[2]	*San Juan National Forest*[3]	*White River*[4]	*Totals*
Miles of road	23 miles	23 miles	100 miles	146 miles
Acres of road disturbance[5]	92 road acres	94 road acres	400 road acres	586 road acres
Number of wells	74 wells	61 wells	580 wells	715 wells
Well pads	32 well pads	47 well pads	83 well pads	162 well pads
Pad acres	55 pad acres	47 pad acres	498 pad acres	600 pad acres
Total acres of disturbance	147 acres	141 acres	898 acres	1,186 acres
Estimated ultimate recovery [6] (BCFG = billion cubic feet of gas, BO = barrels of oil)	311.2 BCFG 49,000 BO	219.6 BCFG	667 BCFG	1,197.8 BCFG 49,000 BO

1) Road miles include assumed co-located pipelines. Projections are based on BLM RFDs, existing development decisions, existing lease terms allowing surface occupancy, and prohibitions on road construction and reconstruction in conjunction with future leases.

2) GMUG: 10 wells on single-well pads, 30 wells on 6 well pads of 3.5 acres each, 34) wells on 16 pads of 1.5 acres each, average estimated ultimate per-well recovery of 0.8 bcf and 3,500 bo from Mesa Verde sandstones and 5 bcfg from Mesa Verde coals.

3) San Juan National Forest: Some wells are on multi-well pads. Well and pad numbers and average estimated ultimate per-well recovery of 3.6 bcfg verified by Walt Brown, San Juan National Forest, May 14, 2008.

4) White River National Forest: all wells on 7-well pads of 6 acres each, average estimated per-well recovery of 1.15 bcfg

5) Road disturbance in acres is based on an estimated average disturbance of 4) acres/mile of road. Actual road miles and acres for an individual well may vary considerably from the average, depending on terrain and actual distance of the well from an existing road.

6) Estimated ultimate recovery (EUR) is the estimated amount of oil or natural gas the projected wells could produce during average well life, which for the purpose of this report is considered to be 30 years.

Differences in projected oil and gas roads, wells, and associated disturbance between Alternative 1 and Alternative 2 are due to different roadless areas boundaries in the two alternatives, which resulted in the proposed HD Mountains CRA having about 4,560 more leased acres than the HD Mountains IRA. The leased acres included in the proposed HD Mountains CRA (Alternative 2) have oil and gas wells already authorized. Wells projected for the HD Mountains roadless area, for both Alternatives 1 and 2, are approved and are expected to be drilled at locations identified in the Northern San Juan Basin Coalbed Methane Project (USDI BLM, San Juan National Forest Center and USDA Forest Service, San Juan National Forest, 2007), regardless of whether or not those locations are inside or outside an IRA or CRA.

Under Alternative 2, 336 CRAs that do not have existing leases are assumed to have low-to-moderate potential for and gas occurrence and low-to-no potential for development. The quantified extent of potential oil and gas production from these CRAs has not been estimated for this analysis.

Estimated effects of roadless area designations and prohibitions on road construction and reconstruction on the development of oil and gas resources over the 15-year analysis timeframe under Alternative 2 include the following:

- Roads associated with oil and gas activity, along with drilling, development, and production, would not occur in the 336 CRAs that have no existing leases (no leases issued before the effective date of the Colorado Roadless Rule).
- Some portion of oil and gas resources from beneath roadless areas where roads or surface occupancy is prohibited could be recovered with directional or horizontal drilling techniques. This development would be limited to those hydrocarbons that can economically be recovered by drilling from adjacent locations where surface use is allowed. No reasonable estimate exists as to how many wells or how much resource would be recovered from roadless areas by this approach.
- Oil and gas leases exist in 27 CRAs. Projected oil and gas activity in conjunction with existing leases in 16 of those CRAs with high development potential could result in up to an estimated 146 miles of new road construction and reconstruction, along with up to an estimated 715 wells on 162 pads with 600 acres of disturbance.
- Though unlikely, some non-quantified, low level of activity could occur, including roads, in conjunction with existing leases in CRAs with low development potential.
- Estimated disturbance from well pads and roads is projected at approximately 1,190 acres, which constitutes about 1 percent of the acres in the 16 CRAs projected to have oil and gas roads and development, or about 0.03 percent of the total CRA acres in Colorado.
- Compared to Alternative 1 under which access roads for development of oil and gas resources on lands in IRAs leased before the effective date of the 2001 Roadless Rule could occur, the proposed action (Alternative 2) would result in the following:

- 3 more miles of oil and gas roads in roadless areas
- 16 more oil and gas well pads and 13 more acres of pad disturbance in roadless areas
- 27 acres more total pad and road disturbance
- 10 more oil and gas wells in roadless areas
- Estimated ultimate production of 19.2 BCF more gas and 3,500 fewer barrels of oil

- Compared to Alternative 3, under which access roads for development of oil and gas resources could occur on leased lands and on unleased lands that are eventually leased, the proposed action (Alternative 2) would result in the following:
  - 13 fewer miles of oil and gas roads in roadless areas
  - 2 more oil and gas well pads, with 59 fewer acres of disturbance due to an increase in the number of wells on single-well pads on the San Juan National Forest related to a difference in boundaries between the HD Mountains CRA and the HD Mountains IRA, and a decrease in the number of wells on multi-well (larger) pads on the White River National Forest.
  - 109 acres less total pad and road disturbance
  - 72 fewer oil and gas wells in roadless areas
  - Estimated ultimate production of 85 BCFG and 59,500 BO less from wells in roadless areas
- Opportunities to explore and develop undiscovered oil and gas resources in all proposed CRAs with potential for resource occurrence and not under lease before the effective date of the Colorado Roadless Rule largely would be foregone under the proposed action.

Alternative 3

Under Alternative 3, road construction and reconstruction for oil and gas development would be allowed in IRAs in conjunction with existing and future oil and gas leases whose terms allow surface occupancy and roads. Future oil and gas leases could be offered, sold, and issued under the direction of forest plans and oil and gas leasing availability decisions[12]. Road construction and reconstruction would be prohibited in conjunction with existing and future leases where lease stipulations prohibit surface occupancy or roads. Requests for waivers, exceptions, or modifications to stipulations prohibiting surface occupancy on existing leases would be considered (not necessarily granted) when operations are proposed.

Oil and gas development in IRAs over the 15-year analysis timeframe is most likely to occur in IRAs that have high potential for oil and gas occurrence and development on the GMUG, San Juan, and White River National Forests. Oil and gas development is most likely to occur in these areas where there currently is development and production in and/or adjacent to IRAs in conjunction with existing and future leases in those areas. Oil and gas leasing with subsequent development could also occur in currently unleased IRAs where lands are available for leasing under forest plans and leasing availability decisions. Development could occur on future leases where lease terms allow surface occupancy and roads.

[12] *The Forest Service is required to analyze NFS lands for oil and gas leasing and make decisions designating specific lands available to be leased and stipulations that would apply to leasing before authorizing BLM to offer NFS lands for lease. (36 CFR 228.102)*

Table 3-14 lists IRAs with existing leases, and illustrates the relative extent to which existing and future leases in these IRAs would experience oil and gas activity by also listing the total acres available for lease and acres that would allow surface occupancy, including roads, under Alternative 3. Table 3-14 reflects current leasing decisions, and the availability of lands and surface occupancy criteria could change as leasing decisions are revised.

Under existing leasing decisions, only the GMUG and White River National Forests have substantive potential for oil and gas roads and development in IRAs for leases issued after the effective date of the 2001 Roadless Rule under Alternative 3. The San Juan National Forest leasing analysis is currently in progress; a decision on what lands would be available for leasing and applicable surface occupancy conditions has not yet been made. Accordingly, a projection of potential for oil and gas roads and development in conjunction with future leases that might be issued under Alternative 3 on the San Juan National Forest cannot be made at this time.

Oil and Gas Maps 7 and 9 (see Colorado Roadless Rule website or RDEIS map packet) illustrate the geographical relationships among IRAs, existing oil and gas leases, lands available for leasing (with distinction between surface occupancy allowed and surface occupancy prohibited), and existing oil and gas development (wells) on and in the vicinity of IRAs on the GMUG, San Juan National Forest, and White River National Forests. There is low-to-moderate potential for development in IRAs outside of those areas on the GMUG, White River, and San Juan National Forest listed in Table 3-14.

Table 3-14. *Acres Leased and Acres Available for Leasing in IRAs under Forest Plans and Oil and Gas Leasing Availability Decisions as of June 2011.*

Forest	IRA[1]	Acres Leased	Acres Available (Includes Leased Acres)	Available Acres (Allow Surface Occupancy)	Available Acres (Prohibit Surface Occupancy)
GMUG	Battlement Mesa[3]	9,200	36,000	500	35,500
	Clear Creek	21,500	42,800	37,500	5,300
	Drift Creek	4,100	9,300	8,700	600
	Hightower	1,900	4,600	4,000	500
	Priest Mountain[4]	4,000	43,200	32,700	10,500
	Raggeds[5]	2,100	13,300	12,300	1,100
	Salt Creek	1,000	11,000	1,400	9,600
	Springhouse Creek	17,600	17,500	17,600	0
Manti-La Sal	Roc Creek[6]	5,600	10,600	7,700	2,900
Routt	Pagota Peak[2]	200	57,800	1,900	55,900
Pike-San Isabel	Front Range[6]	8,100	25,600	NA[6]	NA[6]
	5Rare2 [2,6]	<100	41,900	NA[6]	NA[6]
San Juan	**HD Mountains**	17,500	NA[7]	NA[7]	NA[7]
	South San Juan National Forest	2,100	NA[7]	NA[7]	NA[7]
White River	**Baldy Mountain**	6,000	6,000	6,000	0
	East Divide/Four Mile Park	8,600	8,900	8,900	0
	East Willow	4,600	7,100	7,100	<100
	Housetop Mountain[3]	7,021	12,651	0	12,651
	Mamm Peak	11,800	25,300	8,100	17,200
	Reno Mountain	9,200	12,400	12,400	100
	Thompson Creek	14,200	18,400	16,100	2,300
Totals		***156,400***	***336,900***	***182,700***	***154,200***

1) Available acres further distinguished by acres with terms allowing surface occupancy, including road construction or reconstruction and acres with terms prohibiting surface occupancy. IRAs in boldface are those considered most likely to have oil and gas development activity as allowed by lease terms.

2) IRAs with fewer than 640 acres under lease are considered to have such a small percentage of the roadless area leased that there would be essentially no potential for development and associated roads in the IRA.

3) IRAs have low development potential due to No Surface Occupancy stipulations on leases.

4) 51,658 acres of Priest Mountain Roadless Area is designated not available for leasing. 43,091) acres of Raggeds Roadless Area is designated not available for leasing.

5) IRAs have low development potential due to less favorable positions in oil and gas basins, relatively small lease areas, distance from proven production, and/or unsuccessful attempts at establishing production in or near the IRAs.

6) Leasing availability information was not in GIS format to facilitate determining surface occupancy acres. Pike-San Isabel is anticipating a revision to its leasing analysis in the near future.

7) San Juan National Forest is conducting analysis for oil and gas leasing availability, so for purposes of this report, no lands are shown as being available for leasing. Final leasing decision will dictate availability of future leases in listed IRAs.

Twenty-one (21) IRAs contain 156,400 leased acres on the GMUG, White River, San Juan, Pike-San Isabel, Manti-La Sal, and Routt National Forests. Roads would be allowed in conjunction with existing and future leases covering 182,700 acres, and roads would be prohibited in conjunction with existing and future leases covering 154,200 acres.

For effects analysis purposes, 14 IRAs (Table 3-14, IRAs in boldface) are considered to have high potential for oil and gas roads and development activity associated with existing and future leases over the 15-year analysis timeframe. Five IRAs with existing leases are considered to have low development potential for reasons not related to the surface occupancy restrictions:

- Roc Creek on the Manti-La Sal National Forest
- Front Range on the Pike-San Isabel National Forests
- 5 RARE II on the Pike-San Isabel National Forests
- Pagota Peak on the Routt National Forest
- South San Juan National Forest on the San Juan National Forest

Oil and gas wells and roads are not projected in these IRAs. However, projections are uncertain estimates, and it is possible that some level of activity could be associated with existing and future leases in these IRAs. Two additional IRAs (Battlement Mesa on the GMUG National Forests and Housetop Mountain on the White River National Forest) have high development potential based on geologic factors, high level of leasing, and proximity to development. However, No Surface Occupancy lease stipulations per the current Forest leasing decision will prohibit surface disturbance in these IRAs for the foreseeable future.

Table 3-15 shows 122 IRAs that are available for leasing under current forest plans and leasing decisions, but have no existing leases. These areas are considered to have some level of potential for oil and gas occurrence, but low-to-no development potential. No oil and gas development activity or road construction or reconstruction is projected in these IRAs for the foreseeable future. However, because projections are uncertain estimates, it is possible that there could be some level of oil and gas activity and roads associated with future leases issued in these IRAs. Unleased lands in IRAs on the San Juan National Forest are not included in Table 3-15. The San Juan National Forest is in the process of making a final leasing decision on the availability and lease terms for future leasing in IRAs, including the HD Mountains and South San Juan National Forest IRAs.

The oil and gas map on the Colorado Roadless Rule website shows the relationships among existing oil and gas leases, lands available for leasing with surface occupancy allowed, and roadless areas statewide. Outside of the areas of the GMUG and White River National Forests in the Piceance Basin, very few IRA lands are available for leasing with surface occupancy allowed, and only a small fraction of IRA lands have existing leases. All other IRAs not listed in Tables 3-14 or 3-15, or shown as leased or available for leasing on the oil and gas map on the Colorado Roadless Rule website are considered to have little to no recognized potential for oil and gas occurrence and no potential for development.

Table 3-15. *IRAs with Lands Available for Leasing in Areas with Low Potential for Development as of June 2011*[1]*.*

Forest [2]	*IRA*	*Nature of Availability*
Arapaho-Roosevelt	Gold Run	NSO
	Indian Peaks Adjacent Area	Small portion available, NSO
	James Peak	Small portion available, NSO
	Never Summer Adjacent Area	NSO
	Troublesome	Mostly NSO
GMUG	Electric Mountain	Mostly available
	Johnson Creek	Portion available, ½ NSO, ½ surface occupancy allowed
	Nick Mountain	Available, Mostly NSO
	Roubideau	Portion available, NSO
	Tabeguache	Portion available, NSO
	Ute Creek	Small portion available, surface occupancy allowed
	West Elk	Portion available, surface occupancy allowed
Pike-San Isabel	Rampart West	Mostly available, surface occupancy allowed
	Tanner Peak	Mostly available, surface occupancy allowed
	Greenhorn Mountain	Mostly available, surface occupancy allowed
	Spanish Peaks	Portion available; portion no lease
	3a	Mostly available, IRA is many tracts over broad area of Forest
	Spanish Peaks - proposed	Portion available; portion no lease
Rio Grande	Alamosa River	Portion available, NSO
	Beaver Mountain	¾ NSO, ¾ surface occupancy allowed
	Bennet Mountain/Blowout/Willow Creek/Lion Point/Greenie Mountain	NSO
	Bristol Head	Small portion available, ½ NSO, ½ surface occupancy allowed
	Butterfly	NSO
	Chama Basin	1/3 available, NSO
	Conejos River/Lake Fork	Mostly NSO
	Cotton Creek	NSO
	Crestone	NSO
	Cumbres	NSO
	Deep Creek/Boot Mountain	Most available, ½ NSO, ½ surface occupancy allowed
	Dorsey Creek	NSO

Forest [2]	*IRA*	*Nature of Availability*
	Four Mile Creek	Very small portion available, NSO
	Fox Creek	Portion available, NSO
	Fox Mountain	NSO
	Gibbs Creek	NSO
	Kitty Creek	NSO
	La Garita wilderness	Mostly NSO
	Lake Fork	Portion available, ½ NSO, ½ surface occupancy allowed
	Lower East Bellows	Mostly NSO
	Middle Alder	NSO
	Miller Creek	NSO
	Pole Creek	NSO
	Pole Mountain/Finger Mesa	Small portion available, NSO
	Sawlog	NSO
	Snowshoe Mountain	Very small portion available, NSO
	Spruce Hole/Sheep Creek	NSO
	Sulphur Tunnel	NSO
	Summit Peak/Elwood Pass	NSO
	Tewksberry	NSO
	Tobacco Lakes	Small portion available, NSO
	Trout Mountain/Elk Mountain	NSO
	Ute Pass	Small portion available, NSO
	Wightman Fork/Upper Burro	Small portion available, NSO
	Willow Mountain	Portion available, NSO
Routt	Kettle Lakes	NSO
	Grizzly Helena	NSO
	Dome Peak	Small portion available, mostly NSO
	Elkhorn	Surface occupancy allowed
	Shield Mountain	NSO
	Nipple Peak North	Surface occupancy allowed
	Nipple Peak South	NSO
	Sugarloaf North	Surface occupancy allowed
	Sugarloaf South	Mostly NSO
	Black Mountain	Large areas of NSO
	Barber Basin	About 1/3 NSO
	Morrison Creek	Very small portion available
	Bushy Creek	Mostly available, small portion NSO
	Chatfield	About ½ NSO, ½ surface occupancy allowed

Forest [2]	*IRA*	*Nature of Availability*
	Bunker Basin	NSO
White River	Adam Mountain	Surface occupancy allowed
	Assignation Ridge	Mostly NSO
	Basalt Mountain A	Surface occupancy allowed
	Basalt Mountain B	Surface occupancy allowed
	Berry Creek	Surface occupancy allowed
	Big Ridge to South Fork A	Mostly NSO
	Big Ridge to South Fork B	Surface occupancy allowed
	Boulder	Surface occupancy allowed
	Buffer Mountain	Surface occupancy allowed
	Burnt Mountain	Surface occupancy allowed
	Crystal River	Surface occupancy allowed
	Deep Creek	Portion available, part NSO, part surface use allowed
	Dome Peak	Surface occupancy allowed
	East Vail	Surface occupancy allowed
	Fawn Creek/Little Lost Park	Surface occupancy allowed
	Freeman Creek	Surface occupancy allowed
	Gallo Hill	Surface occupancy allowed
	Game Creek	Surface occupancy allowed
	Grizzly Creek	Surface occupancy allowed
	Hardscrabble	Surface occupancy allowed
	Hay Park	Surface occupancy allowed
	Hunter	Part available, surface use allowed
	Little Grand Mesa	Surface occupancy allowed
	Lower Piney	Surface occupancy allowed
	Maryland Creek	Surface occupancy allowed
	McClure Pass	Surface occupancy allowed
	Meadow Mountain A	Surface occupancy allowed
	Meadow Mountain B	Surface occupancy allowed
	Morapos A	NSO
	North Elk	Surface occupancy allowed
	North Woody	Surface occupancy allowed
	Pagoda Peak	NSO
	Piney Lake	Surface occupancy allowed
	Porcupine Peak	Surface occupancy allowed
	Ptarmigan A	Surface occupancy allowed
	Ptarmigan Hill A	Surface occupancy allowed

Forest [2]	*IRA*	*Nature of Availability*
	Red Dirt A	Surface occupancy allowed
	Red Dirt B	Surface occupancy allowed
	Red Mountain	Surface occupancy allowed
	Ryan Gulch	Surface occupancy allowed
	Salt Creek	Surface occupancy allowed
	Sloan Peak	Surface occupancy allowed
	Spraddle Creek B	Surface occupancy allowed
	Sweetwater A	Surface occupancy allowed
	Sweetwater B	Surface occupancy allowed
	Tenderfoot Mountain	Surface occupancy allowed
	West Brush Creek	Surface occupancy allowed
	West Lake Creek	Surface occupancy allowed
	Wildcat Mountain	Surface occupancy allowed
	Wildcat Mountain B	Surface occupancy allowed
	Wildcat Mountain C	Surface occupancy allowed
	Williams Fork	Surface occupancy allowed
	Willow	Surface occupancy allowed
	Woods Lake	Part available, surface occupancy allowed

1) Table 3-15 also describes the extent to which available lands have surface occupancy allowed or prohibited. "NSO" indicates No Surface Occupancy stipulations applied to leases.

2) San Juan National Forest is not included because the oil and gas leasing availability decision-making process is underway. Oil and gas leasing availability with NSO is proposed in some IRAs.

Table 3-16 summarizes projections of oil and gas road miles, road acres, wells, well pads, pad acres, and production under Alternative 3 based on BLM RFDs (Conrath and O'Mara, 2008; Fowler and Gallagher, 2004; Spencer, 2006), a pending project proposal, existing development decisions (U.S. Department of Interior, Bureau of Land Management (BLM), San Juan National Forest Center and U.S. Department of Agriculture, Forest Service, San Juan National Forest, 2007), existing lease terms allowing surface occupancy, and the potential for future leasing allowing surface occupancy. In total, up to 787 wells on 160 pads (659 acres) with about159 miles of road access are projected in conjunction with existing and future leases in IRAs with high oil and gas occurrence and development potential on the GMUG, San Juan National Forest, and White River National Forests. Possible production from these projected wells is estimated at up to 1,282.8 billion cubic feet of gas (BCFG) and up to 108,500 barrels of associated oil (BO) over 30 years of estimated average well life.

Table 3-16. *Estimated Projections of Oil and Gas Road Miles, Road Acres, Wells, Pads, Pad Acres, and Production in IRAs under Alternative 31.*

	GMUG[2]	San Juan National Forest[3]	White River[4]	Totals
Miles of road[4]	35 miles	11 miles	113 miles	159 miles
Acres of road disturbance[5]	140 road acres	44 road acres	452 road acres	636 road acres
Number of wells	96 wells	36 wells	655 wells	787 wells
Well Pads	44 pads	22 pads	94 pads	160 pads
Pad acres	73 pad acres	22 pad acres	564 pad acres	659 pad acres
Total acres of disturbance	213 acres	66 acres	1,016 acres	1,295 acres
Estimated ultimate recovery[6] (BCFG = billion cubic ft. of gas, BO = barrels of oil)	400.2 BCFG 108,500 BO	129.6 BCFG	753 BCFG	1,282.8 BCFG 108,500 BO

1) Road miles include assumed co-located pipelines. Projections are based on BLM RFDs, existing leasing decisions, existing development decisions, existing lease terms allowing surface occupancy, and prohibitions on road construction and reconstruction in conjunction with future leases.

2) GMUG: 15 wells on single-well pads of 1) acre each, 35 wells on 7 well pads of 3.5 acres each, 46 wells on 22) pads of 1.5 acres each, average estimated ultimate per-well recovery of 0.8 bcf and 3,500 bo from Mesa Verde sandstones and 5 bcfg from Mesa Verde coals.

3) San Juan National Forest: Some wells are on multi-well pads. Well and pad numbers and average estimated ultimate per-well recovery of 3.6 bcfg verified by Walt Brown, San Juan National Forest, May 14, 2008.

4) White River National Forest: all wells on 7-well pads of 6 acres each, average estimated per-well recovery of 1.15 bcfg

5) Road disturbance in acres is based on an estimated average disturbance of 4) acres/mile of road. Actual road miles and acres for an individual well may vary considerably from the average, depending on terrain and actual distance of the well from an existing road.

6) Estimated ultimate recovery (EUR) is the estimated amount of oil or natural gas the projected wells could produce during average well life, which for the purpose of this reported is considered to be 30 years.

IRAs that are available for leasing but do not have existing leases are assumed to have low-to-moderate potential for occurrence of oil and gas and low-to-no potential for development for the foreseeable future. The quantified extent of potential oil and gas production from these IRAs has not been estimated for this analysis. All other IRAs (not available or not analyzed for availability) are considered to have low-to-no potential for development.

Estimated effects of roadless area management under Alternative 3 on the development of oil and gas resources over the 15-year analysis timeframe include the following:

- Roads associated with oil and gas activity, along with drilling, development, and production, would not occur in any of the IRAs that have no existing leases, are not available or analyzed for leasing, or are available for leasing, but with No Surface Occupancy stipulations.
- Some portion of oil and gas resources from beneath roadless areas where roads or surface occupancy is prohibited could be recovered with directional or horizontal drilling techniques. This development would be limited to those hydrocarbons that can economically be recovered by drilling from adjacent locations where surface use is allowed. No estimate is made as to how many wells or how much resource would be recovered from roadless areas by this approach.
- Oil and gas leases exist in 21 IRAs. Projected oil and gas activity in conjunction with existing and future leases in 14 of those IRAs with high development potential could result in up to an

estimated 159 miles of new road construction and reconstruction, along with up to an estimated 787 wells on 160 pads with 659 acres of disturbance.

- Though unlikely, the potential exists for some non-quantified low level of activity, including roads, in conjunction with existing leases in IRAs with low development potential.
- Estimated disturbance from well pads and roads is projected to be 1,295 acres, which constitutes about 1 percent of the acres in the 14 IRAs projected to have oil and gas roads and development, or about 0.03 percent of total IRA acres in Colorado.
- Compared to Alternative 1 under which access roads for development of oil and gas resources on lands in IRAs leased before the effective date of the Colorado Roadless Rule could occur, Alternative 3 management of roadless areas would result in the following:
  - 16 more miles of oil and gas roads in roadless areas
  - 14 more oil and gas well pads, with a corresponding 72 more acres of pad disturbance in roadless areas
  - 136 acres more total pad and road disturbance
  - 82 more oil and gas wells in roadless areas
  - Estimated ultimate production of 104.2 BCF more gas and 56,000 more barrels of oil from wells in roadless areas
- Compared to the proposed action (Alternative 2) and Alternative 4 under which access (roads) for development of oil and gas resources on lands in the CRAs and leased before the effective date of the Colorado Roadless Rule could occur, Alternative 3 would result in the following:
  - 11 more miles of oil and gas roads
  - 2 fewer oil and gas well pads, with 59 more acres of disturbance primarily due to a decrease in the number of wells on single-well pads on the San Juan National Forest and an increase in the number of wells on multi-well (larger) pads on the White River National Forest.
  - 109 acres more total pad and road disturbance
  - 72 more oil and gas wells
  - Estimated ultimate production of 85 BCF more gas and 59,500 more barrels of oil from wells in roadless areas

Opportunities for exploration and development of oil and gas resources in IRAs would only be limited by direction in forest plans and oil and gas leasing availability decisions.

Alternative 4

The projection of oil and gas activity and description of consequences under Alternative 4 will be the same as described for Alternative 2 for two reasons:

- The roadless area boundaries of individual CRAs are the same for both alternatives
- For both Alternative 2 and 4, it is assumed that activity will occur only on existing leases with stipulations that allow surface use. Accordingly, the difference in upper tier designation between the two alternatives will not have any effect on the projected level of activity.

Comparison of Estimated Projections of Oil and Gas Development in Areas of Combined IRAs and CRAs across All Alternatives

Table 3-17 is provided to summarize and compare total estimated projections of oil and gas activity and production in the State's roadless areas across all alternatives, showing both estimated projections for IRAs and CRAs alone and for the area covered by IRAs and CRAs combined. When combined IRA/CRA analysis area is considered, only the White River and GMUG National Forests show a difference in activity between the alternatives with road prohibitions and the forest plan alternative. Due to the fact that there is currently no leasing availability decision, the projected activity for San Juan National Forest does not change across the four alternatives for the combined analysis area.

Table 3-17. Comparison of Estimated Projections of Oil and Gas Road Miles, Road Acres, Wells, Pads, Pad Acres, and Production in IRAs, CRAs, and Combined Area of IRAs/CRAs under the Alternatives 1-4

	Alt. 1 IRAs	*Alt. 2 & 4 CRAs*	*Alts. 1, 2,& 4 Combined IRAs & CRAs*	*Alt. 3 IRAs*	*Alt. 3 Combined IRAs & CRAs*
Miles of road [1]	143 mi.	146 mi.	157 mi.	159 mi.	178 mi.
Acres of road disturbance 1	572 ac.	586 ac.	628 ac.	636 ac.	712 ac.
Number of Wells	705 wells	715 wells	732 wells	787 wells	819 wells
Well Pads	146 pads	162 pads	173 pads	160 pads	192 pads
Pad acres	587 ac.	600 ac.	614 ac.	659 ac.	691 ac.
Total acres of disturbance	***1,160ac.***	***1,190 ac.***	***1,240 ac.***	***1,295 ac.***	***1,400 ac.***
Estimated ultimate recovery BCFG = billion cubic feet of gas, BO = barrels of oil	1,178.6 BCFG 52,500 BO	1,197.8 BCFG 49,000 BO	1,275.8 BCFG 52,500 BO	1,282.8 BCFG 108,500 BO	1,384.0 BCFG 126,000 BO

1) Road mile and disturbance estimates include assumed co-located pipelines.

Cumulative Effects

Existing leases (past actions) would allow natural gas resources to be developed to the extent the lease terms allow. With surface occupancy restrictions on only 15 percent of existing leased acreage, the cumulative effect of past actions would not have a significant effect on developing the natural gas resource within roadless areas.

The effects of the four alternatives (present actions) on developing natural gas resources are detailed in the above environmental consequences discussion. Alternatives with road prohibitions would have a significant adverse effect on the ability to explore and develop natural gas resources on lands not already under lease as of the effective date of the Rule. This adverse effect would reduce the amount of energy produced from roadless areas with high development potential by an estimated 85 to 104.2 billion cubic feet of natural gas and 56,000 to 59,500 barrels of oil over a 30 year period (the respective differences in projected ultimate gas recovery between Alternative 3 and the alternatives with road prohibitions). Although the quantities foregone would not be significant in from a statewide oil and gas perspective (the average annual volume forgone would be less than 0.5 percent of annual statewide gas production), they would be significant locally.

Because of the uncertainty associated with projecting undiscovered resources, a quantified cumulative effect for roadless areas with low-to-medium development potential was not determined for this report. Revisions to forest plans or forest-wide leasing availability decisions (reasonably foreseeable future actions) could add to the significant cumulative effect on natural gas development in roadless areas, particularly considering the tendency toward greater protections for roadless characteristics. However, no projection is made as to how these future decisions would affect natural gas development within roadless areas.

Geothermal

Geothermal resources are underground reservoirs of hot water or steam that are created by heat from the earth. Geothermal steam and hot water can be used when they occur naturally on the surface of the earth in the form of hot springs, geysers, mud pots, or steam vents. Geothermal resources also can be accessed by drilling wells. The heat energy produced from wells can be used for generating electricity or for “direct uses”, such as heating greenhouses, homes, commercial buildings, and aquaculture operations, or for dehydrating vegetables. Geothermal is a “clean” energy source in that its utilization does not result in greenhouse gases.

Affected Environment

Leasing geothermal resources on NFS lands has similarities to oil and gas leasing. BLM issues geothermal leases for a 10-year primary term that may be extended for two five-year periods, if certain work commitments are met. If commercial production is established, the lease may receive a production extension of up to 35 years and a renewal period of up to 55 years. Lease rights can be restricted with stipulations, as with oil and gas leases. Leases can be either for “direct use”, such as heating, recreational use, or aquaculture, or for “indirect use”, such as commercial electrical generation.

Geothermal resource development for electrical generation purposes occurs over four distinct phases: exploration, drilling operations, utilization, and reclamation and abandonment. Like oil and gas development, roads, well pads, and drilling of wells are ultimately necessary to produce the hot water or steam and reinject it after its thermal energy is extracted. Unique to geothermal development is that it requires construction of a power generating facility to convert geothermal heat to electricity, as well as construction of an electrical transmission line to carry power to end users. A binary cycle power generating facility is the most suitable system, given the nature of geothermal resources in Colorado. (Geopowering the West Colorado State Working Group, 2007) The size of power plant that could be developed in roadless areas would be 5 - 10 megawatts, supported by five operational wells (three

production wells and two injection wells with one of each typically idle as a back-up). The plant area itself would occupy less than 10 acres of surface disturbance. Geothermal projects tend to require placement of power-generating facilities close to where the resource is recovered from the ground, because heat energy is lost when piped over large distances. Current technology allows piping of geothermal resource about two miles. (BLM, 2010)

Geologic indicators of geothermal resource potential (heat flow, volcanism, recent faulting, and continental rifting) are present in Colorado. (GeoPowering the West, Colorado State Working Group, 2007) Colorado's renewable portfolio standard (a state policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources, such as geothermal, by a certain date) for investor-owned utilities is 30 percent by the year 2020. Current geothermal installations in Colorado are exclusively thermal-use applications for aquaculture, district heating, greenhouses, resorts/pools, and space heating. These five application types represent 28 MWt (megawatt thermal) and 140 GWh/yr (thermal). Currently, no electrical generation in Colorado is a product of geothermal energy, but projects are on the drawing board. (http://coloradogeothermal.groupsite.com) :

A BLM-Forest Service programmatic EIS (USDI BLM and USDA Forest Service, 2008) projected the commercially viable, electrical-generation capacity from geothermal resources on all Forest Service-managed lands in Colorado to be 20 MW by 2015, with another 50 MW capacity by 2025. However, the extent of Colorado's geothermal resource potential has yet to be assessed fully, and little definitive data exist that indicate where and to what extent commercial geothermal resources might occur in IRAs. Geologic conditions conducive to geothermal potential in various areas around the state are assumed to overlap, in part, with roadless areas.

A recent U.S. Geological Survey report, "Assessment of Moderate- and High-Temperature Geothermal Resources of the United States" (Williams, C.F. et.al., 2008), estimates the U.S. electrical-power-generation potential of both identified (known) geothermal systems and undiscovered geothermal resources. This USGS report does not identify any roadless area in Colorado as containing identified geothermal resources. It does provide geothermal favorability information, which was used to derive the mean estimated electric-power-generation potential from roadless areas to be 173 Megawatts-electric (MWe) for IRAs and 169 MWe for proposed CRAs; or roughly about 15 percent of the Statewide total. The Pike-San Isabel National Forest (11 roadless areas), the White River National Forest (10 roadless areas), and the GMUG National Forest (6 roadless areas) contained the most roadless areas with higher geothermal favorability factors.

The 2008 USGS Assessment also contained an estimate of power resources attributable to Enhanced Geothermal Systems (EGS), which is a geothermal resource that requires some form of man-made engineering to develop the permeability necessary to circulate hot water or steam and to recover heat for electrical power generation. Averaging the EGS power potential per square kilometer over the State's roadless areas yields a rough estimate of 1,833 MWe power potential for IRAs; just over three percent of the State total. Applying the same approach to CRAs would yield a slightly lower estimate due to less overall acreage in CRAs compared to IRAs.

Currently, one geothermal lease application exists for geothermal resources on the GMUG National Forests, but it does not involve lands in an IRA or CRA. No other leases, lease applications, operations, or applications exist for operations on NFS lands in Colorado. Except for the analysis

done for the single application on the GMUG, no other national forest in Colorado has an existing decision on the availability of lands for geothermal leasing.

Environmental Consequences
This section describes the effects of each alternative on the availability of the geothermal resource.

Alternatives 1, 2, and 4
With no existing geothermal leases on NFS lands in Colorado, the road construction and reconstruction prohibition for these alternatives would preclude development of geothermal resources in roadless areas. Similar to oil and gas, roads are assumed to be necessary for developing geothermal resources. Opportunities for exploration and development of the estimated 169 to 173 megawatt electric (MWe) of undiscovered geothermal resources or the estimated 1,833 MWe of enhanced geothermal system (EGS) potential in all roadless areas would be foregone under these alternatives.

Alternative 3
Alternative 3 would allow development of geothermal resources in the analysis area to the extent that forest plans and leasing decisions would provide for such activities. The 2008 USGS Assessment provides useful information to derive a rough estimate of the overall undiscovered and EGS resource potential of roadless areas. In addition, the USGS favorability-of-occurrence map identifies areas with higher resource potential relative to other areas of the State. However, with no existing geothermal leases or development on national forests in Colorado, there is little basis upon which to make a more specific projection of the extent and location of possible development in roadless areas under this alternative.

Cumulative Effects
With no existing geothermal leases in roadless areas (past actions), prohibitions on road access under Alternatives 1, 2, and 4 (present actions) would have a significant adverse impact on the ability to explore and develop any undiscovered geothermal resources in designated roadless areas. The lack of opportunity to develop this resource in roadless areas could result in less supply being available to meet local, regional, and national need for energy. Impacts could extend beyond roadless boundaries, if the unavailability of roadless areas would render non-roadless areas economically unviable due to lack of sufficient acreage to warrant project development. Additional access or occupancy restrictions to geothermal leasing applied through forest plan or leasing decisions currently in effect or made after the effective date of the rule (reasonably foreseeable future actions) would add to the adverse effects to resource development of these alternatives. Given the limited geothermal development presently in Colorado, the foregone geothermal potential likely would be insignificant on a statewide scale, but could be significant locally.

Alternative 3 would provide the best opportunity to develop some of the mean estimated 169 to 173 megawatts of undiscovered geothermal electrical generation potential and 1,833 MWe of EGS potential that is projected to exist within the State's roadless areas. Development of geothermal resources could still be adversely impacted through access and occupancy restrictions applied to leases issued in roadless areas that result from forest plan and/or leasing decisions made after the effective date of the rule (reasonably foreseeable future actions) .

Soil Resource

This section evaluates potential effects of the alternatives on the soil resource, focusing on key differences in foreseeable activities under each alternative. Changes in soil conditions typically have interrelated effects on vegetative productivity and water quality; however, the analyses of effects on these other resources are described in separate sections of the EIS.

Affected Environment

Soil within the potentially affected roadless areas in Colorado is generally in satisfactory condition. There do not appear to be large acreages of excessive soil erosion, detrimental soil disturbance, or landslides attributed to management activities. Localized areas devoid of vegetation and subject to accelerated soil erosion occur on relatively small, scattered acreages where human activities have routinely occurred.

Roadless areas in Colorado have many different soil types because of the wide ranges in the following:

- geologic parent material
- elevation
- precipitation
- topography
- geologic time during which soil formation has been taking place

At high elevations, vegetative growth and microbial activity are restricted because of the short growing season. Under these conditions, the rate of soil formation is much slower than in the more temperate growing conditions. High-elevation soils are generally not as well-developed or as fertile as those occurring at lower elevations.

Some soil types are relatively more prone to accelerated surface erosion, due primarily to inherent soil properties and terrain features, such as slope. Erosion hazard is a rating of the inherent susceptibility of a soil to erosive forces, such as raindrop impact or water flow over the surface. Erosion hazard depends on particle size distribution, organic matter content, soil structure, permeability, rock fragment content, slope gradient, and rainfall characteristics. Erosion hazard on most soils in the analysis area can be characterized as low to moderate, with the moderate rating being dominant. High-erosion hazards are associated with soils on slopes greater than 40 percent.

A wide range of surface erosion and sediment control methods are suitable for use in the forest environment. During project-level analysis, areas sensitive to surface erosion are identified and appropriate mitigation measures are used to reduce surface erosion and sediment production. Erosion is a naturally occurring event; the objective is to retain erosion rates following project implementation that approximate pre-existing background rates. Implementation of a well-prepared surface erosion and sediment control program in conjunction with road construction and forestry activities can mitigate the potentially degrading impacts of surface erosion.

Environmental Consequences

For many effects to the soil resource, all alternatives have the same potential to cause impact to the resource. This section describes the effects common to all alternatives, followed by the effects specific to each alternative.

Effects Common to All Alternatives

Tree cutting, sale, or removal; road construction/reconstruction; and use of LCZs can affect soil productivity by compacting soils, increasing erosion, displacing soils, releasing carbon dioxide, depleting nutrients, increasing overland flow in areas of high amounts of precipitation and soil disturbance, and reducing soil strength. Most of the changes in soil conditions would be limited to relatively small, localized areas. Construction of forest roads or other long-term infrastructure, such as communication sites or oil and gas drilling pads is considered a dedicated use.

During project-level analysis, areas sensitive to surface erosion are identified and appropriate mitigation measures are used to reduce surface erosion and sediment production. New road location or facility construction would be done to minimize placement on highly sensitive soil. Roads would typically not be located on steep slopes (over 40 percent) where landslides are more common. Resource protection measures, such as those in the Forest Service regional watershed conservation practices handbook, and other best management practices, including post-project rehabilitation of disturbed soil, would be applied during any ground disturbing activities to minimize soil loss. Erosion is a naturally occurring event; the objective is to retain erosion rates following project implementation that approximate pre-existing background rates.

Implementation of a well-prepared surface erosion and sediment control program in conjunction with tree cutting, road construction, or LCZs can mitigate the potentially degrading impacts of surface erosion. Under all alternatives, roads decommissioned would have a beneficial effect on soil resources by restoring infiltration and vegetative cover, thus reducing soil erosion. In those areas that need ground cover, disturbed sites would be revegetated after the project is completed.

Other ongoing, ground-disturbing activities in roadless areas are known to contribute to localized impacts on soil quality, but are not measurably different under any of the alternatives. Examples include prescribed fire and wildland fire, hard-rock mining, livestock grazing, and recreational use. Whether or not the permitted acres of ski areas remain within the roadless areas under an alternative, the extent of new ski area roads and facilities is projected to be minimal over the next 15 years.

The potential for adverse impacts on the soil resource in roadless areas would differ slightly among the alternatives, based on the acres disturbed by projected tree removal, road construction or reconstruction, LCZs, or other ground-disturbing activities. Alternatives 1, 4, and 2 have restrictions on tree cutting and road construction to facilitate tree cutting for hazardous fuels treatments (in the order listed with Alternative 1 being the most restrictive). Restrictions could result in a greater risk of high-severity wildfires and larger fires (see Fire/Fuels section in this chapter). The higher severity and larger fire size would result in increased adverse post fire effects due to erosion and slower vegetation recovery, compared to other alternatives.

If a large, high-intensity wildfire occurred, the Forest Service would conduct a Burned Area Emergency Assessment to identify post-fire threats, critical values at risk, and the need for emergency stabilization measures. If emergency stabilization treatments are deemed necessary, they would be done immediately. This immediacy would mitigate some of the fire effects to soil and water resources.

In general, impacts in any alternative would be limited in geographic extent and be distributed over many different roadless areas. Thus, the actual effects on soil quality would be minor and of short duration.

Alternative 1

This alternative would have little potential for accelerated rates of erosion in IRAs because of the general prohibitions on road construction, reconstruction, and tree cutting activities.

Direct and Indirect Effects

Construction of forest roads or other long-term infrastructure, such as communication sites is considered a dedicated use, and the occupied land is removed from production. However, under the 2001 Roadless Rule, few forest roads or major facilities are expected to be constructed in the IRAs. Thus, there would be little to no permanent loss of the productive capacity of the land.

There would be little risk of significant amounts of soil movement or loss of soil quality from increases in soil erosion or landslides because few circumstances exist where new road construction is allowed or projected to occur in the IRAs. The limited miles of new roads projected to be constructed or reconstructed in IRAs under this alternative would be scattered among many different IRAs, and only a fraction of these miles would occur on highly erosive soils (refer to Analysis Framework section for road mile details). Thus, the likelihood would be low that projected road construction would occur on highly sensitive soils and result in a substantial increase in soil erosion.

The 15-year projections for potential future tree cutting and energy resource development activities as described in the Analysis Framework section would pose a low risk of significantly increasing the current soil erosion rates under this alternative. This low risk is due to many factors, including, but not limited to the following:

- the relatively small proportion of the roadless areas on which these ground-disturbing activities would occur
- the fact that these activities would not likely occur on steep slopes
- the mitigation measures that would be implemented to minimize soil erosion

Maintaining the restrictions on new road construction in the substantially altered areas would further help to maintain desirable soil conditions in the IRAs, even though tree cutting activities would continue to occur along existing roads in those areas.

The 2001 Roadless Rule allows existing oil and gas leases with stipulations allowing road access to construction roads within the IRAs. Similarly, some road construction would be associated over time with existing coal leasing within IRAs. This impact to soil will be similar to Alternative 2 and 4, but less than Alternative 3.

Like other alternatives, Alternative 1 allows for additional roads and facilities to be constructed where authorized within existing, permitted ski areas within IRA boundaries. However, the extent of new ski area roads and facilities in IRAs is projected to be minimal over the next 15 years, and is projected to be the same for all alternatives. Thus, no major long-term impacts on soil resources would be anticipated to occur as a result of projected new development in those ski areas.

Under the 2001 Roadless Rule, the general prohibitions on road construction or reconstruction and tree cutting activities in IRAs do not apply to the acres of unroaded areas outside the IRAs. Those unroaded areas outside IRAs would continue to incur the same soil effects that are currently occurring, and potential soil impacts may increase if roads are constructed in those areas in the future.

The number of IRA acres vulnerable to a large-scale, high-intensity wildland fire would continue to be about the same as current conditions under the 2001 Roadless Rule, as described in the Fire and

Fuels section. The 2001 Roadless Rule poses a slightly increased risk of experiencing a high-severity wildland fire in an IRA due to the limits on fuel treatments within IRAs under this alternative. Therefore, the potential for post-wildland-fire erosion and other wildland fire-related impacts on soil quality in IRAs would be slightly higher for this alternative compared to the other three alternatives.

Alternative 2

Compared to the 2001 Roadless Rule, Alternative 2 would result in some risk of affecting the soil resource in those non-upper tier acres within the CPZ, and the coal, oil/gas areas. Little to no risk of affecting the soil resource would be likely in the upper tier acres because few activities are likely to occur.

Direct and Indirect Effects

Under Alternative 2, most road construction projected to occur is temporary roads. The forest roads constructed in the CRAs in the next 15 years would result in a permanent loss of soil productivity on those acres (see Analysis Framework section for road mile projections). These roads are associated with fuels treatments focused in the CPZs, within the North Fork coal mining area, and for existing oil and gas leases.

The new temporary roads projected to be constructed under this alternative would cause a slightly higher increase in soil erosion and disturbance in CRAs, compared to Alternative 1 within the CPZs. While the roads remain in place, before decommissioning, a temporary loss of soil productivity would occur on those affected acres. All the roads in CRAs associated with CPZ activities would be decommissioned, very little permanent loss of soil productivity would occur in the CRAs.

As in Alternative 1, a temporary, but long-term, loss of productivity would occur on CRAs devoted to new oil, gas, and coal drilling pads and associated roads because the life of some of these commitments could continue for a couple of decades. However, because of the mitigation measures anticipated to protect soil quality, the post-project rehabilitation of disturbed soils, and the localized nature of projected activities, the activities projected under Alternative 2 that would differ from Alternative 1 would not be expected to result in significant increases in soil erosion rates that would reduce long-term soil productivity in the roadless areas.

The 15-year projection for potential tree cutting and energy-resource development activities (oil, gas, coal) is slightly more in CRAs under this alternative within the North Fork coal mining area. The increase in those permissible activities would increase the potential amount of soil erosion, compaction, and impacts to other soil properties in the affected areas. As these activities are completed, these areas would be reclaimed and returned to a more productive condition. Overall, no significant reduction in long-term soil productivity would occur in the roadless areas resulting from higher levels of tree cutting activities or from energy resource development activities in CRAs.

The roads projected to be decommissioned within the CRAs would reduce current road-related impacts on soil and improve soil quality in the same way that was described for Alternative 1.

Alternative 2 is projected to have three miles of new road constructed annually, over the next 15 years, outside of CRAs on lands considered to be substantially altered. Road construction would not be allowed on the lands considered to be substantially altered within the 2001 Roadless Rule inventory. This difference would result in a slightly higher risk of road related soil erosion, compared to Alternative 1, although those impacts would be mitigated to a large extent. The new roads in those

substantially altered areas would be removed from soil productivity while they remain as roads, before decommissioning.

The addition of unroaded areas into CRAs under this alternative would reduce the potential for road-related impacts on soil quality in those areas. This is because the potential for new roads would be higher on those acres under Alternatives 1 and 3, where they remain outside the CRAs under Alternatives 2 and 4.

The number of CRA acres vulnerable to a large-scale, high-intensity wildland fire would be slightly reduced under this alternative, as described in the Fire and Fuels section. Therefore, the potential for wildland fire-related impacts on soil quality in roadless areas would be lower under Alternative 2 compared to Alternative 1 and 4, but higher than Alternative 3.

Other ongoing land use activities in CRAs and their associated impacts to soil resources would be the same as previously described for Alternative 1.

Alternative 3

This alternative would result in some higher risk of adversely affecting soil quality in IRAs compared to Alternatives 1, 2, and 4 because of the additional acreage in the analysis area projected to be used for road construction, tree cutting and removal activities, and energy resource development activities.

Direct and Indirect Effects

The overall soil resource impacts would not substantially differ from the other alternatives and long-term soil productivity in IRAs and in the analysis area would be expected to be maintained at a satisfactory level.

Like the other alternatives, the soil resources on a landscape scale in the analysis area would remain in satisfactory condition under Alternative 3, with no significant loss of long-term soil productivity. However, there would be an increased risk of localized and short-term soil impacts because there would be more acres of soil disturbance in this alternative. Like all the alternatives, areas of steep slopes and sensitive soils would be avoided during project planning and layout.

Under Alternative 3, the forest roads projected to be constructed in the analysis area would result in those acres being permanently converted to a non-vegetated state, with an associated loss in soil productivity on those acres. The projected temporary roads would have the same effects described for all alternatives—that is, soil erosion would be increased in the short term.

The 15-year projections for potential tree cutting and energy resource development activities would result in soil impacts similar to what was described for the other alternatives (see Analysis Framework section for projections). Because of the greater amount of acreage projected to be disturbed, the potential risk of detrimental impacts would occur on more IRA acres under this alternative than the other three alternatives. However, with the anticipated mitigation measures, rehabilitation requirements, and limited geographic extent and distribution of soil disturbances, adverse impacts on soil quality would be minimized.

Soil quality impacts within the substantially altered areas of IRAs would primarily be related to the projections of the new road construction in those areas over the next 15 years (see Analysis Framework section). This would pose a higher risk of road-related soil erosion within those areas under Alternative 3, compared to the 2001 Roadless Rule, and would be essentially the same as impacts previously described for Alternatives 2 and 4.

Soil quality impacts on the unroaded areas not included in IRAs under Alternative 3 would be the same as described for the 2001 Roadless Rule. Like Alternative 1, there would be a higher potential for adverse soil quality impacts from future road construction or reconstruction and other development activities in these unroaded areas.

The roadless area acreage vulnerable to a large-scale high-intensity wildland fire would be reduced under Alternative 3, as described in the Fire and Fuels section. The potential for post-fire accelerated erosion and other wildland fire-related impacts to soil quality in IRAs would be slightly reduced under this alternative, compared to Alternatives 1, 2, and 4.

Alternative 4

Alternative 4 would result in some risk similar to Alternative 1, but less than Alternatives 2 or 3, of affecting the soil resource. The soil resource would remain in a functioning condition, with no significant loss of long-term soil productivity.

Direct and Indirect Effects

The environmental consequences of this alternative are similar to Alternative 2. The difference between these two alternatives is the number of the upper tier acres within CRAs. Because the additional upper tier acres, less tree cutting and road construction is projected than Alternative 2. The potential for accelerated rates of erosion or landslides in CRAs caused by tree cutting activities and road construction, or reconstruction is less than Alternative 2, but there is an increased risk of a high-severity wildfire event over Alternative 2, which could increase post-fire soil erosion or landslides.

Cumulative Effects

Cumulative effects on soil resource within roadless areas consider the effects from past, ongoing, and reasonably foreseeable future activities, when combined with effects described for each alternative. The primary activities that could affect these resources in roadless areas include the existing roads and road uses; tree cutting; livestock grazing; fire and fuels treatment; oil, gas and coal development; and recreation activity. All alternatives project a minimal amount of annual tree cutting and road construction that are limited to a relatively few areas. Uses adjacent to roadless areas can have an effect, as can natural events, including wildland fires, floods, windstorms, and insect and disease outbreaks.

Considering the relatively limited extent, magnitude, and duration of potential soil quality impacts under Alternatives 1, 2, and 4 and given future projects' mitigation measures, ground-disturbing activities under Alternative 3are not likely to create any significant adverse impacts on the soil resource. Therefore, cumulative effects to the soil resource would also be limited and minor.

Water Resources

This section evaluates potential effects of the alternatives on water resources, focusing on key differences in foreseeable activities under each rulemaking alternative. Cumulative effects are particularly relevant to addressing water quality, and those potential cumulative effects are described for each alternative. Changes in water resources are typically interrelated with effects to vegetation and soil, which are described in more detail in separate sections of the FEIS.

Affected Environment

Colorado is a headwaters state. Four of the great rivers in the United States have their origins in the Rocky Mountains of Colorado: the Colorado, Platte, Arkansas and Rio Grande. There are approximately 95,540 miles of rivers and streams in the state in 7 major river basins (Table 3-18). There are also approximately 250,000 acres of lakes, reservoirs, and ponds (CDPHE, 2010).

Table 3-18. Stream Miles and Impaired Stream Miles and Lake Acres in Colorado

River Basin	Stream Miles[1]	Impaired Stream Miles[1]	Impaired Lake Acres[1]	Impaired Stream Miles in CRA[2]
Arkansas	22,100	2,850	34,620	45
Rio Grande	10,0	90	2,130	2
San Juan National Forest	5,770	170	8,390	8
Colorado	19,340	3,950	9,340	23
Green	13,450	500	14,310	4
Platte	18,960	3,000	10,210	10
Republican	5,850	90	0	0
Total	***95,540***	***10,680***	***78,998***	***90.6***

Rounded to nearest 10 acres or miles. Totals might not add due to rounding.

1) CDPHE 2010a: Integrated Water Quality Monitoring and Assessment Report, State of Colorado (2010 Update to the 2008 305(b) Report)

2) CDPHE 2006: GIS layer of 2006 303(d) List (Regulation 93, 5 CCR 1002-93) and CDPHE 2010b: 2010 303(d) List (Regulation 93, 5 CCR 1002-93)

Water Quality

Water quality in Colorado water-bodies is generally very good. However, as seen in Table 3-18 above, approximately 11 percent of Colorado's river miles and 31 percent of Colorado's lakes and reservoir acres are impaired due to one or more pollutants. Classified uses of water in rivers that are impaired are predominantly aquatic life, followed by recreation, agriculture, and drinking water supply. The major pollutants causing impairments in Colorado rivers and streams are selenium, other metals like iron, zinc and copper, pathogens (fecal coliform bacteria and *Escherichia coli*), and sediment. Pollutants causing impairments to aquatic life in lakes and reservoirs are unknown biologic stressors, mercury, selenium, pH, and dissolved oxygen saturation.

Table 3-19 shows the total miles of streams and acres of lakes and reservoirs in the IRAs and CRAs by forest. The IRAs have slightly more river miles and lake/reservoir acres than the CRAs because they contain more land area. The IRAs and CRAs also contain an unknown number of wetlands, including forested wetlands in riparian areas and near springs and seeps; scrub-shrub wetlands, such as willow thickets and bottomland shrublands; emergent wetlands, such as marshes, fens, alpine snow glades, and wet meadows; and aquatic-bed wetlands in ponds and lakes.

Table 3-19. *Stream Miles and Lake Acres in Roadless Areas*

Forest	*IRA*		*CRA*	
	Total Stream Miles	***Total Lake Acres***	***Total Stream Miles***	***Total Lake Acres***
AR	500	310	460	300
GMUG	1,460	820	1140	360
MLS	10	0	10	0
PSI	750	400	890	290
RG	650	690	610	660
RT	730	960	720	940
SJ	700	110	720	720
WR	910	420	900	450
TOTAL	***5,710***	***3,710***	***5,450***	***3,710***

Totals might not add due to rounding.

Many of the roadless areas are located either in the headwaters of stream systems or immediately downslope of relatively undisturbed areas, such as designated wilderness. In these geographic positions, the streams and lakes within roadless areas generally have good-to-excellent water quality. This is in part because these water-bodies are within large, relatively undeveloped areas and management activities are limited in roadless areas. As shown in Table 3-20, very few miles of streams in the CRAs are on the Colorado 303(d) list of impaired streams. The Pike-San Isabel National Forest CRAs have the greatest number of impaired stream miles. These miles are primarily in the Pikes Peak East and Pikes Peak West CRAs and are impaired due to either selenium or pathogens. A major source of selenium in streams is from irrigation of high-selenium soils. Sources of pathogens can be wildlife, livestock, and/or humans (either from dispersed recreation, stormwater discharges in developed areas, or from poorly functioning sanitation facilities like failing septic tanks). The segment on the White River National Forest that is listed for sediment is Black Gore Creek in the East Vail CRA. The primary source of sediment to Black Gore Creek is road de-icing sand from Interstate 70. The primary sources of metals causing stream impairments in the CRAs are most likely historic mining activities.

Table 3-20. *Impaired Stream Miles in CRAs and Pollutants Causing Impairments*

Forest	*Impaired Stream Miles in CRA[1]*	*Pollutants Causing Impairments1*
Arapaho-Roosevelt	3	Metals
GMUG	13	Selenium
Manti-La Sal	0	
Pike-San Isabel	45	Selenium, Pathogens and Metals
Rio Grande	2	Metals
Routt	7	Iron
San Juan	8	Metals
White River	13	Selenium, Sediment, Metals
TOTAL	***86.8***	

1) CDPHE 2006: GIS layer of 2006 303(d) List (Regulation 93, 5 CCR 1002-93) and 2008 and 2010 303(d) Lists (Regulation 93, 5 CCR 1002-93)

For each impaired water-body on the 303(d) list, the Clean Water Act requires the state to establish a Total Maximum Daily Load (TMDL), which is the maximum amount of a pollutant that a water-body can receive and still meet water quality standards. The water resource specialist report contains a table with the TMDL status of the 303(d) listed water-bodies (2008 list) in the CRA/IRA. Several water-bodies on the 2008 list were removed from the list in 2010 for a variety of reasons. TMDLs for most water-bodies listed for metals have been completed and approved. A TMDL for selenium in the Gunnison Basin was completed and approved in 2011, while TMDLs for selenium impaired segments in the Arkansas and Colorado Rivers are currently being drafted.

Water Supply

Water is used for a variety of purposes including public water supply, agriculture, industrial uses (including mining/mineral development), recreation and supporting aquatic life. Growing populations in Colorado are expected to increase the demand for reliable quantities of high quality water. Most NFS lands in Colorado are located in mountainous areas, which receive the highest amounts of precipitation in the state. As a result, about 68 percent of the water yield in Colorado originates on NFS lands (Brown et. al. 2005).

Water yield generated by a watershed is primarily a function of climate conditions, i.e., precipitation, although landscape-scale vegetation disturbance, such as mortality from a large fire or insect outbreaks, in a watershed can increase runoff and water yield. Climate change is expected to result in decreased winter snowpacks, more winter precipitation as rain rather than snow, earlier snowmelt, and reduced summer low flows (Saunders et. al. 2008). The combination of vegetation changes from insects and climate change will be primary causative factors in water yield coming from roadless areas in the foreseeable future.

Forests in Colorado are currently experiencing a wide-spread epidemic of mountain pine beetle (MPB) affecting mostly lodgepole pine, but also other pine species. Many roadless areas have already been affected or will be affected in next few years. Scientists and watershed managers have had a general expectation, based on research, that the wide-spread tree mortality from MPB would

significantly increase basin-scale water yield and cause earlier runoff peaks. To date, however, there has been no evidence that the current MPB epidemic has resulted in increased runoff or changes in runoff timing in Colorado. Competing processes of canopy interception, snow accumulation and melt, and evapotranspiration by residual vegetation are much more complex than a simple "fewer live trees = more water" model (Lukas and Gordon 2010).

The state has delineated a "Source Water Assessment Area" (SWAA) around surface water and ground water sources for each public water supply in the state (CDPHE 2004a, 2004b). (Note: SWAA and public water supply are not the same as a "municipal water supply system" as used in the Colorado Roadless Rule.) Seventy percent of the delineated surface water SWAAs and 49 percent of the delineated groundwater SWAAs are located partially or completely on NFS lands. Nearly all of the CRAs have either surface water or ground water SWAA, or both, within their boundaries. There are approximately 3,148,000 acres of surface water SWAAs and 4,124,000 acres of ground water SWAAs located within the CRAs (CDPHE 2007, SWAA database). There are no "sole source aquifers" designated under section 1424(e) of the Safe Drinking Water Act in Colorado.

There are numerous reservoirs, diversions, ditches, tunnels, and other water conveyance facilities located in the IRAs and CRAs. These facilities are important for storing and delivering water supplies to downstream users. These facilities have changed the natural hydrograph of these streams by stopping, diverting, or augmenting flows. The effect of any one facility depends on the amount, timing, and duration of the streamflow that is affected.

Environmental Consequences

The most common sources of potential water quality impacts in the roadless areas that vary by alternative are tree cutting, road construction/reconstruction, LCZs, and oil-gas or coal development and operations. Other sources of potential water quality impacts do not vary measurably by alternative.

Effects Common to All Alternatives

Activities that result in soil compaction, erosion, loss of vegetation cover, and concentration of water runoff, can cause excess sediment and other pollutants to more easily enter water-bodies and degrade water quality. The greatest potential for effects to occur is where there are connected disturbed areas, i.e., a direct surface flow path from the disturbed area to the water-body. Alternatives that are more restrictive on the amount and type of activities that would be allowed would provide greater protection for water quality because less ground disturbance would occur.

Forest Service policy is to use Best Management Practices on all management activities to control nonpoint sources of pollutants and to meet applicable state water quality standards (FSM 2532). The Region 2 Watershed Conservation Practices (WCP) Handbook (FSH 2509.25) directs that the WCPs, or acceptable alternatives, are to be used in all projects on NFS lands. The WCP Handbook is recognized in Colorado's Nonpoint Source Management Program as a technical reference and guidance document for planning and implementation of the state's Best Management Practices (CDPHE 2005). Individual forest plan direction and standards and guidelines would also be used to protect water resources. In addition, some activities and projects would be subject to federal or state Clean Water Act (CWA) permit requirements (Sections 401, 402 and/or 404) or other regulations. Permits may be required for road construction, mining and oil and gas development or other ground-disturbing activities.

All projects would be subject to the NEPA process and site-specific analysis to determine appropriate design criteria and mitigation measures to protect water quality. Management measures and design criteria from the WCP Handbook, or acceptable alternative mitigation measures, and forest plan standards and guidelines, would be applied as appropriate in all projects to protect hydrologic function, stream health, soil quality, water purity and reduce sediment production. The potential for adverse effects would be minimized by using these practices for the following reasons:

- sensitive areas, like the water influence zone (WIZ), wetlands, steep slopes, or highly erosive soils, would be avoided
- protective ground cover would be maintained
- connected disturbed areas would be minimized
- appropriate road drainage and erosion control techniques would be applied
- the areas would be restored following use.

In general, most ground-disturbing activities in any alternative would be limited to relatively small; localized areas distributed over many different roadless areas, and would be eventually restored to natural vegetation cover after the projects are completed. As a result, with few exceptions, actual effects to water quality would be minor and of short duration.

Allowable activities expected to continue in roadless areas that could potentially continue to affect water quality include prescribed burning, some hard-rock mining, livestock grazing, camping, hiking/biking, off-road motor vehicle uses, and many other ongoing land use activities. These activities are all known to contribute to localized impacts to water quality. However, effects would be mitigated through the use of site-specific WCPs and best management practices. The extent and effect of activities would not be measurably different under any of the alternatives. Whether or not the permitted acres of ski areas remain within the roadless areas under an alternative, the extent of new ski area roads and facilities is projected to be minimal over the next 15 years.

Road Construction and Decommissioning and Linear Construction Zones

Research has found that roads can affect watershed geomorphology, hydrology, and chemical water quality (Gucinski et al. 2000; MacDonald and Stednick 2003). Roads can become chronic, long-term sources of fine sediment to streams from accelerated surface erosion of the roadbed, cutbanks, fillslopes, and ditches. Road-related mass failures can occur from improper location and construction of the road or inadequate road drainage. Chemical water quality can be affected by road treatments or accidental spills from road traffic.

The longer a road feature remains in place, the greater is the potential for adverse effects to water quality resulting from that road. All things being equal, a well-designed and located temporary road that is decommissioned after use is completed will have fewer long-term adverse effects on water quality than a permanent Forest road that is continually open and requires periodic maintenance.

A LCZ would be similar in effects to a temporary road. Some initial ground disturbance occurs when vegetation is removed to allow mechanized access, and some soil compaction occurs from machinery passes. During construction, appropriate best management practices and other mitigation measures would be employed to reduce erosion. Following use, the LCZ would be rehabilitated, with soil compaction mitigated as necessary, and the disturbed area revegetated to reduce long-term soil erosion.

All alternatives would allow some amount of road construction and LCZs for various purposes, with direct and indirect effects described above. The difference among alternatives would be the difference in potential for adverse effects to water quality due differing amounts of allowable road construction and LCZs. Alternatives with more restrictions on road construction and LCZs would have less potential for effects than less restrictive alternatives.

Under all alternatives, decommissioning roads would have beneficial effects to water quality as this activity is one of the best watershed restoration treatments that can be employed to improve watershed and stream health. Treatments that outslope roadbeds, pull drainage crossing structures, restore stream crossings, scarify the roadbed to reduce compaction and revegetation all work together to disperse runoff and eliminate the road as a sediment source. In addition, where slope re-contouring is used to decommission the road, subsurface water flow paths are restored, further erasing the effect of the road.

Tree Cutting: Water Quality

The act of tree cutting itself has little potential to affect water quality as most erosion and sediment impacts come from the associated skidding, forwarding, and roads. Timber harvest has only a minor effect on nutrient concentrations in surface waters. Tree cutting in riparian zones or the water influence zone (WIZ) could affect stream temperature if a sufficient amount of riparian vegetation shading is removed (MacDonald and Stednick 2003). In all alternatives, site-specific analysis would prescribe appropriate best management practices and other mitigation measures to protect water quality from tree cutting. The difference among alternatives would be a greater potential for adverse effects in the alternatives with fewer restrictions on tree cutting for any purpose.

Tree Cutting: Water Yield

The extent and magnitude of vegetation-cover removals under any of the rulemaking alternatives would not be expected to cause a major change in water yield under any of the alternatives. The aerial extent of the tree cutting in the roadless areas would not be great enough to exceed 20 percent basal area within any watershed. (Research indicates 20-30 percent of a watershed needs to be disturbed to generate a measureable increase in water yield). Also, much of the projected vegetation cutting would be salvage of already dead or nearly dead trees for fuels treatment. In this case, the effect on water yield would have happened when the tree died, not when it was cut down.

Tree cutting: Hazardous Fuel Reduction and Wildfire

Large, high-severity, stand-replacing wildfires can change the hydrology of the watershed, even if the trees are already dead due to MPB mortality. The loss of protective ground cover, sealing of the soil surface due to raindrop impact and formation of fire-induced hydrophobic layers will cause the burned watershed to respond faster to rainfall, producing higher peak flows and flash floods during high intensity, short duration storm events after the fire. These flash floods can change channel structures and adversely affect water quality due to high sediment loads. The risk of post-fire floods during summer convective storms is greatest in the first two or three years after the fire (MacDonald and Stednick 2003).

In the event of a high-severity wildland fire, the Burn Area Emergency Response (BAER) program (FSM 2523) would be used to assess the burned area to identify post-fire threats, critical values at risk and the need for emergency stabilization measures. Emergency stabilization measures would be

prescribed and implemented as needed to moderate the intensity or severity of effects to minimize the risk to municipal water supplies and other critical values at risk.

All alternatives would allow some amount of tree cutting for the purpose of hazardous fuels reduction. The difference among alternatives would be the difference in the fire hazard, potential for high severity fire and associated water quality impacts due to differing amounts of hazardous fuels treatments. Alternatives with more restrictions on tree cutting for hazardous fuels reduction would have greater fire hazard and potential for high severity fire than less restrictive alternatives.

Leasable Minerals

Energy development (oil, gas, and coal) can potentially affect water quality in several ways:

- Surface ground is disturbed for mine sites, well pads, roads and pipelines. Increased ground disturbance increases the potential for accelerated erosion and sedimentation to affect nearby water-bodies. Best management practices for erosion control would mitigate these impacts.
- In some operations, large volumes of produced water can be generated throughout the life of the project. This water might or might not be of sufficient quality to be disposed of on the surface and might need to be re-injected into deep aquifers. Produced water that is discharged to surface water-bodies would be regulated by state discharge permits to ensure that water quality standards would be met.
- The potential exists for chemical contamination of surface and groundwater by hydrocarbons or other substances (fracking compounds) used in oil and gas production. Debate is currently ongoing as to the magnitude of the risk to water supplies from fracking operations and the need for additional federal or state regulation of this activity. Best management practices are used to prevent chemical contamination from areas like drilling pits. Another source of chemical contamination is through accidental spills. The risk of spills or other pollution from energy development increases with the amount of energy development activity.

Oil and gas development activities would be subject to Colorado Oil and Gas Conservation Commission rules. These permits and regulations mandate use of best management practices and monitoring to minimize discharge of pollutants to waters of the United States or waters of the state. Disposal of produced water from oil and gas development would also be regulated by the state to protect water quality.

All alternatives would allow some amount of energy development and associated roads and other infrastructure, with direct and indirect effects described above. The difference among alternatives would be the difference in potential for adverse effects to water quality due differing amounts of allowable energy development. Alternatives with more restrictions on energy development would have less potential for effects than less restrictive alternatives.

Water Conveyance Structures: Streamflows

As water needs increase throughout the country and drought cycles continue, requests for new reservoirs and associated water conveyance structures, and expansion and enlargement of existing water facilities are expected to increase. The location of water conveyance structures is limited by forest plan direction and does not vary by alternative. However, the method by which water conveyance structures could be constructed, reconstructed, or maintained does vary by alternative. Three of the alternatives allow for road construction for at least some of the water conveyance

structures. All of the alternatives allow for LCZs for at least some of the future water conveyance structures.

Any existing or future water conveyance structures would be authorized and managed consistent with the Federal Land Policy and Management Act (FLPMA). Under this law, rights-of-way for water diversion, storage, and/or distribution systems must include terms and conditions to minimize damage to scenic and aesthetic values, fish and wildlife habitat, and to otherwise protect the environment. In all alternatives, site-specific analysis would be performed to determine appropriate streamflow-related terms and conditions necessary to meet FLPMA requirements.

Water Quality: Impaired Streams

Activities that could be allowed to occur under any alternative are unlikely to contribute to further impairment of streams currently listed on the state 303(d) list. Roads, tree cutting and other ground disturbing activities would not significantly increase discharge of selenium, pathogens or metals to the water-bodies, particularly with the use of WCPs or best management practices.

Wetlands

As the number and locations of wetlands and the amount and locations of potential activities within the IRA/CRA is not known, it is impossible to quantify the potential impacts to wetlands for any alternative. All alternatives could result in some wetland impacts. Alternatives with fewer restrictions on activities would have more potential for wetland impacts than an alternative that is more restrictive. In all alternatives, projects and activities would be planned and implemented to avoid, minimize, or mitigate wetland impacts to the extent practicable consistent with E.O. 11990 (Protection of Wetlands), CWA Section 404(b)(1) guidelines (40 CFR 230), and other applicable regulations.

Municipal Watersheds

As noted above, nearly all of the IRA/CRAs are located within a surface water or groundwater SWAA. These SWAAs would be managed for multiple uses according to forest plan direction and other applicable regulations. Municipal water supplies would be protected by use of WCPs, best management practices, and other mitigation measures in projects located within SWAAs. All alternatives would allow activities to occur within SWAAs. The differences among alternatives are two-fold:

- In general, alternatives with more restrictions on activities would provide greater protection of water quality for municipal water supplies.
- Alternatives that allow for more hazardous fuels treatments would reduce the fire hazard and potentially provide greater protection for municipal water supply systems.

Cumulative Effects Common to All Alternatives

Cumulative effects for water resources are generally evaluated on the basis of watershed boundaries. Two watershed scales are typically used:

- **Watersheds** (5th level HUC), which range in size from 40,000 to 250,000 acres
- **Sub-watersheds** (6th level HUC), which range in size from 10,000 to 40,000 acres, but can be as small as 3,000 acres depending on landforms.

A sub-watershed can be fully contained within a roadless area (IRA or CRA). A watershed would generally contain both roadless areas and non-roadless areas, with the roadless acres typically being

the smaller area percentage-wise. Incremental changes to water quality or quantity from activities within a roadless area would be most evident at the sub-watershed scale, but might not be evident at the watershed scale, due to the interaction of pollutants coming from downstream land uses.

Existing past and present human activities within the watersheds that encompass the roadless areas include timber harvest, livestock grazing, and recreation, including off-highway vehicle use and ski areas, energy development, residential development within the wildland-urban interface, agriculture, mining, and the associated transportation infrastructure to support these activities. The substantially altered acres have the greatest amount of past human disturbance, as indicated by the existing road miles.

Reasonably foreseeable future activities are somewhat speculative, especially regarding exact locations. What is known, however, is that continued population growth in Colorado is increasing the demand for greater amounts of high quality water for municipal, agricultural, and other purposes. Coupled with the increased demand for water supplies is an increased demand for water storage and conveyance facilities. As NFS lands, and roadless areas in particular, are located high in the watershed, sites on NFS lands are attractive for future new development or expansion of existing facilities to take advantage of low evaporation rates and gravity distribution. Also, the population growth increases the demand for raw materials including timber, minerals, and energy, and for recreational and residential opportunities, which increases the adverse effects to water quality by creating land use changes and disturbances.

Projected activity in any of the proposed alternatives would have no cumulative effect on water supply. However, some changes could occur to streamflows coming off roadless areas, if water storage and conveyance facilities are expanded or increased in the future. Alternative 1 would have the least potential for cumulative effects to changes in streamflows due to water storage and conveyance facilities.

The potential for cumulative effects to water quality is based primarily on the amount of activity that would be projected to occur. As noted above, the direct and indirect effects to water quality from projected activities in the roadless areas are unlikely to be detected beyond the sub-watershed scale because best management practices and other mitigation measures would be employed to mitigate effects. Downstream changes to water quality at the watershed scale would be more likely to be from activities downstream outside the roadless areas than from activities within the roadless areas.

Alternative 1

The 2001 Roadless Rule projects the least amount of tree cutting or road construction for any purpose over the next 15 years of the four alternatives. This alternative, in general, has little risk of potential adverse effects and provides the greatest protection of water quality.

Direct and Indirect Effects

Maintaining the substantially altered areas within the IRAs would further help to maintain desirable watershed conditions in these areas. However, on the unroaded areas outside of the IRAs that are included in the CRAs, there would be an increase in the potential for water quality impacts from future road construction and/or tree cutting in these areas that would otherwise be restricted in the IRAs.

The 2001 Roadless Rule is the most restrictive in terms of treating hazardous fuels within the IRAs. As a result, there would be the least reduction in fire hazard in this alternative and a slightly greater potential for high severity fire near communities and municipal water supply systems, and associated effects to water quality.

Alternative 1 is projected to have about the same amount of oil and gas development (roads, well pads, and acres of disturbance) as Alternatives 2 and 4, and less than Alternative 3, and therefore, would have the same potential for water quality effects as Alternatives 2 and 4, but less than Alternative 3.

Alternative 1 would be the most restrictive with regard to road construction to access coal reserves in the North Fork coal mining area. This alternative would have the least potential for water quality impacts from coal mining and associated activities in those IRAs.

The 2001 Roadless Rule does not limit the use of LCZs, and it is projected to have about the same number of LCZs use as Alternatives 2 and 4, which are slightly less than Alternative 3. The potential water quality impacts from construction and use of LCZs in this alternative is the same as Alternatives 2 and 4 and less than Alternative 3. This alternative does not have a road construction exception for water conveyance structures, so any new water conveyance structures would have to be constructed or maintained using an LCZ rather than a road. This could limit some new water conveyance structures from being located within an IRA, reducing the potential for water quality or streamflow effects from new or increased flow diversions or reservoirs.

Alternative 2

This alternative projects an increased level of tree cutting and temporary road construction over Alternatives 1 and 4, within the non-upper tier acres, most focused within the CPZ, coal and oil/gas areas. In these areas, Alternative 2 might have more potential for impacts to water quality than Alternative 1 because of the greater number of projected activities. Alternative 2 also removes the substantially altered acres from the CRA, which could allow for additional activities on those acres than the 2001 Roadless Rule. However, the addition of unroaded areas to the CRAs and the greater restrictions in the upper tier acres of CRA in Alternative 2 is more protective of water quality in those areas than provided by the 2001 Roadless Rule.

Direct and Indirect Effects

This alternative allows for limited treatment of hazardous fuels within the CPZ acres of CRAs. As a result, there could be a reduction in fire hazard in this alternative and a slightly less potential for high-severity fire near communities and municipal water supply systems, and associated effects to water quality.

This alternative is projected to have about the same amount of oil and gas development as Alternatives 1 and 4, and less than Alternative 3, and therefore, would have the same potential for water quality effects as Alternatives 1 and 4, but less than Alternative 3.

Alternative 2 has an increase in the projected coal mining and associated new temporary roads in the North Fork coal mining area than Alternative 1, the same as Alternative 4, and less than Alternative 3. Alternative 2 would have slightly more potential for adverse impacts to water quality from coal mining activities in those CRAs than Alternative 1, the same as Alternative 4, and less than Alternative 3.

This alternative generally prohibits LCZs within the CRAs, but allows for limited exceptions to this prohibition. This alternative is more restrictive than Alternative 3, the same as Alternative 4, but more limiting than Alternative 1. Overall, the projected LCZs, and associated water quality impacts, in Alternative 2 is the same as Alternative 1 and 4, but less than Alternative 3. This alternative includes both a road construction exception (other than in upper tier acres) and a LCZ exception for new water conveyance structures that are authorized pursuant to water rights granted by a pre-existing water court decree. With these exceptions, it is more likely that new water conveyance structures would be constructed in the CRA, with associated effects to water quality, under this alternative compared to Alternative 1 and the same as Alternative 4, and less likely than Alternative 3.

Alternative 3

Alternative 3 has the greatest amount of projected tree cutting and road construction for any purpose over the next 15 years of the four alternatives. This alternative, in general, has the more risk of potential adverse effects and provides only basic protection of water quality because more activities would occur in the analysis area.

Direct and Indirect Effects

The substantially altered acres would be managed in this alternative the same as in Alternative 2 and 4, and fewer restrictions may be placed on these areas than in Alternative 1. The unroaded areas added to the CRAs and not included in the IRAs would be managed the same in Alternative 3 as in Alternative 1, and fewer restrictions might be placed on these areas than in Alternatives 2 and 4. Alternative 3 would have greater potential for water quality effects on the substantially altered acres than Alternative 1, and on the unroaded acres added to the CRAs than Alternatives 2 and 4.

This alternative would be the least restrictive in terms of treatment of hazardous fuels. As a result, the greatest reduction in fire hazard would occur under this alternative, with a slightly reduced potential for high severity fire near communities and municipal water supply systems, and associated effects to water quality.

This alternative is projected to have the greatest amount of oil and gas development and coal mining of all the alternatives, and therefore, has the greatest potential for effects to water quality from energy development of the alternatives.

In this alternative, construction and maintenance of water conveyance structures would be guided by forest plan direction. In most analysis area, current forest plan direction places no restrictions or limitations on water conveyance structures. The potential for water quality and streamflow effects from water conveyance structures would be greatest in this alternative.

Alternative 4

The environmental consequences of this alternative are similar to that described for Alternative 2. However, there are about 1.4 million more upper tier acres in this alternative, which provide greater water quality protection for these areas. This alternative would be more restrictive in terms of treating hazardous fuels within the CRA than Alternative 2 due to upper tier acres overlapping with CPZs. As a result, there might be an increase in fire hazard in this alternative, with some potential for high severity fire near communities and municipal water supply systems, and associated effects to water quality than Alternatives 2 and 3.

Cumulative Effects

Road construction and other ground-disturbing activities can adversely affect water quality by concentrating runoff, increasing erosion and sedimentation, and introducing other pollutants to streams and other water-bodies. The actual effects to water quality of any activity proposed in the roadless area in any of the alternatives would be mitigated by using site-specific Watershed Conservation Practices, Best Management Practices, other mitigation measures, and regulatory (Clean Water Act) permit requirements. Impacts to wetlands would be avoided, minimized, or mitigated in accordance with E.O. 11990 and Section 404(b)(1) guidelines to the extent practicable. Therefore, actual effects to water quality are anticipated to be small in magnitude and short in duration. Activities in the roadless areas are not expected to contribute to continued impairment of 303(d) listed water-bodies in the analysis area. Effects to water quantity are also expected to be minimal because the area of any one watershed affected by tree cutting is anticipated to be small.

Alternatives 1, 2, and 4 would have the little risk of adverse direct, indirect, and cumulative effects to water quality, water quantity and streamflows because the overall amount of activity projected is limited. Alternative 3 would have the greatest potential for effects to water resources as the most activity could potentially occur.

Air Resource

This section evaluates potential effects of the alternatives on air quality, focusing on key differences in foreseeable activities under each rulemaking alternative.

Affected Environment

The EPA has established standards for six specific air pollutants, also known as criteria pollutants. These standards limit the amount of the criteria pollutants that can be found in the atmosphere anywhere in the country. The six criteria pollutants are ozone (O_3), sulfur dioxide (SO_2), particulate matter, carbon monoxide (CO), nitrogen dioxide (NO_2), and lead (Pb). The EPA establishes two types of standards for these pollutants. Primary standards protect human health, and secondary standards protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. The EPA identifies geographic areas of the country that do not meet the primary ambient air quality standards. An area that fails to meet a primary standard for a particular criteria pollutant is designated by EPA as being in "nonattainment" for that air quality standard. The current air quality standards (as of August 2011) are shown in the Table 3-21 below.

Table 3-21. *National Ambient Air Quality Standards (EPA 2011c)*[1]

Pollutant	*Primary Standards*		*Secondary Standards*	
	Level	***Averaging Time***	***Level***	***Averaging Time***
Carbon Monoxide	9 ppm (10 mg/m3)	8-hour [2]	None	
	35 ppm (40 mg/m3)	1-hour [2]		
Lead	0.15 µg/m3 [3]	Rolling 3-Month Average	Same as Primary	
Nitrogen Dioxide	53 ppb [4]	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour [5]	None	
Particulate Matter (PM10)	150 µg/m3	24-hour [6]	Same as Primary	

Pollutant	Primary Standards		Secondary Standards	
	Level	**Averaging Time**	**Level**	**Averaging Time**
Particulate Matter (PM2.5)	15.0 µg/m3	Annual (Arithmetic Average) [7]	Same as Primary	
	35 µg/m3	24-hour [8]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour [9]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [10]	Same as Primary	
	0.12 ppm	1-hour [11]	Same as Primary	
Sulfur Dioxide	0.03 ppm (1971 std) [12]	Annual (Arithmetic Average)	0.5 ppm	3-hour (1)
	0.14 ppm (1971 std) [12]	24-hour [2]		
	75 ppb [13]	1-hour	None	

1) Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb - 1) part in 1,000,000,000) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air (µg/m^3).

2) Not to be exceeded more than once per year.

3) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3) as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

4) The official level of the annual $NO_{2)}$ standard is 0.053) ppm, equal to 53) ppb, which is shown here for clearer comparison to the 1-hour standard.

5) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

6) Not to be exceeded more than once per year on average over 3) years.

7) To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

8) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/$m^{3)}$ (effective December 17, 2006).

9) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)

10) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. (b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. (c) EPA is in the process of reconsidering these standards (set in March 2008).

11) (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12) ppm is < 1.

12) The 1971) sulfur dioxide standards remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971) standards, the 1971) standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

13) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Ozone is not emitted to the atmosphere directly; it is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. In general, ozone concentrations in the lower atmosphere are highest during warmer months and lower in the cooler months. Ozone in the lower atmosphere is harmful to human health and vegetation.

The responsibility for ensuring that air quality meets the national standards lies with individual states. The Colorado Air Pollution Control Commission issues an annual report that summarizes air quality data collected in the state. The most recent report to the public indicates state-wide carbon monoxide trends are down, and levels are well below the national standard. Sulfur dioxide and nitrogen dioxide levels are also below national standards. Levels of lead in the atmosphere are well below the standard,

and no violations of the standard for lead have occurred since 1980. Ozone concentrations have fluctuated around the standard. Exceedances of the national standards for ozone and particulate matter did occur in Colorado in 2008 and 2009, with most exceedances occurring in the eastern half of the state. An exceedance occurs whenever an individual measurement is recorded that is above the level of the standard, but as the standards are generally defined as an average of several measurements or percentiles, an individual exceedance does not necessarily indicate a violation of an ambient air quality standard. EPA has identified only one nonattainment area in the state for ozone, which includes part or all of Denver, Adams, Arapahoe, Boulder, Broomfield, Douglas, Jefferson, Larimer, and Weld counties (roughly the Denver-Boulder-Greeley-Fort Collins metropolitan areas). This nonattainment area was designated by EPA in 2007 and is based on the 1997 ozone standard. The ozone standard was revised in 2008, and EPA has not issued new nonattainment designations based on that standard as of August 2011. EPA has not identified any current nonattainment areas in Colorado with respect to any of the other criteria pollutants. None of the identified roadless areas are located within any air quality nonattainment areas in Colorado, and are therefore, all in compliance with federal air quality standards.

Visibility is a measure of not only how far one can see, but how well one can see important characteristics of the landscape such as form, color, geologic features, and texture. Visibility is limited by the presence of particles and gasses in the atmosphere that scatter and absorb light. In the Clean Air Act, Congress established a national goal of remedying any existing, and preventing any future, impairment to visibility that is caused by man-made pollution in selected areas called mandatory federal class I areas (42 USC § 7491). The class I areas in Colorado are shown in Table 3-22.

Air quality related values are defined as resources that may be negatively affected by air pollutants (U.S. Forest Service: Air Quality Program, National Park Service: Air Resources Division, and U.S. Fish and Wildlife Service: Air Quality Branch 2000). Examples of air quality related values include visibility, soil and water quality, and vegetation.

To meet the national visibility goal set by Congress in the Clean Air Act, the EPA issued a regulation known as the Regional Haze Rule (EPA 2011g). This rule requires states to develop plans to reduce emissions that affect class I areas in order to achieve the national goal of reaching natural visibility conditions in those areas. In addition, the rule requires states to track progress toward achieving the goal within 60 years. When the EPA issued the Regional Haze Rule, it also provided guidance on the procedures to be used in tracking progress toward the national visibility goal (EPA 2003). The amount of haze is expressed according to a haze index called the deciview (dv), which is similar in form to the decibel index used to measure the intensity of sound. Each year, the clearest 20 percent and haziest 20 percent of days according to the haze index are identified and annual averages of these groups are computed. Successive five-year averages are then calculated for both groups and used to evaluate whether or not the haze levels are being reduced at a rate that will achieve the goal of reaching natural conditions by 2064. The first five-year average covered the period 2000-2004, and the second five year average covered the period 2005-2009. Table 3-22 below shows the five-year average deciview values on the clearest and haziest days along with the estimated natural conditions for the monitors located within Colorado. Table 3-22 demonstrates that, although there is visibility impairment in all of Colorado's class I areas, progress is being made toward achieving natural visibility conditions.

Table 3-22. *Visibility Conditions at Class I Areas in Colorado*

Monitor Location	Class I Areas Represented by Monitor	Clearest Days			Haziest Days		
		2000-2004 Average Haze Index (dv)	2005-2009 Average Haze Index (dv)	Estimated Natural Conditions (dv)	2000-2004 Average Haze Index (dv)	2005-2009 Average Haze Index (dv)	Estimated Natural Conditions (dv)
Great Sand Dunes	Great Sand Dunes wilderness	4.5	3.6	1.2	12.8	11.4	6.7
Mesa Verde	Mesa Verde National Park	4.3	3.1	1	13	11.3	6.8
Mount Zirkel	Mount Zirkel wilderness Flat Tops wilderness	1.6	0.7	-0.5*	10.5	9.7	6.1
Rocky Mountain	Rocky Mountain National Park Rawah wilderness	2.3	2	0.3	13.8	12.6	7.2
Weminuche	La Garita wilderness Black Canyon of the Gunnison wilderness						
	Weminuche wilderness	3.1	2.4	1	10.3	10	6.2
White River	Maroon Bells wilderness Eagles Nest wilderness West Elk wilderness	0.7	0.2	-0.8*	9.6	8.9	6.1

** For pristine conditions at high elevation sites (i.e., >2200 meters) these deciview values are sometimes negative. While counterintuitive, this is mathematically appropriate and negative or zero values are retained.*

Methane gas (CH_4) is not an air quality pollutant currently regulated by state and federal air quality standards. However, it is a greenhouse gas that contributes to global climate change. Methane is considered approximately 20 times more potent as a greenhouse gas than carbon dioxide (CO_2), though it is emitted to a lesser degree than carbon dioxide in terms of overall quantity of emissions. Methane is emitted into the atmosphere from a variety of human-related and natural sources, the most prominent being from waste, energy, and agriculture (EPA 1999). It is emitted from natural gas and coal production activities, as well as from the natural digestive processes in livestock. It has been estimated that slightly more than half of global methane emissions are related to human activities (Intergovernmental Panel on Climate Change 2001). Approximately 10 percent of U.S. methane emissions in 2009 resulted from coal mining (EPA 2011i). Methane is emitted from underground mines through a venting system, which is required for safety purposes. Natural sources of methane include wetlands, gas hydrates, permafrost, termites, oceans, freshwater-bodies, and non-wetland soils.

Environmental Consequences: All Alternatives

This rulemaking decision does not authorize any activities or actions. Any future activities or actions will undergo the appropriate level of additional NEPA review and might require additional analysis for air quality impacts. The types of activities that could occur in roadless areas under the alternatives considered and the types of emissions associated with these activities are listed below.

Road Construction

In general, road construction would result in emissions of fine particles (dust) from the disturbance to the ground surface and processing of road construction materials such as crushed rock, sand, and gravel, as well as volatile organic compounds, soot, nitrogen oxides, sulfur dioxide, particulates, carbon dioxide, and carbon monoxide from vehicle and construction equipment engines. Construction of paved roads could lead to additional emissions of volatile organic compounds from the processing and application of asphalt to the road surface. Once construction is complete, vehicles travelling along the roads would emit, through their exhaust systems, volatile organic compounds, nitrogen oxides, sulfur dioxide, particulates, carbon dioxide, and carbon monoxide. Post-construction travel by vehicles along unpaved roads would result in additional emissions of fine particles from the surface of the roads.

Tree Cutting and Removal

Tree cutting and removal could potentially result in limited road construction activities and surface disturbance, with the associated emissions described above. In addition, gas and diesel powered equipment used to cut and remove trees would result in emissions typically found in diesel exhaust, including sulfur dioxide, particulates, volatile organic compounds, carbon dioxide, and nitrogen oxides.

Prescribed Fires and Slash Burning

Prescribed fires and slash burning would result in emissions typically associated with wood combustion, particularly volatile organic compounds, nitrogen oxides, soot, particulates, carbon dioxide, and carbon monoxide. Fires could also emit hazardous air pollutants, such as polynuclear aromatic hydrocarbons, and aldehydes (such as formaldehyde). Since prescribed fires and slash burning are conducted under controlled conditions, are usually less intense than wildfires, and are

generally much smaller in size than wildfires, it can be reasonably expected that the emissions resulting from these fires would be considerably lower than those from uncontrolled wildfires that could occur if fuel loads were left in place.

Coal Mining

Coal mining would result in the release of methane, which is the chief component of natural gas (EPA 1999). Methane is also a much more potent greenhouse gas than carbon dioxide. Methane resulting from underground mining activities is vented to the atmosphere for safety reasons, as accumulated methane can cause explosions. Coal extracted from surface mines generally has lower methane content than coal found in underground mines. Although most methane is released during mining operations, some will remain in the coal and can be released during storage, transport, and processing. Once the coal is burned, there will be additional emissions from the combustion process. These emissions include nitrogen oxides, particulates, volatile organic compounds, sulfur dioxide, carbon dioxide, and small amounts of mercury. Mercury is not a criteria pollutant, but it is readily converted to toxic methyl mercury once it is deposited into water-bodies. A neurotoxin, methyl mercury can accumulate in fish to levels that are not safe for human consumption.

Quantification, or estimation, of greenhouse gas emissions may be appropriate when evalutating alternatives during site specific NEPA analysis for the coal mine permitting process. Project level NEPA provides the depth of technical analysis about the mining operation that would provide the basis for greenhouse gas estimations. Methane is formed during the process of coal formation and stored in the coal seams and surrounding rock layers. Shallow coal seams, such as those mined via surface mining operations, contain less methane because there is less pressure due to the overburden (i.e., the rock and soil lying on top of the seam) to keep the methane from escaping. Methane is released to the atmosphere when the coal seam is fractured through surface or underground mining. The amount of methane released by mining depends on the carbon content of the coal, the depth of the coal seam (deeper seams contain more methane), and the type of mining being conducted. These and other technical details would likely be analyzed during site specific NEPA.

The quantity of coal available to the mine is not directly correlated to methane released. For example, the coal mine may have additional coal available and choose not to develop part of it for technical or economic reasons. Furthermore, the mine is restricted by state permits in the amount of coal that can be processed. Essentially, the *rate* of coal extraction is capped and will not change with additional coal available. The mine's rate of production (throughput of coal processed) does not increase even if availability of coal doubles. However, the temporal extent of methane release would increase under Alternative 2 by up to 30-40 years.

The amount of methane released varies considerably over the life of the mine, and is not correlated with production levels. In general, the amount of methane released decreases as mining operations progress into shallower seams. It is also important to remember that the amount of methane released from a mine and the number of vent wells is not a linear relationship. For example, more wells could vent the same pocket of methane faster than fewer wells with the same total quantity of methane released.

Draft Council on Environmental Quality (CEQ) guidance regarding the consideration of greenhouse gases, suggests quantification "where a proposed Federal action that is analyzed in an EA or EIS would be anticipated to emit greenhouse gases to the atmosphere in quantities that the agency finds

may be meaningful…" The nature of the proposed Colorado Roadless Rule is programmatic and the extent of greenhouse gas emission is not quantifiable at this stage. Site-specific analysis of emissions would occur at the project level.

Oil and Gas Extraction Activities

Oil and gas extraction activities would result in emissions associated with drilling, production, processing, storage, and transport of oil and gas products. These emissions would include nitrogen oxides, particulate matter, carbon dioxide, carbon monoxide, volatile organic compounds, and possibly sulfur dioxide. The sources of these emissions could include drilling equipment, venting and flaring of gas, storage tanks, pipe fittings and valves, pumps, dehydrators, compression engines, and diesel engines found in heavy equipment and vehicles used to transport of people, equipment, and oil and gas products. Particulate matter in the form of fugitive dust could also be emitted as a result of vehicle movement and ground-disturbing activities.

All Activities

If any of the above activities were authorized in the roadless areas, there would be accompanying emissions of carbon dioxide. Carbon dioxide is not a criteria pollutant or threat to human health, but it is a greenhouse gas. The increase in atmospheric carbon dioxide concentrations caused by human activity is believed to be linked to observed changes in global climate (Intergovernmental Panel on Climate Change 2007). In addition, any of the above activities that would emit either nitrogen oxides or volatile organic compounds has the potential to affect ozone concentrations in the atmosphere, depending on the time of year and meteorological conditions. Ozone concentrations could be affected not only near potential activities, but also some distance away because nitrogen oxides or volatile organic compounds could be transported by winds to areas where conditions are more favorable for ozone production. Ozone production is more likely during warmer months than in cooler ones, and depends on a number of weather-related factors, such as wind speed, wind direction, relative humidity, and cloud cover. Relatively high concentrations of ozone have been observed during winter months near some areas of dense oil and gas field development in Colorado. Winter-time ozone formation is undergoing study by state and federal agencies to better understand its causes and to better predict and mitigate future events.

In most roadless areas, the relative likelihoods of tree cutting and road construction activities are usually the same for all alternatives and generally quite low. For this reason, it is anticipated that the level of any of the activities listed above would be quite low, and thus, the resulting emissions from those activities would be also low.

It is possible to provide an approximate rank ordering of the alternatives in terms of their relative potential for air pollution emissions from hypothetical future activities, should any occur (see Table 3-23). Please note, however, that comparisons among the five different types of activities cannot be made. For example, it is not possible to discern the relative potential for air pollution emissions between coal mining and oil and gas development from this table. Table 3-23 is useful in considering the relative potential for air pollutant emissions between different alternatives for a given type of activity.

In general, alternatives with a potential for higher levels of activity are likely to have a higher potential for emissions. Differences in levels of activity are likely to be quite small, and thus, the differences in emissions of air pollutants would also be fairly small. In particular, the potential for

emissions due to oil and gas extraction is not substantially different between Alternatives 2 and 4 because there is little opportunity for oil and gas development on the upper tier acres identified under either alternative.

Table 3-23. *Relative Potential for Air Pollutant Emissions Among Alternatives, Including Ozone Precursors*

Activity	*Relative Potential for Air Pollutant Emissions*			
	Alternative 1	***Alternative 2***	***Alternative 3***	***Alternative 4***
Road construction	+	+++	++++	++
Tree cutting and removal	+	+++	++++	++
Prescribed fire	++	+++	++++	+++
Wildfire	++++	++	+	+++
Coal mining	+	+++	++++	++
Oil and gas extraction	+	++	++++	++

+ Lowest relative potential for emissions among alternatives

++++ Highest relative potential for emissions among alternatives

The relative ranking of potential air quality emissions by alternatives followed this logic:

1. Assess which alternatives have more / fewer acres where road construction or LCZs could be allowed.
2. Assume those alternatives with more / less potential for roads and LCZs will result in more / fewer roads and LCZs proposed if selected and approved.
3. Assume that the alternatives with more / less potential for roads and LCZs will result in more / fewer proposals for activities if selected (e.g., pipelines, coal mining expansion or drainage wells, oil and gas development not already authorized, tree cutting, prescribed fire, etc.)
4. Assume that these activities will be approved and actually occur.
5. Assume any activities would produce measurable, un-mitigated air pollution.
6. Perform a relative ranking of alternatives for potential air quality emissions.
7. Assume coal mining includes methane emissions.

It is also important to note that all of these types of activities presently occur on Forest Service administered lands (as well as other lands) in Colorado. As of August 2011, in parts of Colorado relevant to this rulemaking decision analysis, no areas currently exceed allowable limits for ambient air quality in areas where these activities occur on Forest Service lands. Based on the projected land management activities that differ among alternatives, as described in the Analysis Framework, atmospheric emissions within roadless areas are not anticipated to directly, indirectly, or cumulatively increase to a level that would be likely to exceed state or federal air quality standards. This estimate of potential impact is based on the estimated magnitude, extent, and duration of atmospheric emissions from those activities, as projected for each alternative.

All alternatives limit these authorized activities within roadless areas to some extent. The amount and geographic extent of impacts from dust particulate, volatile organic compounds, and other emissions from projected activities in roadless areas would be relatively low, localized, and of short duration.

They would not likely accumulate in the lower atmosphere in significant concentrations or linger for long periods of time. Those infrequent or short-duration emissions would not likely create visibility impairment or public health hazards in high-sensitivity areas such as schools, hospitals, airports, or residential areas. Thus, it is unlikely that the particulate matter, carbon dioxide, or other noxious emissions that may result from potential future activities would result in a significant contribution to violations of air quality standards or negatively impact air quality related values.

The amount of prescribed burning that is allowed in roadless areas was not projected or analyzed in this EIS because this proposal would not authorize any activities or actions, and because the alternatives do not differ in the circumstances in which prescribed burning could occur in roadless areas. Smoke from prescribed burning would be carefully controlled to encourage good smoke dispersion and minimize smoke accumulations that could otherwise affect visibility and scenic quality in roadless areas, or affect public health and safety. To minimize adverse air quality effects, the Forest Service would continue to consult with the Colorado Department of Public Health and Environment and obtain the state's authorization through established permitting processes before conducting prescribed burns.

Prescribed burns would be conducted under very specific fuel moisture and weather parameters to facilitate good smoke dispersal and minimize adverse air quality impacts. The difference in the acres that may potentially be burned under each alternative would not result in a noticeable difference in meeting air quality or visibility impairment standards. Burn permits in Colorado issued by the Air Pollution Control Division typically do not exceed a few hundred acres on any given permit, so the acres burned at one time would not be very large. Burning would occur on different days and in widely different places in roadless areas, and at relatively small scales in one place and time. It is anticipated that there would not be any days of visibility impairment in the 11 class I areas as a direct or indirect result of activities from any of the alternatives.

High-severity wildland fires would be expected to continue to occur in roadless areas, producing larger quantities of smoke that last for longer periods of time than prescribed burns. Smoke from wildland fires in roadless areas may result in serious air quality impacts on class I airsheds and other sensitive receptors located down-wind from the fire. Alternative 3 would provide for the most potential of hazardous fuel reduction treatment, followed by Alternatives 2, 4, and 1. By restricting the amount of hazardous fuel reduction treatments likely to occur in roadless areas, Alternative 1 would result in a slightly higher probability of experiencing a wildland fire that could adversely affect air quality and public health and safety. However, the difference among alternatives is relatively minor in terms of the potential for smoke from large wildland fires in roadless areas and assumptions about future fuels treatments and fire activity are speculative.

Air quality impacts from dust emissions would be negligible and would not vary significantly by alternative. There would continue to be a very low density of unsurfaced roads and exposed soil areas in roadless areas, and the permitted roads in roadless areas would receive infrequent use. The level of development in roadless areas would remain low under all alternatives, and would not be expected to produce a significant quantity of airborne dust. Authorized activities in roadless areas would be designed to mitigate the magnitude and extent of airborne dust, consistent with forest plan direction. Road use associated with mining, timber harvest, and other authorized activities under any alternative would require dust abatement measures where necessary and consistent with forest plan direction. Implementation of dust abatement measures, such as watering dry roads, would minimize adverse

impacts to air quality. Differences in the roadless area boundaries (IRAs and CRAs) among the alternatives would not result in any noticeably different impacts to air quality in the roadless area airsheds.

Summary of Effects

No major difference exists in the effects on air quality among the alternatives. One minor difference is related to potential smoke-related impacts from wildland fires, which would be most likely to occur in roadless areas under the 2001 Roadless Rule, and least likely to occur under Alternatives 2, 3, and 4.

Cumulative Effects: All Alternatives

This cumulative effects analysis considered the effects from past, ongoing, and reasonably foreseeable future activities that could cumulatively affect air quality when combined with effects described for each alternative. If any of the listed activities are authorized, through future decisions and accompanying NEPA analysis, under any of the alternatives, the emissions from those activities would contribute to the levels of pollutants already present in the atmosphere from other sources. The relative contribution of emissions from potential activities in roadless areas to the air pollution already contributed by other sources is expected to be small. The primary activities that would have ongoing or future effects on air quality within roadless area airsheds include smoke from prescribed burning and residential wood burning stoves, dust emissions, such as from driving unsurfaced forest roads, increases in greenhouse gasses from numerous sources that are changing regional climate patterns, power plant emissions from nearby power plants, oil and gas development emissions, and increases in other emissions caused by increasing population trends.

Smoke

Wildland fires would continue to occur within and outside roadless areas and would have the greatest potential to produce smoke and associated pollutants that would affect public health and safety, and scenic quality in roadless areas and adjacent class I areas. Smoke from wildland fires could affect sensitive smoke receptors such as nursing homes, hospitals, schools, and smoke-sensitive residents in communities just outside roadless areas. Smoke from prescribed burning on NFS lands around the roadless areas would not likely accumulate in large amounts in smoke-sensitive areas, and fires are managed to minimize impacts to the extent that the health and safety of the general public would not be affected. Prescribed burning in and adjacent to roadless areas, in conjunction with thinning treatments, would reduce hazardous fuel loads in those airsheds, and thus, reduce the potential for very large smoke emissions from high-intensity wildland fires.

Overall, there would be few if any noticeable cumulative air quality effects from prescribed burning, because the emissions would not typically occur on the same days within the same airspace. Smoke from residential wood burning could potentially combine with smoke from prescribed burns, although state and federal agencies avoid burning during air inversions where wood-burning smoke has accumulated in a given airshed and conditions are not favorable to dispersing the smoke.

Dust

Dust would be a very minor contributor to potential cumulative effects for air quality, because the magnitude of dust emissions that would occur in the same place at the same time would be quite small and of short duration. Dust emissions do not typically travel long distances in comparison to

smoke emissions. The use of NFS roads adjacent to roadless areas may contribute additional dust emissions that could potentially combine with dust generated from activities in roadless areas.

Carbon Dioxide, Methane, and Other Greenhouse Gases

The lack of scientific tools to predict climate change on regional or local scales limits the ability to quantify potential future global, regional, or local impacts. Potential impacts on air quality due to climate change are likely to be varied. For example, if global climate change should result in a warmer and drier climate in the Front Range of Colorado where the roadless areas are located, increased particulate matter air impacts could occur because of increased wind-blown dust from drier and less stable soils. Cool-season plant species' ranges are predicted to move north and to higher elevations, and extinction of native vegetation may be accelerated; these changes in vegetation may further affect air quality.

Alternatives 1, 2, or 4 would not be expected to cause a meaningful change in the amount of carbon dioxide from vegetation management projects compared to current conditions and trends in the roadless areas under Alternative 3. The difference among alternatives in potentially thinning trees would not result in relevant difference in the increasing accumulation of greenhouse gasses in our atmosphere. Because there would be no meaningful direct or indirect effects of the alternative on carbon dioxide emissions or climate change, there would be no potential for cumulative effects.

Under all alternatives, methane gas that must be vented from coal mines for safety purposes would be released into the atmosphere. The amount is expected to be lowest under Alternative 1 compared to Alternatives 2, 3, and 4, based on the differences in coal mining activity and production anticipated, as described in the Leasable Minerals section. Rapid dispersion of methane emissions would be expected to result in no localized air quality impacts. However, there could be an insignificant incremental contribution to global greenhouse gas concentrations and on global climate change. For example, methane emissions from an existing coal mine, the West Elk Mine were estimated to be potentially 0.3 percent of U.S. methane emissions and 0.03 percent of the total U.S. greenhouse gas emissions over a five year period (USDA Forest Service 2002). Emissions from coal mining activities are expected to decrease in the U.S. as production shifts from underground coal mines to surface mines. In addition, coal mines in the U.S. are increasingly capturing and recovering methane. Methane emissions are highly variable, with no direct correlation to the number of methane drainage wells or other factors. There is no way to reasonably forecast future methane emissions for the roadless area alternatives subject to this EIS. There is conflicting scientific research on sources and consequences of the effects of methane gas on global warming trends, and insufficient reliable data to make predictions of global climate change consequences from the coal mining activities that vary by alternative. Greenhouse gas emissions are integrated across the global atmosphere, so it is difficult to determine the incremental impact on global climate from emissions associated with these alternatives.

Power Plant Emissions

Although no coal-fired power plants exist in the roadless areas, there are several power plants that exist or are planned for construction within atmospheric transport distance of the roadless areas. Coal-burning power plants are major, long-term sources of nitrogen oxides, sulfur dioxide, mercury, particulates, greenhouse gases, and other pollutants that affect air quality-related values, such as visibility, water quality, and high-elevation flora and fauna ecosystems. The Forest Service is an active participant in the permitting process for large emission sources, including power plant projects. Using this process, mitigation measures to prevent air quality impacts would be implemented where

indicated by site-specific analysis. Activities in roadless areas would be small, localized, and of short duration. Therefore, these activities would not substantially interact with power plant emissions, nor would they likely add to cumulative effects.

Oil and Gas-Related Emissions

New wells are occurring on federal, state, and private lands near many of the roadless areas. The cumulative effects of existing emission sources are evaluated through air quality modeling for specific oil and gas projects, but would be the same for all alternatives. Cumulatively, oil and gas development near roadless areas and other large sources of air pollution close to roadless areas could potentially degrade air quality. Mitigation measures and project design criteria for Forest Service-authorized projects would continue to minimize adverse air pollution emissions generated from authorized activities. Overall, the additional amount of oil-and-gas-related pollutants associated with any alternative would be relatively very small compared to other cumulative sources of pollution such as existing oil and gas emissions and therefore would not likely add significantly to cumulative effects.

Methane emissions that would be released during natural gas operations would contribute to greenhouse gasses that add to global warming trends (U.S. Climate Change Science Program 2011, EPA 1999). However, the amount would be smaller than the fractional amount previously estimated in relation to coal operations and thus negligible. The eventual combustion of natural gas will contribute greenhouse gases to the atmosphere primarily in the form of carbon dioxide.

Emission Increases from Population Growth

Air quality protection issues continue to challenge management of roadless area air resources where there is large and rapid population growth. This is especially true in areas where large new resort towns are constructed within a few miles of the roadless areas. Wood- and coal-heating emissions, road dust, vehicle emissions, and other mobile and stationary sources are all common pollution sources that potentially affect air quality. Regional development is not affected by any of the alternatives and does not vary by alternative.

Summary of Cumulative Effects

With respect to effects on air quality, there is no substantial difference among the alternatives. None of the alternatives is likely to have a measurable adverse impact on air quality, compared to current conditions and trends, as previously described under direct and indirect effects. Air quality in the class I areas and airsheds that overlap roadless areas would remain in compliance with all state and federal Clean Air Act standards. Other sources of emissions and air quality pollution sources described in this cumulative effects section would be the dominant air quality issues in and around NFS lands in Colorado. The roadless area management alternatives would not make any noticeable contribution to the overall regional haze situation or air quality trends in Colorado; however, any air pollution emissions occurring on NFS lands would add, even if negligibly, to cumulative levels of pollution from all sources.

Climate Change

Ongoing climate change research has been summarized in reports by the United Nations Intergovernmental Panel on Climate Change (www.ipcc.ch). These reports have indicated that climate change is linked to greenhouse gas emissions, primarily carbon dioxide. This issue is pertinent to the management of roadless areas because Colorado's forests play an important role in

the carbon cycle and are subject to changes in vegetative composition and structure associated with climate, precipitation, as well as fire frequency and intensity.

Affected Environment

Forests can help mitigate atmospheric greenhouse gases by storing carbon in vegetation and soil (carbon sink). However, fire, insects, and other disturbances, can result in greenhouse gas emissions (carbon source). Movement of carbon from the atmosphere into vegetation and soil, and back into the atmosphere, is a fundamental part of the terrestrial carbon cycle. Changes in this cycle can be natural, or influenced by human activities. Fires are a natural part of much of the western landscape; however, they have been altered though fire suppression and other forest management activities. Climate change is likely to increase the magnitude and frequency of fires in Colorado, as well as other Western states.

Forests contain large amounts of carbon, stored as biomass both in the above-ground biomass and soil component (Smith and Heath 2004). Forests accumulate carbon through the process of photosynthesis, which converts sunlight and water to carbon. As most forest ownership in Colorado is on federal lands, national forests are important for carbon storage.

A large pulse of carbon release occurred during the 1800s, largely due to utilization of forests (cutting) and land conversions, primarily to agricultural uses. The last century saw a re-growth of forests that had been harvested and the re-establishment of forests on abandoned agricultural lands. In the West, the effects of fire suppression are thought to have been a contributor to this increase in stored carbon (Birdsey et al. 2006).

In Colorado, droughts have influenced fire frequencies, insect outbreaks, woody encroachment, and plant mortality. The 2002 drought resulted in mass die-off of pinyon and ponderosa pine, and was likely a trigger for the mountain pine beetle outbreak in lodgepole pine and ponderosa pine, along with shorter frost seasons. Numerous warm winters also helped beetles survive and multiply. Mountain pine beetle populations grew across a landscape of mature, dense, homogenous lodgepole pine trees. The long-term drought weakened tree resistance. Mountain pine beetle infestations continue to kill entire hillsides of lodgepole pine. Three other tree species also suffer from this insect: ponderosa, limber, and bristlecone pine trees. The epidemic's core area exists in the Arapaho-Roosevelt, White River, and Medicine Bow-Routt National Forests and adjacent forested lands and affects CRAs on those national forests.

Recent changes in Colorado's climate are discussed in the Colorado Climate Action Plan (www.cdphe.state.co.us). They include the following:

- Shorter and warmer winters, with a thinner snowpack and earlier spring runoff
- Less precipitation overall, and more falling as rain than as snow
- Longer periods of drought
- More wildfires, burning twice as many acres each year than before 1980
- Widespread beetle infestations in pine forests, and die-off in aspen stands
- Rapid spread of West Nile virus due to higher summer temperatures

Future Climate Change

Descriptions of projected climate changes over the next century for Colorado are highly variable. By the end of the century, average annual temperature is projected to rise approximately 4ºF to 10ºF above the historical baseline, averaged over the Southwest region. Changes will be more or less in different areas, and by season.

In the last 30 years, the Colorado Plateau has experienced a 0.2 to 0.5°C increase, particularly in cold-season temperatures, as typical for the mid-latitudes (http://data.giss.nasa.gov), and climate models forecast the continuation of these patterns, but with periodic droughts that would be more severe.

However, the Center for Integrative Environmental Research claims Colorado could become warmer and wetter: "Seasonal temperature changes and overall increased precipitation, less of which is falling as snow, have led to less snow pack and earlier spring thaw on average for the Rocky Mountains. Precipitation in the state's higher altitudes increased by 5 percent to 20 percent during last century, but the eastern plains have seen slightly lower precipitation levels. During the next century, winter precipitation could increase by 20 percent to 70 percent, with high altitudes receiving the largest boost. This could alter the seasonal flow patterns of major rivers that originate in the Rocky Mountains, intensifying summer droughts in downstream areas. The arid weather and longer growing seasons caused by warmer weather are expected to increase the risk of drought and forest fires.

According to the Colorado Climate Action Plan, in the coming decades, scientists project that Colorado and neighboring western states will see the following:

- Temperatures increasing by 3 to 4 degrees F by 2030. Summer heat extremes will become more frequent and last for longer periods.
- Longer and more intense wildfire seasons. Fires are projected to claim more land each year than the year before.
- Midwinter thawing and much earlier melting of snowpack. The seasonal changes will cause flooding, shorten the ski season by three to six weeks, and place added stress on reservoirs.
- Much lower flows in rivers in the summer months and a greater vulnerability to drought. Already over-used river systems will have an even harder time filling existing water rights and future growth. Hydropower production may decline. Water quality will suffer as flows are depleted.
- Water shortages and heat stress for irrigated agriculture. Soil moisture will decline, crops will need more irrigation and some crops might not survive mid-summer droughts and heat spells.
- Movement of plant and animal species to higher elevations and latitudes. High-elevation habitat will become fragmented. Many of today's high-elevation species will face localized or total extinction. Local ecosystems will be more like those now found at lower elevations.
- Insect attacks in forests. Warmer winter temperatures reduce winterkill of beetles, warmer summer temperatures allow faster insect life cycles, and summer droughts further tip the advantage, making forests more vulnerable. Gypsy moths could invade aspen groves.

Environmental Consequences

This rule-making decision does not authorize any activities or actions. Future activities or actions will undergo additional NEPA analysis. Any future activities or actions related to this rule-making are

uncertain at best and therefore emission inventories for GHGs are too speculative for estimation or quantification. A qualitative discussion, with relative comparisons, is appropriate.

Greenhouse Gases: All Alternatives

Some aspects of greenhouse gas emissions associated with land management activities are not included in this discussion. For example, wood products, woody biomass for energy production, timber harvest and regeneration rates, and combustion of coal, oil, or natural gas extracted within a Colorado Roadless Area.

Tree Cutting and Removal

Tree cutting activities involve the release of carbon dioxide through tree cutting, soil disturbance, and to a lesser degree, the operation of machinery.

Almost all vegetation management activities would release stored carbon. However, when vegetation management activities include timber harvest operations, a portion of the carbon removed from the activity area would continue to be stored in wood products. Similarly, when wood can be used for energy production, it can displace fossil fuels. When wood is used from sustainably managed forests, forests are regenerated and additional carbon sequestration can be expected as trees grow. However, the fate of harvested timber after it leaves Forest Service lands is speculative and inappropriate for this FEIS.

Longer-term indirect effects are associated with forest re-growth after a management activity is completed. This involves the re-growth of trees and other vegetation removed or reduced in extent during the activity. The amount of time that it takes vegetation re-establishes is a function of the initial condition of the forest before treatment, intensity of prescribed treatment, productivity of the particular site and, in the cases of regeneration harvests, how quickly and successfully tree seedlings are established on the site once the harvest has been completed. Forest regeneration is beyond the scope of this analysis and will not be discussed in further detail in this section.

Wildfire

Wildfire results in the release of carbon dioxide, methane, and nitrous oxide emissions. Wildfires may involve crown fires and burn forested areas more severely than prescribed burns. Fuels treatments are most restrictive under Alternative 1 and Alternative 4 and it is possible that wildfires might be more common in roadless areas under these alternatives. Roads are often used as access points for wildfire suppression activities.

Coal Mining

The exploration, mining, transportation, and combustion of coal produce carbon dioxide, the most common greenhouse gas. Common sources are from internal combustion associated with heavy machinery and other equipment, methane venting for miner safety, and the release of some soil carbon associated with site development.

The combustion of coal also results in carbon dioxide emissions. However, emissions associated with combustion of coal are not considered in detail for the FEIS. Power plants that burn coal have varying degrees of efficiency and potential emissions at the point of combustion is too speculative and beyond the scope of this FEIS. It is reasonable to expect wider adoption of more efficient technologies, such as carbon capture and storage, in the next few decades. In addition, coal is increasingly a global

commodity and any reductions in coal production associated with a roadless rule likely would be substituted by coal from another source.

Oil and Gas Leasing

Similar to coal development, oil and gas development would have greenhouse gases associated with the exploration, extraction, and transportation of the product. Any emissions associated with oil and gas combustion is too speculative and beyond the scope of this FEIS.

Table 3-24 provides a relative, qualitative comparison in potential greenhouse gas emissions for each alternative. Please note that comparisons among the five activities cannot be made. For example, it is not possible to discern the relative magnitude between prescribed fire and coal mining with this table. The table is helpful to consider how each alternative could impact emissions associated with the five activities.

Table 3-24. *Relative Potential for Greenhouse Gases*

Activity	*Relative Potential for Greenhouse Gas Emissions*			
	Alternative 1	***Alternative 2***	***Alternative 3***	***Alternative 4***
Tree cutting and removal	*	***	****	**
Wildfire	****	**	*	***
Coal mining	*	***	****	***
Oil and gas extraction	*	**	***	**

** Lowest relative potential for emissions among alternatives*

***** Highest relative potential for emissions among alternatives*

Alternative 1

This alternative likely would release the least amount of greenhouse gases associated with coal mining, because this alternative does not recognize road construction exceptions for the North Fork coal mining area. Tree cutting is restricted and harvesting would be further limited because of the costs of doing this work without roads. This alternative could result in highest emissions from wildfire because fuel treatments would be limited and fire suppression would be restricted with fewer projected roads.

Alternative 2

This alternative likely would release more emissions from tree cutting and coal mining than the 2001 Roadless Rule. The North Fork coal mining area is the same for Alternative 2 and Alternative 4, so emissions from coal are not expected to differ between these two alternatives.

Alternative 3

This alternative likely would release the highest emissions associated with tree cutting, coal mining, , and oil and gas development. However, this alternative would provide the most access and flexibility to treat fuels. Therefore, emissions associated with wildfires likely would be least under this alternative.

Alternative 4

This alternative likely would release more emissions from coal mining than the 2001 Roadless Rule. The North Fork coal mining area is the same for Alternative 2 and Alternative 4, so emissions from coal are not expected to differ between these two alternatives. Wildfire emissions likely would be less

than Alternative 1, but more than the other alternatives. Tree cutting for fuel reduction would be allowed within non-upper tier CPZ. Alternative 4 does contain upper tier areas within the CPZ that would limit the ability to treat fuels to reduce the risk of wildfire.

Climate Change Impacts and Adaptation: All Alternatives

Projected impacts of climate change on forests are variable over space and time. Specific changes in temperature and precipitation regimes, as well as severity and frequency of storms and fires will influence vegetative structure and composition. These changes to forests and grasslands will not only determine the types of fish and wildlife habitat, but could also influence invasive species, recreational opportunities, and the continued provision for Colorado's National Forests to serve as the headwaters for western states.

Active management includes adaptive responses as additional information on forest vegetation is accumulated and monitoring results of actual management effects are evaluated. Active (adaptive) management strategies would generally promote management intervention to mitigate climate change effects and proactively participate with evolutionary processes through management (Tchebakova et al. 2005).

Passive management includes reserve networks that generally promote natural processes. As they relate to carbon storage and climate change, these strategies would include permitting plant communities and their species to be allowed to adapt to the changing circumstances, relying on evolutionary processes to control re-assemblage of species and genotypes within species, with the new climatic conditions presented (Noss 2001).

Alternatives 1 and 4 align closely to the passive management strategy, offering more restrictive management on all, or most of the roadless inventory. Alternative 3 aligns closely with the active management philosophy and affords more management options for climate change adaptation. Alternative 2 is a hybrid alternative, offering strict passive management strategies for the upper tier, as well as some active management options within the CPZ, and beyond in some cases (tree cutting for ecosystem composition and structure, etc).

Carbon Storage and Climate Change: Cumulative Effects

It is reasonably foreseeable that global climate change would have potential effects on fire frequency and severity and forest insect and disease relationships. Increased fire activity has been linked to the effects of a warming climate, as have certain insect infestations in the western U.S. and Canada (USDA Forest Service 2007a). This increased fire activity could lead to increased emissions of carbon dioxide and other greenhouse gases from wildfires, and possibly to decreased stored carbon in western forests and rangelands (USDA Forest Service 2007b).

Stored carbon in the roadless areas in Colorado can be expected to fluctuate over time due to timber harvesting, fires, and mortality from insects and disease. These fluctuations would be expected to be similar in all alternatives. Timber harvesting affects less than 1 percent of the roadless areas annually in any alternative, and areas that are harvested are expected to regenerate as required by law. In a general sense, as long as fire-affected ecosystems recover at the same rate as fires consume biomass and surface fuels, the net effect of fire on the carbon in the atmosphere or stored in ecosystems would be approximately neutral. If the frequency, extent, or severity of fire should increase because of

changing climate or management practices, then terrestrial carbon storage would decrease and the carbon in the atmosphere would increase (USDA Forest Service 2007b).

Under a changing climate, the trajectories of vegetation recovery after fire may also change, leading to different potentials for ecosystem carbon storage. The exact mechanisms and magnitude of this change are still under research (USDA Forest Service 2007b).

Forest Vegetation, Forest Health, and Timber Management

This section discusses forest vegetation, forest health, and timber management in the context of the proposed roadless rule.

Affected Environment

Forest Vegetation

Roadless areas provide a diverse array of forest vegetation, ranging from warm, dry pinyon-juniper woodlands to cold, moist sub-alpine forests. Species composition is generally correlated with elevation and aspect. Forest vegetation cover types in Colorado's roadless areas are based on information in the R2Veg database, which is primarily developed from aerial photography. The cover type refers to the most dominant species in the overstory canopy and does not include the wide variation in understory trees and other vegetation. Table 3-25 displays the cover type distribution within the analysis area that includes all IRAs and CRAs. The non-forest cover types within the roadless areas include grasslands and meadows, shrublands, areas devoid of vegetation, such as exposed bedrock, and a minor amount of surface water.

The roadless areas are predominantly coniferous forest types occupying mountainous terrain. Forested land covers approximately 2,933,000 acres or 72 percent of the NFS lands within the Colorado Roadless Rule analysis area. As displayed in Table 3-25, the higher elevation quaking aspen (*Populus tremuloides*) is the most common cover type, covering 864,000 acres or 21 percent of the analysis area. Spruce-fir (*Picea engelmannii* and *Abies lasiocarpa*) and lodgepole pine (*Pinus contorta*) also grow at the higher elevations of the analysis area and cover an additional 20 and 12 percent of the area respectively. Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and pinyon-juniper (*Pinus edulis* and *Juniperus scopulorum*) grow lower in elevation and represent eight, three, and six percent, respectively, of the analysis area. All other tree types occupy two percent of the area.

Table 3-25. *Cover Type Distribution In Colorado Roadless Rule Analysis Area*[1,2]

Cover Types	*Acres*	*Portion Of Total*
Rock and Water	136,000	3%
Grass	356,400	9%
Forbs	311,000	8%
Shrubs	362,700	9%
Pinyon-Juniper	232,700	6%
Ponderosa Pine	140,300	3%
Douglas-fir (and minor amount of White Fir)	323,500	8%

Bristlecone Pine and Limber Pine	65,800	2%
Lodgepole Pine	496,600	12%
Spruce/Fir (and minor amount of Blue Spruce)	809,800	20%
Aspen (and minor amount of Cottonwood)	864,000	21%

1) Information from R2Veg database for the analysis area (area is approximate and rounded to nearest 100 acres). Percentages do not total 100% due to rounding.

2) Riparian vegetation not identified as separate cover types, but represents approximately 3% of the roadless areas.

Forest species composition has changed somewhat from pre-European settlement conditions as a result of human and natural disturbances, as well as successional processes. The amount of change varies based on the types and frequency of disturbances and the response of the vegetation types. Roadless areas by their very nature have limited access, and therefore, have had little timber management. Forest vegetation changes in roadless areas have primarily been influenced by natural processes in concert with management, such as fire suppression and grazing that affected fire frequency in some areas.

The disturbance processes provide insights into current and likely future forest conditions. Grasses, shrubs, ponderosa-pine, and Douglas-fir have higher natural fire frequencies than lodgepole pine and spruce-fir cover types, and therefore, generally have higher departures from historic conditions due to fire suppression. Tree species composition in southwest Colorado has changed in many places from ponderosa-pine-dominated stands with relatively few medium and large diameter trees to many smaller diameter Douglas-fir and white fir trees (Covington and Moore 1994; Fule and others 1997). The Colorado Front Range had a mixed-severity fire regime that provided a complex forest structure of openings, patches of pure ponderosa pine and patches of mixed ponderosa pine and Douglas-fir (Kaufman and others 2001). Fire suppression in the 20th century reduced tree mortality and resulted in forests with much higher tree density than existed historically (Kaufman and others 2000; Veblen and others 2000). The forest structure in more mesic, upper-montane, ponderosa pine/Douglas-fir forests, particularly in the northern Front Range might not have been as severely altered (Baker and others 2007).

The departure from historic conditions is smaller in the infrequent, high-intensity fire regimes of spruce-fir and lodgepole-pine forests. Although the departure from historic conditions is less than in lower elevation forest types, dramatic changes can and have occurred with high-intensity fires and beetle epidemics, such as the ongoing mountain pine beetle epidemic and spruce beetle epidemic.

The current distribution of forest composition and structure has resulted from the type of disturbances and time since disturbance. In addition to the cover types, the size of the trees is an important metric for wildlife habitat, aesthetics, forest health, and timber management. Table 3-26 shows the tree size distribution estimated from the R2Veg database. The current size classes within the forested areas of the analysis area are estimated to have 4 percent of the area in seedlings and saplings, 35 percent of the area considered young forest with trees that are 5-9 inches in diameter at breast height (DBH), 54 percent of the area considered mature forest with trees 9-16 inches DBH, and 7 percent of the area having trees greater than 16 inches DBH (vegetation data do not reflect recent mortality).

Table 3-26. *Tree Size Distribution*[1]

Size Class Description	Size (DBH)	Roadless Area (portion of total)
Seedling and Sapling	< 5”	4%
Young Forest	5-9”	35%
Mature Forest	9-16”	54%
Old Forest	>16”	7%

1) Information from R2Veg database for the analysis area

Vegetation is greatly influenced by the climate. Descriptions of projected climate changes over the next century for Colorado are highly variable. By the end of the century, average annual temperature is projected to increase above the historical baseline. The magnitude will vary in different geographic areas and by season. Some landscapes would change with increasing temperatures as species migrate north and/or up in elevation, which would change the species composition of present-day forest types (Malmsheimer et al. 2008). Projections made with Climate FVS indicate potential shifts in several of the vegetation types found in Colorado roadless areas, including ponderosa pine, aspen, lodgepole, and spruce-fir (Crookston and others 2010). Low elevation species, such as ponderosa pine, are predicted to shift both to higher elevations and northward. Aspen is predicted to increase in abundance in the lodgepole pine types, with some dieback occurring in lower elevations areas where aspen is currently found. Increasing temperatures and shifting precipitation patterns will drive declines in high elevation ecosystems, such as spruce-fir forests.

Forest Health

Forest health describes the forest condition associated with its age, composition, structure, function, vigor, insects and disease, and resilience to disturbances (Helms 1998). Forest health is framed by the individual or societal perspective, including the land management objectives and spatial and temporal scales. The health of the forest includes the departure from the ecosystem’s natural range of variability. For example, “fire regime condition class” is a metric used to describe the departure from a forest’s range of variability in terms of fire disturbance, which is discussed in the Fuels and Fire section. Trees growing in dense stands are often weakened by the competition for light, nutrients, and moisture. Stand conditions can be used to estimate the risk of mortality from damaging insects and disease organisms. Landscapes with high levels of stressed, dying, or dead trees are considered unhealthy for purposes of this analysis.

Forest health conditions in the roadless areas are variable, with some areas considered healthier than others. The susceptibility to various insects and diseases is a function of tree species, density, size, and age of the forested stands. Roadless areas are experiencing similar health concerns to what is occurring in other parts of Colorado. Recent outbreaks have been larger than most historical outbreaks, although a spruce beetle outbreak affected hundreds of thousands of acres on the White River Plateau in the 1940s and 1950s. In addition, outbreaks affecting different forest types have been concurrent, which has not been noted in the past. Recent outbreaks are attributable to stand conditions with high portions of susceptible, mature trees and warmer winter temperatures. Tishmack and others (2005) identified recent winter temperatures were warmer than long-term averages. They recommended raising the upper elevation threshold limit in Colorado from 9,500 feet to 10,000 feet or above where stands highly susceptible to mountain pine beetle could occur. Forest types described earlier in this document are susceptible to a suite of insects and diseases. Table 3-27 below identifies

the Roadless acres affected by the major damage agents. The forest pests of greatest concern are as follows:

- Mountain pine beetle (*Dendroctonus ponderosae*) activity was detected on approximately 748,000 acres within the analysis area since 2003 (damage from the mountain pine beetle exceeds the area with susceptible pine cover types because some mortality occurs in pine trees outside of pine cover types). Much of the 497,000 acres of lodgepole pine cover type within the analysis area has already been infested or is likely to be infested. The current mountain pine beetle epidemic threatens to kill most mature lodgepole pine in northern Colorado. The mountain pine beetle also attacks ponderosa pine and 5-needle pines that encompass 140,000 acres and 66,000 acres, respectively. The impact to pines other than lodgepole pine is highest in the northern Front Range. Tree mortality from the mountain pine beetle appears to be declining with fewer acres of susceptible trees. Prevailing winds appear to cause the spread south and west to be slower than the spread north and east.
- Spruce beetle (*Dendroctonus rufipennis*) activity was detected on approximately 150,000 acres since 2003. Engelmann spruce and Colorado blue spruce (*Picea pungens*) are susceptible to spruce beetle. The spruce beetle epidemic has been increasing and expected to continue increasing.
- Douglas-fir beetle (*Dendroctonus pseudotsugae*) activity was detected on approximately 85,000 acres since 2003. Douglas-fir beetle populations have been relatively steady and expected to continue at similar levels.
- Subalpine fir succumbs to a combination of western spruce budworm, western balsam bark beetle (*Dryocoetes confusus*), and Armillaria root disease (*Armillaria ostoyae*). Combined, these forest pests result in subalpine fir decline and have affected 50,000-100,000 acres of subalpine fir annually (cumulative acres are not available). Subalpine fir decline is often sporadic and follows drought with no obvious trend.
- Aspen throughout much of Colorado has been recently affected by sudden aspen decline (SAD). The recent, sudden aspen mortality has not been attributed to agents that typically kill mature aspen. Severe drought combined with high temperatures during the growing season appears to be responsible (Worrall and others 2008). SAD is estimated to have affected 122,000 acres of aspen at its peak in 2008 (cumulative acres are not available). Aspen decline has been on a downward trend and is expected to remain low unless another severe drought occurs.
- White pine blister rust (*Cronartium ribicola*) is an exotic fungus that kills bristlecone pine (*Pinus aristata*) and limber pine (*Pinus flexilis*) in Colorado. Native five-needle pines have little resistance to this invasive disease. Affected acres are not available, but are relatively small since less than 2 percent of the roadless area contains five-needle pines.
- White fir (*Abies concolor*) is primarily attacked by western spruce budworm and fir engraver bark beetle (*Scolytus ventralis*). Affected acres are not available, but are relatively small since only about 2,000 acres of the roadless area contain white fir.

Table 3-27 displays the forest acres infested by damaging organisms in Colorado roadless areas, based on aerial detection flights since 2003. The aerial surveys typically under-estimate actual acres of tree mortality because the flights do not cover all areas every year; observers miss some mortality; and some damage is not detectable from the air.

Table 3-27. *Principal Insect and Disease Damaging Agents*

Damage agent	Acres (Thousands) Affected by Year[1]								
	2003	2004	2005	2006	2007	2008	2009	2010	Cum.[2]
Mountain Pine Beetle	55.6	117.5	127.8	168.1	180.8	237.3	208.9	165.0	748.0
Spruce Beetle	18.3	13.4	21.6	15.2	21.8	12.2	27.0	65.4	149.7
Douglas-Fir Beetle	10.8	12.4	8.7	5.7	10.9	8.8	7.7	11.8	85.2
Subalpine Fir Decline	162.1	87.7	125.2	95.6	82.5	91.7	53.5	63.9	N/A
Sudden Aspen Decline[3]	0.2	0.8	5.2	25.0	85.9	121.9	69.9	35.2	N/A

1) Based on annual aerial detection surveys within the analysis area. Not all areas are surveyed every year resulting in underestimates of areas affected.

2) Cumulative acres are not additive across years because some areas were affected for multiple years.

3) Aspen was not extensively sampled in 2003-2005. The aerial survey does not differentiate sudden aspen decline, frost damage, and tent caterpillar damage.

Forest health prevention and treatment options vary by forest type, pest species and other factors. Treatment methods may include, but are not limited to, pesticide spraying, pheromones, biological controls, trap trees, thinning, salvage and sanitation harvests, prescribed burning, and/or reforestation of non-host tree species.

A combination of tree cutting, removal, and prescribed burning are used to reduce the occurrence or spread of damaging insects and diseases, address other forest health concerns, and provide desirable forest conditions to reduce fire hazard. Management practices vary by management objectives and habitat type.

Lower montane forests, primarily ponderosa pine and Douglas-fir, are generally considered outside their historic range of variation. These forests are at risk of uncharacteristic, high-intensity fire, as well as forest health concerns. Management typically includes thinning out smaller trees and prescribed burning to reduce hazardous fuels, improve forest health, and restore ecological processes. Mastication is often used in the lower montane zone. Roads are used where timber is removed and to increase economic feasibility. Removal of trees to reduce hazardous fuels or reduce the spread of forest diseases or insects is often economically feasible only if a road system is present.

Mesic forests, primarily lodgepole pine and spruce-fir, generally have too much biomass to use mastication to achieve management objectives. The current mountain pine beetle epidemic exceeds our control capabilities. Management in the general forest is limited to salvaging dead and dying trees to recover economic value and reduce hazardous fuels. Some spruce beetle outbreaks can be prevented by removing large spruce trees within two years of being windthrown. Large spruce beetle epidemics, such as the current one near Wolf Creek Pass, exceed our control capabilities.

Timber Management

Roadless areas contain 709,000 acres identified in forest plans as suitable for timber management. Approximately 26 percent of the National Forest System lands suitable for timber management in Colorado are in roadless areas. These lands are scheduled to provide a regulated timber yield contributing to the allowable sale quantity (ASQ). The ASQ for all national forest lands in Colorado is 145.4 million board feet (MMBF) annually as averaged over a decade. The ASQ is a measure of

the potential sustainable supply of timber. The actual timber volume sold from 2000-2009 averaged 69.2 MMBF per year. Very little timber has been sold or harvested from roadless areas during this time.

Tree cutting and harvest are used to achieve multiple resource management objectives. The objectives include timber production, as well as improving forest health, improving wildlife habitat, and reducing hazardous fuels where timber volume is sometimes a secondary objective or a by-product. Timber in roadless areas is generally less accessible (further from existing roads) and has more site limitations such as steep and/or rocky terrain.

Reducing hazardous fuels has been an important objective in forest vegetation management in recent years. The emphasis on hazardous fuel reduction has focused on commercial and non-commercial thinning in the pinyon-juniper, ponderosa pine, and Douglas-fir cover types. Thinning is not generally used in mature lodgepole pine and aspen forests that are early successional species typically regenerated using even-aged methods. These species are susceptible to wind throw and are primarily managed using clearcuts or similar silvicultural methods. Forest vegetation management in spruce-fir forests primarily relies on uneven-aged methods. Table 3-28 shows the lands suitable for timber management.

Table 3-28. *Lands Suitable for Timber Management and Timber Sale Quantity*

Forest	*Suitable Lands for Timber Management within Roadless Areas (acres)*	*Forest-wide Allowable Sale Quantity (MMBF)*	*Average Timber Volume Sold Annually 2000-2009 (MMBF)*
Arapaho- Roosevelt	25,000	6.6	7.9
GMUG	179,000	38.8	9.3
Pike and San Isabel	145,000	26.0	7.1
Rio Grande	12,000	22.8	7.4
Routt	74,000	14.8	17.1
San Juan	117,000	24.0	8.5
White River	157,000	12.4	11.9
Total	***709,000***	***145.4***	***69.2***

Spruce trees are often of the highest value for timber and can retain value several years after death. Aspen deteriorate quickly after death and lose value for forest products. Pines and other species lose value, particularly for saw logs, a couple years after death. In addition, the wood of pine trees becomes blue-stained when infested by mountain pine beetles. The blue stain reduces the lumber value for most uses; however, a small portion of blue-stained wood is used for higher-value decorative purposes. Only a small portion of the recent timber mortality will be harvested. The recent epidemics reduced tree stocking for future timber harvest. The tree mortality is expected to reduce mature trees on lands suitable for timber management for the next several decades. The epidemic is expected to affect future timber supply on the Arapaho and Roosevelt National Forests, Routt National Forest, and White River National Forest where timber available for substitution could be limited. Other National Forests in Colorado are not expected to have timber supply limited by the beetle epidemics.

Environmental Consequences

Roaded areas will continue to be more intensively managed than roadless areas. Forest health treatments and other forest management projects are limited to some degree in roadless areas under any of the alternatives.

Effects Common to All Alternatives

Economics and management constraints, such as smoke emission from prescribed fires, will limit the extent of forest vegetation management over the next 15 years. Natural processes will continue to be the primary driver affecting establishment, growth, composition, and health of forests in roadless areas. The level of insect and disease outbreaks outside roadless areas is similar to forest health concerns within the analysis area, with the potential to spread into adjacent roadless areas. Conversely, forest health concerns within roadless areas have potential to expand to adjacent areas. The current mountain pine beetle epidemic will subside in lodgepole pine with most mature trees having been killed. The mountain pine beetle will likely affect mature ponderosa pine, but the effects are more uncertain and could result in a patchy mix of dead and live trees. The spruce beetle epidemic will likely continue to expand in infested areas, creating mixed stands increasing the subalpine fir component. Aspen decline appears to be leveling off. Aspen regeneration will occur in much of the

area where decline occurred and will expand into some areas of high lodgepole pine mortality. The location and size of fires are more uncertain than the beetle epidemics and discussed in the fire and fuels section.

Congressionally designated areas, such as wilderness areas and wild and scenic rivers, have restricted management in some areas near roadless areas. Forest plan management area allocations allow, restrict, or prohibit forest vegetation management activities in various ways.

A warming and drying climate could decrease the ability to achieve the desired condition for forest vegetation, especially with regard to wildfire severity and damage from forest insects and diseases. Seedlings better adapted to future climates could be planted to assist genetic and/or species migration to increase the resiliency of forests to increased temperatures and variable precipitation. The Forest Service's restoration focus could reduce the harvest of larger trees and management in forest cover types with infrequent fire regimes.

Alternative 1

Under the 2001 Roadless Rule, tree cutting would be limited to the following:

- small diameter timber needed to improve at-risk species habitat or restore ecosystem composition and structure
- incidental cutting associated with permitted activities
- necessary personal or administrative use
- within areas that have already been substantially altered that do not require road construction.

Direct and Indirect Effects

The requirements of the 2001 Roadless Rule also indirectly limit tree cutting. Small-diameter timber has higher harvest costs and is less valuable than larger timber. Costs often increase substantially with the distance of a project from a road. Lands within 0.25 to 0.5 mile of existing roads would be the most likely to result in some trees cut and/or removed, consistent with the above tree cutting limitations. Tree cutting and road construction have more restrictions on approximately 3,067,000 acres or 66 percent of the analysis area than what would otherwise have been permitted under the forest plans.

This alternative would reduce the lands suitable for timber management by 638,000 acres or 23 percent of the suitable lands within Colorado's national forests. The ASQ would be reduced by approximately 33.4 MMBF to 112 MMBF annually. The ASQ would remain above the recent 69.2 MMBF annual timber sale volume. Forests would be able to continue recent State-wide harvest levels by substituting timber from lands outside of roadless areas. However, harvest may be reduced locally on forests most affected by bark beetles because mature suitable timber for substitution is expected to be limited.

Based on 15-year projections described earlier in the Analysis Framework section, approximately 2,700 acres annually in the analysis area would have tree cutting activities to contribute to fuel management, restoration, and other forest vegetation management. Almost all of the forest vegetation would remain unmanaged over the next 15 years. These unmanaged areas likely would continue to depart from desired conditions, particularly in the ponderosa pine and Douglas-fir cover types. The decline in forest health would result in some landscapes being less resilient to large-scale insect and disease outbreaks.

Tree cutting and road construction restrictions indirectly affect tree mortality associated with insect and disease agents. Larger areas of stands with forest health concerns could conflict with land management objectives, including a potential increased wildfire hazard and affects to adjacent lands. Standing and down dead trees add to the hazardous fuel load, which can result in wildfire impacts on forest and adjacent lands.

A warming and drying climate, combined with increased restrictions on tree cutting and road construction, likely would exacerbate management challenges to address forest health problems. Management options allowed in the forest plans to improve site-specific forest vegetation concerns might need to be reduced in extent and intensity or might not occur. However, overall forest health is unlikely to be affected at large scales because these problems exceed our management capacity. This alternative would provide the least opportunity to introduce genetic diversity or species that are better adapted to future climates because restrictions on regeneration harvesting would create the fewest reforestation opportunities.

This alternative is restrictive on tree cutting and road construction for forest vegetation management, making this alternative unlikely to achieve the forest plan desired conditions and likely would reduce the long-term sustainable supply of timber volume available from national forests in Colorado by 23 percent.

Alternative 2

Like Alternative 1, economics would limit the extent of forest health treatments in portions of roadless areas that would continue to be unroaded in the next 15 years. However, this alternative provides some opportunities to improve forest health to meet desired vegetation conditions compared to Alternative 1, mostly within the CPZ. But, it is more restrictive than the 2001 Roadless Rule in the upper tier acres.

Direct and Indirect Effects

Tree cutting and road construction have more restrictions on approximately 2,940,000 acres or 66 percent of the analysis area than what would otherwise have been permitted under the forest plans. Tree cutting and road construction are nearly the same as under the 2001 Roadless Rule. However, the Colorado rule creates CPZs that include approximately 254,000 acres of CRAs within 0.5 mile of at-risk communities and, if the ground conditions are present to extend the CPZ an additional mile, there is the potential for an additional 1,038,000 acres within 1.5 mile CPZs. Areas within the CPZ would allow tree cutting and road construction within the 0.5 mile CPZ for hazardous fuel reduction for an at-risk community or municipal water supply system.

Tree cutting in these areas is not limited to small diameter trees like Alternative 1, but the focus is on the removal of generally small diameter trees to create ground conditions that modify fire behavior. Although the focus is on cutting small diameter trees, some larger trees could be cut to improve the regeneration opportunities and economic feasibility. In addition to the tree cutting that is needed to reduce hazardous fuels, infrequent tree cutting is allowed where it is needed to maintain or restore ecosystem composition, structure and processes to respond to some forest health concerns. This is not limited to the CPZs and is not focused on cutting small diameter trees. This allows the cutting and removal of some larger trees when it is needed to create regeneration activities and achieve desired conditions which may also improve the economic feasibility in some areas. Road construction to facilitate this ecosystem tree cutting is limited to within the 0.5 mile CPZ of an at-risk community.

This alternative would reduce the lands suitable for timber management by 560,000 acres or 20 percent of the suitable lands within Colorado's national forests. The ASQ would be reduced by approximately 29.1 MMBF to 116.3 MMBF annually. The ASQ would remain above the recent 69.2 MMBF annual timber sale volume. The reduction is slightly less than the 2001 Roadless Rule. Similar to Alternative 1, forests would be able to continue recent state-wide harvest levels by substituting timber from lands outside of roadless areas. However, harvest could be reduced locally on forests most affected by bark beetles because mature suitable timber for substitution is expected to be limited.

Based on 15-year projections described earlier in the Analysis Framework section, approximately 7,300 acres in the analysis area would be treated by tree cutting practices, for fuel management, restoration, and/or forest health purposes. Large areas of roadless would remain unmanaged and remain at high risk of mortality, increase its risk, or die over the next 15 years. These unmanaged areas likely would continue to depart from desired conditions, particularly in the ponderosa pine and Douglas-fir cover types. The decline in forest health would result in some landscapes being less resilient to large-scale insect and disease outbreaks.

A warming and drying climate, combined with increased restrictions on tree cutting and road construction, likely would exacerbate management challenges to address forest health problems. This alternative would allow more flexibility than the 2001 Roadless Rule, but less flexibility than the forest plans. Management options allowed in the forest plans to improve site-specific forest vegetation concerns likely would be reduced in extent and intensity or might not occur. However, overall forest health is unlikely to be affected at large scales because these problems exceed our management capacity. This alternative would provide more opportunity than Alternatives 1 or 4, but less than Alternative 3, to introduce genetic diversity or species that are better adapted to future climates as a result of reforestation opportunities where regeneration harvests occur.

Although this alternative is unlikely to substantially improve forest health and hazardous fuel conditions overall, the increased flexibility compared to Alternative 1, would increase the likelihood of achieving management objectives in critical areas, especially in the CPZs. This alternative would also reduce the likelihood of achieving the forest plan desired conditions outside of CPZs and likely would reduce the long-term sustainable supply of timber volume available from national forests in Colorado by 20 percent.

Alternative 3

Similar to Alternatives 1 and 2, economics would limit the extent of forest management in portions of roadless areas that would continue to be unroaded in the next 15 years. However, this alternative provides the greatest opportunities to achieve resource management objectives that include improving forest health and reducing hazardous fuels.

Direct and Indirect Effects

Based on 15-year projections described earlier in the Analysis Framework section, approximately 17,400 acres in the analysis area would be treated by tree cutting practices, for fuel management restoration, and/or forest health purposes. Although this alternative provides the most flexibility for management, accessibility and other resource requirements would result in most roadless area remaining unmanaged and at high risk of mortality over the next 15 years. These unmanaged areas likely would continue to depart from desired conditions, particularly in the ponderosa-pine and

Douglas-fir cover types. The decline in forest health would result in some landscapes being less resilient to large-scale insect and disease outbreaks.

Forest health would not be improved nor hazardous fuels reduced on most area within roadless areas, but this alternative provides more flexibility than Alternatives 1, 2, or 4 to address concerns that could arise. The ASQ is 33.4 MMBF higher than Alternative 1, and 29.1 MMBF higher than Alternatives 2 or 4. This alternative provides a full range of management options to address respond to climate change or unanticipated events if vegetation trajectories become inconsistent with the desired conditions. Alternative 3 would provide the highest likelihood of achieving forest plan objectives. This alternative would provide the most opportunity to introduce genetic diversity or species that are better adapted to future climates as a result of having more reforestation opportunities.

This alternative would allow the full range of management actions and would provide the greatest flexibility to achieve the forest plan desired conditions.

Alternative 4

The effects of Alternative 4 are nearly identical to those in Alternative 2. Economics would limit the extent of forest health treatments in portions of roadless areas that would continue to be unroaded in the next 15 years. However, this alternative has fewer opportunities to improve forest health to meet desired vegetation conditions, compared to Alternative 2, because of the additional upper tier acres. This alternative provides more opportunities to improve forest health in CPZs than would occur in Alternative 1, but less than Alternative 2 where the CPZ and upper tier acres overlap.

Direct and Indirect Effects

Tree cutting and road construction have more restrictions on approximately 3,245,000 acres, or 70 percent of the analysis area, than what would otherwise have been permitted under the forest plans. All prohibitions and exceptions are the same in this alternative as in Alternative 2. The difference in the two alternatives is the amount of designated upper tier acres where the only tree cutting is incidental to a management activity, personal or administrative. This alternative restricts tree cutting and road construction on slightly more acres than the 2001 Roadless Rule.

This alternative would reduce the lands suitable for timber management by 560,000 acres or 20 percent of the suitable lands within Colorado's national forests the same as Alternative 2. The ASQ would be reduced by approximately 29.1 MMBF to 116.3 MMBF annually. The ASQ reduction is slightly less than the 2001 Roadless Rule. The ASQ would remain above the recent 69.2 MMBF annual timber sale volume. Similar to Alternatives 1 and 2, forests would be able to continue recent state-wide harvest levels by substituting timber from lands outside of CRAs. However, harvest may be reduced locally on forests most affected by bark beetles because mature suitable timber for substitution is expected to be limited.

Cumulative Effects

The tree cutting and road construction restrictions, combined with tree cutting and timing restrictions associated with the Southern Rockies Lynx Amendment, likely would make it more difficult to achieve the ASQ for Colorado's national forests over the next 15 years if timber management was fully funded under Alternatives 1, 2, and 4. No cumulative effects were identified for Alternative 3 because management direction would be unchanged. The direct effects associated with the Southern

Rockies Lynx Amendment were disclosed in its environmental analysis and do not create cumulative effects associated with Alternative 3.

Fire and Fuels

This fire and fuels analysis is closely related to other vegetation and forest health topics, which are addressed in separate sections of the EIS. Fire regimes and condition classes are used to characterize fire. This analysis evaluates the relative ability to treat hazardous fuels within the wildland urban interface and municipal watersheds, major focus areas of the National Fire Plan, Healthy Forests Restoration Act (HFRA), Healthy Forests Initiative, and Congressional budget direction. The prohibitions and exceptions for tree cutting, sale, or removal and road construction or reconstruction contained in the four alternatives influence the ability to treat hazardous fuels. This can affect the amount of hazardous fuels, frequency and intensity of wildfire, and response to wildfires.

Affected Environment

Natural disturbances such as fire, wind, insects, and diseases help shape forests. Although fire is widespread, it is seldom uniform; every forest has its own characteristic pattern of fire intensity, frequency, and size. Fire regime and condition class are used to characterize fire.

Fire Regimes

"Fire regimes" refers to the nature of fire occurring over long periods and the prominent immediate effects of fire that generally characterize an ecosystem. Descriptions of fire regimes are general because of the enormous variability of fire over time and space. Fire regimes have been described by factors, such as fire frequency, fire periodicity, fire intensity, size of fire, pattern on the landscape, season of burn, and depth of burn (Forest Encyclopedia Network, 2008). The natural role of fire can be understood and communicated through the concept of fire regimes. In addition, significant changes in the role of fire due to management actions or possible shifts in climate can be readily described by shifts in fire regimes.

Five combinations of fire frequency, expressed as fire return interval in fire severity, are defined in the Cohesive Strategy and are referenced in the HFRA Public Law 108-148 and this analysis. Table 3-29 describes each regime, as modified by Keeley et.al (2009).

Table 3-29. *Fire Regime Classification*

Fire Regime Type	*Fire Return Interval (years)*	*Fire Spread Drivers*	*Fire Intensity*	*Fire Effects*	*Ecosystem Examples*
I	1-35	Surface and other low understory fuels	Heavy understory and fuel consumption	Low to moderate fuel overstory mortality	Ponderosa Pine, pine oak savannah, dry site Douglas-fir
II	1-35	Mostly surface fuels	Low to moderate	Above ground biomass killed, most fuels consumed	Drier grassland types, tall grass prairie, low scrub, some pacific chaparral communities
III	35-100	Surface and canopy fuels	Mixed high and low	High understory mortality and fuel consumption, thinning of the overstory	Western mixed conifer, dry site shrub communities
IV	35-100	Mostly canopy fuels	High	Above ground biomass killed, high fuels consumption	Chaparral, sagebrush, dry site lodgepole pine
V	>200	Mostly canopy fuel	High	Above ground biomass killed, high fuels consumption	Subalpine forests, cool moist lodgepole pine, Engelmann Spruce

The fire regime classifications used in this analysis are based on fire severity as detailed in Brown and Smith (2000) and the Forest Encyclopedia Network (2008). Using this system, the understory and mixed-severity fire regimes apply only to forest and woodland vegetation types. All other ecosystem types are considered to have a stand-replacement fire regime because the above-ground vegetation is typically killed or removed by most fires.

Fire Regimes in Colorado

Colorado roadless areas generally fall into two fire regimes (LANDFIRE 2007):

- III (less frequent, mixed severity)
- IV (less frequent, high severity)

Of the IRA and CRA acreage within 1.5 miles of at-risk communities (FOTE 2000), approximately 60 percent are in Fire Regime 3 and 20 percent are in Fire Regime IV (see Table 3-30). This is significant, especially in the wildland urban interface (WUI) because these fire regimes (mixed severity and stand replacement, respectively) support fire behavior that is difficult for firefighters to control. Such fire behavior leaves at-risk communities vulnerable to negative impacts and potentially adverse consequences.

Table 3-30. *Total Acres in Each Fire Regime Group by Roadless Classification and within 0.5 Mile and 1.5 Miles of At-Risk Communities [1].*

Fire Regime Group	CRA Total Acres		IRA Total Acres	
	0.5 Mile CPZ	***1.5 Mile CPZ***	***0.5 Mile WUI***	***1.5 Mile WUI***
I	30,300 (12%)	107,700 (10%)	29,300 (12%)	103,800 (10%)
II	3,600 (1%)	14,600 (1%)	3,700 (1%)	14,900 (1%)
III	164,400 (65%)	619,200 (60%)	163,300 (6%)	615,300 (59%)
IV	41,100 (16%)	204,000 (20%)	43,100 (17%)	215,000 (21%)
V	6,800 (3%)	42,700 (4%)	6,800 (3%)	43,800 (4%)
Other	7,600 (3%)	46,400 (4%)	7,600 (3%)	45,800 (4%)
Total	***253,900***	***1,034,600***	***253,900***	***1,038,700***

1) Acres within the 1.5 mile column include the acres within the 0.5 mile column.

Fire Regime Condition Class

Fire Regime Condition Class (FRCC), also referred to as "Condition Class", describes the degree of departure from reference conditions, potentially resulting in changes to key ecosystem components:

- vegetation characteristics (species composition, structural stage, stand age, canopy closure, and mosaic pattern)
- fuel composition
- fire frequency, severity, and pattern
- other associated disturbances, such as insect and disease mortality, grazing, and drought

Condition Classes are defined as follows:

- **Condition Class 1:** Ecosystems with low (less than 33 percent) departure and are still within the estimated historical range of variability during a specifically defined reference period. Risk of losing key ecosystem components is low.
- **Condition Class 2:** Ecosystems with moderate departure (33 to 66 percent) departure. Risk of losing key ecosystem components is moderate.
- **Condition Class 3:** Ecosystems with high (greater than 66 percent) departure from reference conditions. Risk of losing key ecosystem components is high.

Characteristic vegetation and fuel conditions are those that occurred within the natural fire regime, such as those found in areas categorized as Condition Class 1. Uncharacteristic conditions are those that did not occur within the natural fire regime, such as areas categorized as Condition Class 2 and 3. Table **3-31** displays the condition class within 1.5 miles of at-risk communities.

Approximately 37 percent of both the IRA and CRA acreage within 1.5 miles of the 2000 FOTE at-risk communities is in condition Class 1 and approximately 43 percent is in Condition Class 2 (see Table 3-8). These areas generally in need of some type of treatment to reduce the threat to the public, firefighters, communities, municipal water supplies, and other local resources and infrastructure.

Table 3-31. *Total Acres and Percentage in Each Condition Class by Roadless Classification and within 1.5-Mile WUI/CPZ .*

	Inventoried Roadless Areas		*Colorado Roadless Areas*	
Condition Class	***Acres in 1.5 mile WUI***	***Percent of Area***	***Acres in 1.5 mile CPZ***	***Percent of Area***
1	386,900	37%	381,400	37%
2	445,700	43%	440,300	43%
3	157,000	15%	163,700	16%
Other	45,500	4%	45,600	4%
Total	***1,035,100***	***100%***	***1,031,000***	***100%***

Note: *Totals might not add due to rounding*

Disturbances (fires, insect activity and other natural processes) that have occurred since 1999 are not necessarily reflected in the Condition Class (LANDFIRE 2007) used in this analysis because of the data of the base satellite imagery used. Also, the Reference Condition models might not represent the disturbance (i.e., the ongoing mountain pine beetle) as uncharacteristic because of the scale of the disturbance. Therefore, the displayed condition classes might not be representative of the current departure from historic conditions.

Wildland Urban Interface /Community Protection Zones

Increased development and the accompanying landscape alteration on private rural lands adjacent to national forests will have significant implications for the managing public land resources. Although impacts from increased potential for invasive species and recreation access and use could have indirect effects related to fire management, the proliferation of houses increases the number of structures needing protection, which complicates public land fire management and suppression, and drives up fire management costs (Stein et.al, 2007). A principal reason for the escalating cost of wildland firefighting is the growing number of homes being built in the WUI (Headwaters Economics, 2009).

The Colorado Roadless Rule uses the term CPZ instead of WUI. As defined in the rule, the CPZ is an area extending 0.5 mile from the boundary of an at-risk community, or an area up to 1.5 miles from the boundary of an at-risk community where land exhibits one or more of the following characteristics:

- a sustained steep slope that creates the potential for wildfire behavior to endanger the at-risk community
- a geographic feature that aids in creating an effective fire break, such as a road or a ridge top
- Condition Class 3 as defined by HFRA

For analysis purposes, housing density (current, 2000 and projected, 2030) information from the National Forests on the Edge (FOTE) (Stein et al. 2007) analysis is used as a proxy for at-risk communities. The delineation of the CPZ around at-risk communities was determined using the 0.5-mile default distance and 1.5 miles as the maximum CPZ distance. Table 3-32 displays the acres by forest, in the two analysis classifications within 0.5 mile and 1.5 miles of FOTE 2000 at-risk communities, based on housing density estimates from the 2000 U.S. census.

Table 3-32. *Roadless Classification Acres[1] by Forest within 0.5 Mile and 1.5 Miles of FOTE 2000 At-Risk Communities [2] .*

Forest	*Classification*	*0.5 Mile CPZ/WUI*	*1.5 Mile CPZ/WUI*	*Total Roadless*	*Roadless in 0.5 Mile CPZ/WUI*	*Roadless in 1.5 Mile CPZ/WUI*
Arapaho-Roosevelt	CRA Forest Total	37,400	133,600	**347,100**	10.8%	38.5%
	IRA Forest Total	37,300	134,400	**352,500**	10.6%	38.1%
Grand Mesa, Uncompahgre and Gunnison	CRA Forest Total	26,500	135,200	**901,100**	2.9%	15.0%
	IRA Forest Total	37,400	173,600	**1,058,500**	3.5%	16.4%
Manti La Sal	CRA Forest Total	0	0	**7,700**	0.0%	0.0%
	IRA Forest Total	0	0	**11,000**	0.0%	0.0%
Pike-San Isabel	CRA Forest Total	65,900	280,800	**774,700**	8.5%	36.2%
	IRA Forest Total	57,200	249,400	**667,300**	8.6%	37.4%
Rio Grande	CRA Forest Total	15,300	94,700	**518,600**	3.0%	18.3%
	IRA Forest Total	16,800	97,200	**529,000**	3.2%	18.4%
Routt	CRA Forest Total	4,400	25,200	**433,600**	1.0%	5.8%
	IRA Forest Total	4,400	25,300	**442,300**	1.0%	5.7%
San Juan	CRA Forest Total	39,900	157,300	**566,000**	7.0%	27.8%
	IRA Forest Total	35,800	147,900	**543,600**	6.6%	27.2%
White River	CRA Forest Total	64,500	208,000	**636,700**	10.1%	32.7%
	IRA Forest Total	65,000	211,000	**639,500**	10.2%	33.0%
Grand Total	***CRA Grand Total***	***253,900***	***1,034,700***	***4,185,600***	***6.1%***	***24.7%***
	IRA Grand Total	***254,000***	***1,038,800***	***4,243,600***	***6.0%***	***24.5%***

1) Acreage displayed in all tables in this report might not always balance due to rounding and display methods.

2) Acres within the 1.5 mile column include the acres within the 0.5 mile column.

When using the FOTE 2030 at-risk communities, there is an approximate 1 percent increase in the percentage of both IRA and CRA acreage within 0.5 mile and 1.5 mile of the FOTE 2030 at-risk communities from the FOTE 2000 at-risk communities (Table 3-32). This brings the projected acreage to 7 percent and 26 percent of both the IRA and CRA acres within 0.5 mile and 1.5 of the FOTE 2000 at-risk communities, respectively. The most significant increases in the percentage of acres within 1.5 miles of the FOTE 2030 at-risk communities are on the Arapaho Roosevelt, Pike-San Isabel, and White River National Forests. (The FOTE 2030 at-risk communities are, based on projections of housing growth in the year 2030.) In 2030, it is projected that 35 percent or more of the IRA and CRA acreage on each of these three forests will be within 1.5 miles of the FOTE 2030 at-risk communities. .

The analysis[13] indicates that, by 2030, Colorado will experience increased development that would result in an estimated increase of almost 15 percent of the number of roadless acres that would be within 0.5 mile of development and over 6 percent within 1.5 miles. The increase of almost 15 percent is over two times the national average of the private rural land projected to experience housing density increases (Stein et al. 2007). The forests projected to have the greatest increase in housing growth adjacent to the roadless areas, as reflected by the increased acreage in the 0.5 mile buffer, are the Pike-San Isabel and White River National Forests.

Community Protection Zones and Upper Tier Designations

In Alternatives 2 and 4, portions of the CRA are designated as upper tier. These CRA upper tier acres prohibit or tightly restrict management activities related to road construction and tree cutting. Table 3-33 displays the acres by Forest, in the CRAs within 0.5 mile and 1.5 miles of FOTE 2000 at-risk communities, based on housing density estimates from the 2000 U.S. census and the overlap with upper tier designation for Alternative 2. In Alternative 2, all forests attempted to minimize the number of upper tier acres in the 0.5-mile CPZ, but approximately 2% of the 0.5 mile CPZ has an upper tier designation. The forests also attempted to minimize any overlap of upper tier acres in the 1.5-mile CPZ, but approximately 8% of the 1.5-mile CPZ has an upper tier designation.

[13] *Comparison of Comparison of 2000 FOTE with 2030 FOTE data*

Table 3-33. *Alternative 2: Overlap of Upper Tier and 0.5 Mile and 1.5 Miles CPZs by Forest*

Forest	*CRA Acres*	*0.5 mile CPZ/WUI*	*1.5 mile CPZ/WUI*	*Upper Tier Acres*	*Upper Tier overlap 0.5 CPZ (acres)*	*Upper Tier overlap 1.5 mile CPZ (Acres)*
Arapaho-Roosevelt	347,100	37,400	133,600	134,800	1,890	15,750
GMUG	901,100	26,500	135,200	130,300	0	0
Pike-San Isabel	774,700	65,900	280,800	149,900	3,200	37,260
Rio Grande	518,600	15,300	94,700	340,300	0	0
Routt	433,600	4,400	25,200	172,100	0	0
San Juan	566,100	39,900	157,300	153,200	660	5,700
White River	636,700	64,500	208,000	131,000	350	31,380
Manti-La Sal	7,700	0	0	0	0	0
Totals	***4,185,600***	***253,900***	***1,034,700***	***1,219,200***	***6,130***	***90,120***

Totals might not add due to rounding.

Table 3-34 displays the acres by Forest, in the CRAs within 0.5 mile and 1.5 miles of FOTE 2000 CARs, based on housing density estimates from the 2000 U.S. census and the overlap with upper tier designation for Alternative 4. Approximately 50 percent of the 0.5 and 1.5 mile CPZs overlap upper tier areas.

Table 3-34. *Alternative 4: Overlap of Upper Tier and 0.5 mile and 1.5 miles CPZs by Forest*

Forest	***CRA Acres***	***0.5 mile CPZ/WUI***	***1.5 mile CPZ/WUI***	***Upper Tier Acres***	***Upper Tier overlap 0.5 CPZ (acres)***	***Upper Tier overlap 1.5 mile CPZ (Acres)***
Arapaho-Roosevelt	347,100	37,400	133,600	198,500	22,900	76,900
GMUG	901,100	26,500	135,200	544,900	12,900	74,300
Manti-La Sal	7,700	0	0	7,700	0	0
Pike-San Isabel	774,700	65,900	280,800	312,900	18,300	94,200
Rio Grande	518,600	15,300	94,700	323,500	6,300	45,500
Routt	433,600	4,400	25,200	362,000	3,800	19,100
San Juan	566,100	39,900	157,300	482,000	22,700	109,300
White River	636,700	64,500	208,000	382,700	34,800	118,100
Totals	***4,185,600***	***253,900***	***1,034,700***	***2,614,200***	***121,600***	***537,400***

Totals might not add due to rounding.

Although not displayed, as population increases in Colorado, the boundaries of communities could expand closer to NFS land. It is expected that moderate increases will occur in the percentage of upper tier acres roadless acres within 0.5 mile and 1.5 miles of the FOTE at-risk communities. It is estimated that the overlap of the 0.5 and 1.5 CPZs and upper tier designations in Alterative 2 and 4 will be similar to the percentages discussed above.

Watersheds

In addition to structures in the wildland urban interface, watershed values could be affected by the Colorado Roadless Rule. In July 2007, The Pinchot Institute for Conservation released an assessment report titled "Protecting Front Range Forest Watershed form High Severity Wildfires" (Lemaster et. al., 2007). Key findings in the report include the following:

> *"When forests burn, watersheds also are affected and in the case of high-severity wildfires, watersheds are substantially altered. Depending on intensity and duration, wildfires can change the soil composition of a watershed by consuming the litter layer at the surface of the soil and by destroying binding organic matter in the soil itself. A water-repellent zone or layer forms when hydrophobic organic compounds from burning vegetation coat soil aggregates or minerals at or parallel to the surface. This hydrophobic layer prevents water from penetrating soil aggregates and seals off soil during rainfall events, which accelerates surface runoff resulting in the transport and deposit of sediments.*
>
> *The adverse impacts continue when the water, sediment and debris pour off slopes into receiving channels, scouring banks and bottoms, often overwhelming them and causing flooding, sometimes many miles away from the precipitating wildfire event. Such sediment and organic debris can dramatically alter water courses.*
>
> *Wildfires are not only a threat to water supplies but, the sediment transport and organic debris flows that often follow wildfires can be even more problematic. If watersheds are not protected through mitigation projects such as fuel breaks, then sediment and organic debris can destroy reservoirs as a functional part of the water supply system."*

Eighteen states (Figure 3-1) depend on water from Colorado's River Systems, with over 10 million acre-feet of water leaving the state (CSFS 2009).

Figure 3-1. States Depending on Colorado's River System

It is estimated that over 33 percent of the subwatersheds (6th order hydrologic unit codes) in Colorado are associated with drinking water supplies for communities and that over 50 percent of those subwatersheds have moderate to high potential for post fire erosion impacts to the watersheds.

Fuels Treatments

Fuel treatments are not performed to prevent fires, but to alter fuel profiles to improve public and firefighter safety, and so that communities, watershed, infrastructure, and other values-at-risk are less vulnerable to impacts from wildfire impacts. The goals of hazardous fuel treatments are to achieve some combination of the following:

- reducing flammability
- reducing fire intensity
- reducing the potential for creating firebrands (spotting) and crown fires
- increasing firefighter safety and effectiveness.

For hazardous fuels management to create the desired effect on fire behavior, management strategies must address the local and landscape scales. Local scale addresses effects of fire within a forest stand, treatment unit, or adjacent to, or including, the area around a house or other structure (Finney and Cohen 2003). Treatment of fuels only within the structure ignition zone (within 200 feet of structures) is not sufficient to reduce the threat to neighborhoods and individual structures. Fuel treatments outside and adjacent to a structure ignition zone could reduce flame and firebrand exposure (Finney and Cohen 2003). Research by Cohen (1995) has shown that structures with typical ignition characteristics are at risk of catching on fire from one of three sources:

- direct exposure to intense flames from a nearby source (structures may be at risk from a flame front no more than 100 feet away)
- less intense sources against or very near the side of the structure, which can occur if a ground fire or firebrands ignite firewood or other flammable material next to the structure
- firebrands (spotting) falling directly on roofs if the roof is flammable, or if flammable debris is present.

The amount of land to be treated around communities and other values at risk, to reduce the threat depends on the current structure of the vegetation, fuel loadings, topographic location, fire regime type, and firefighting concerns, such as access.

Spotting is defined as fire behavior producing firebrands that are transported by ambient winds, fire whirls, and/or convection columns. These firebrands causing spot fires ahead of the main fire perimeter (Andrews 1996; NWCG 2005). Spotting can occur from a few meters to several miles (Albini 1983).

Because no mechanism exists to require homeowners to engage in efforts to reduce the threat adjacent to their homes, they will continue to be at risk without management of the surrounding fuels. Fire prevention programs, Community Fire Safe Councils, as well as Community Wildfire Protection Plans (CWPPs) are valuable tools in communicating to the public the need for clearing and maintaining fuels away from residences and structures, assisting residences in coordinating local hazard reduction efforts, and educating individuals on less flammable building designs and construction materials.

While fuel treatments in themselves will not stop wildland fires, they can change fire behavior so that the outcomes are less catastrophic, or can increase the effectiveness of fire suppression by reducing resistance to control. Removing ladder fuels and reducing stand densities alters fire behavior.

Priorities for hazardous fuels reduction are to reduce surface and ladder fuels, to raise the bottom of the live canopy, and to reduce stand density by thinning.

The performance of fuels treatments in wildfire situations has been documented in several recent evaluations (Jimerson and Hall 2000; USDA 2007; USDA 2007a; USDA 2008; Graham et al. 2009). Key findings include the following:

- Where fuels had been treated, fire behavior was noticeably different from that which occurred in neighboring untreated fuels. Most fuel treatments reduced fire behavior from a crown fire to a surface fire.
- Treatment location and juxtaposition and the treatments of surface fuels, ladder fuels, and crown fuels (in order of importance) are major determinants of both wildfire intensity and burn severity.
- The presence of fuels treatments directly impacted the survivability of structures. Area fuel treatments adjacent to subdivisions provided important safety zones, increasing suppression effectiveness, which saved houses. Fuel treatments, when of sufficient size, often provide safe zones for firefighters.
- Fuel treatments influence burn severity. A higher proportion of acres burned severely on untreated lands than where fuel or other vegetation treatments had been applied. Reduced fire severity in fuels treatments that result in remnant trees and green vegetation will lead to more rapid vegetative recovery compared to high severity areas where all trees are black. Fuel treatments that create irregular forest structures and compositions, both within and among stands (macro and micro mosaics), tend to produce wildfire resilient forests.
- Some fuel treatment units burned at high fire intensity because they were adjacent and downwind from untreated units. Crown fire momentum carried high fire intensity partway into these treated areas before the more widely spaced crowns and reduced surface fuel caused the fire to fall to the surface.
- Fuel treatment longevity and effectiveness depends on location, dead and live fuel ratios, and rate, composition, and structure of vegetation recovery. More recent fuel treatments and higher-intensity fuel treatments reduced fire behavior and fire effects more effectively than older and less intense treatments. Incomplete or partial treatments are less effective or can be ineffective. Large fuel removal alone, without the follow-up treatment of smaller diameter fuels, might not provide adequate fuels reduction to prevent a fire from becoming stand-replacing.
- Fuel treatments increase suppression effectiveness. By modifying the fire's behavior, fuel treatments present suppression opportunities that otherwise may not have been available. When Incident Management Teams had knowledge of treatments, they used these treated areas to plan and implement suppression. These opportunities include both providing locations for burnouts to placement of hand and machine fire lines. Decreased fire intensity in fuel treatments allow fire crews to more easily suppress spot fires that may ignite.
- Even in the face of extreme fire behavior, treated areas can slow the spread of the fire and disrupt the fires progress.

On national forests in the State of Colorado from FY 2001 to 2009, an average of approximately 64,000 acres of fuels treatments occurred per year. An average of 4,400 acres occurred within the

IRAs, 1,200 acres of which were mechanical treatments. An average of 3,400 acres occurred within the CRAs, 1,100 acres of which were mechanical treatments. Approximately 19 percent of the acres treated within the IRAs occurred within 1.5 miles of the FOTE 2000 at-risk communities, while 22 percent of the acres treated within the CRAs occurred within 1.5 miles of the FOTE 2000 at-risk communities.

Almost 500,000 acres (Table 3-35) were treated for hazardous fuels reduction, on national forests in the State of Colorado from FY 2001 to 2009, averaging approximately 64,000 acres per year.

Table 3-35. *Acres of Fuel Treatments Completed in Colorado, FY 2001-2009.*

National Forest	Fire	Mechanical	Total
Arapaho-Roosevelt	50,259	62,128	**112,387**
Grand Mesa-Unc-Gunnison	48,083	38,634	**86,717**
Manti-La Sal	708	2,096	**2,804**
Pike-San Isabel	12,689	28,444	**41,133**
Rio Grande	72,716	80,703	**153,419**
Routt	17,588	22,514	**40,102**
San Juan	44,354	45,229	**89,583**
White River	41,008	12,211	**53,219**
Grand Total	***287,405***	***291,959***	***579,364***
Annual Average	***31,934***	***32,440***	***64,374***

Approximately 39,800 acres of fuels treatment occurred in IRAs and 30,800 acres of fuels treatment occurred in CRAs in the period of FY 2001-2009, or roughly 4,400 acres per year in the IRAs and 3,400 acres per year in the CRAs. This represents approximately 7percent of the total fuel treatments for IRAs and approximately 5 percent of the total fuel treatments for CRAs. In the IRAs, almost 70 percent of the treatments were fire treatments, while in the CRAs 63 percent were fire treatments, the remainder were mechanical treatments. It is important to note that the fire category also includes wildfires that were managed for resource benefits, and the mechanical category includes both hand and mechanized treatments.

Environmental Consequences

It is anticipated that most projected future treatments would generally be targeted community protection in the areas impacted by the mountain pine beetle, in addition to the general priorities of lower-elevation ponderosa-pine, Gamble oak, Douglas-fir and dry-type lodgepole pine (WUI; Fire Regime I, II and III; Condition Class 2 and 3).

Depending on the degree to which each alternative limits treatment activities in roadless areas, the following components of the wildland fire management program could be affected:

- Ability to conduct vegetation treatments to create defensible fuels profiles in the WUI/CPZ
- Ability to conduct vegetation treatments to create defensible fuels profiles in support of the prescribed fire and wildfire management.
- Ability to implement prescribed fire activities

- Suppression and firefighter/public safety

As a measure of potential effects, each alternative was evaluated to determine the impact it would have on the ability to do fuels treatments in the CPZ and the resulting impact on wildland fire management.

Assumptions Related to Hazardous Fuels Treatment and Tools

Fuel treatments only within the structure ignition zone (within 200 feet of structures) are not sufficient to reduce the threat to neighborhoods and individual structures. To effectively reduce the threat to a community located in a high-fire hazard environment, it is usually necessary to perform treatments at a range of distances from homes. Finney (2000, 2001 and 2003) has demonstrated that fuels treatment effectiveness can be "optimized" while treating a portion of the landscape in a strategically placed pattern of overlapping treatments that changes fire behavior and spread both within the treatment areas and across the landscape.

Stephens et al. (2009) found that a combination of mechanical and fire treatments were the most effective in reducing fire severity. A single-fire-only treatment that creates standing dead trees would increase future fuel loads when the dead trees fall and shorten the longevity of fuel treatments. They found that several fire-only treatments would be needed to achieve a desired condition for potential fire behavior.

The longevity of the fuel reduction from fuel treatments depends on the type of treatment and the vegetation type. The period of effectiveness may be a relatively short time for fuel types with a simple structure, such as grasslands, or many years in more complex fuel types, such as multi-storied, coniferous forests.

The period of time over which fuel reduction remains effective depends on the following:

- the type and intensity of the treatment
- the number of fuel layers involved
- the rate of accumulation of fuels
- fuel decomposition rates, and other factors

Even though the use of prescribed fire is not limited or restricted in any of the alternatives, the following could occur:

- a reduction in the number of acres treated because the risk of escape is too high because of the inability to mitigate high-fuel loadings in burn units, or the inability to create a buffer of sufficient depth to reduce the risk of an adverse outcome of an escaped fire to communities
- an increased risk of escape because of the need for multiple prescribed fire treatments to achieve the desired fuels conditions

The application of prescribed fire alone, without previous mechanical treatments, is likely to be limited within the WUI/CPZs because of a higher risk of escape and threat to communities.

Assumptions Related to Access (Roads) and Costs of Hazardous Fuel Reduction Treatments

Only authorized roads are used for hazardous fuel reduction treatments.

The four alternatives vary in the ability to use temporary roads to facilitate tree cutting, sale, or removal activities for hazardous fuels management. Critical locations within roadless areas might not be treated if the area cannot be accessed by roads. This can be due to the following factors:

- Size of material is too large for hand treatments.
- Particularly in areas with dense and/or large trees, the amount of material to be treated would result in unacceptable fuels beds. Without removal, the result is a minimal reduction in fire hazard.
- Size of trees to be treated exceeds mastication equipment capabilities (generally maximum 8-10 inches diameter at breast height.
- Inability to "walk" equipment into critical treatment areas due to terrain and or distance limitations.
- Even though prescribed fire is not limited or restricted in any of the alternatives, the following can occur:
  - a reduction in the number of acres treated because the risk of escape is too high because of the inability to mitigate high fuel loadings in burn units or the inability to create a buffer of sufficient depth to reduce the risk of an adverse outcome of an escaped fire to communities or
  - an increased risk of escape because of the need for multiple prescribed fire treatments to achieve the desired fuels conditions.

The application of prescribed fire alone, without previous mechanical treatments, is likely to be limited within the WUI/CPZs because of a higher risk of escape and threat to communities.

Assumptions Related to Hazardous Fuels Management and Forest Service Response to Wildland Fires

Current management response strategies for wildland fire management would remain in place under all alternatives. No alternative restricts the management response to a wildfire.

Depending on the degree to which each alternative limits treatment activities in roadless areas, the following components of the wildland fire management program could be affected:

- The inability to conduct vegetation treatments to create defensible fuels profiles in the WUI/CPZ and in areas outside of the WUI/CPZ could result in an increase in fire suppression costs, property loss, and other economic impacts.
- Less hazardous fuels treatments can result in a higher risk of high-severity wildfires. The inability to disrupt the flow of fire across the landscape could impact both prescribed fire and wildfire management.
- Prohibitions on tree cutting could result in fewer tactical options being available to fire management personnel. Areas where fuel treatments have occurred present suppression opportunities that otherwise may not be available.

- Depending on the point of ignition, as well as other factors, wildland fires could have the potential to become larger and more damaging because no road access exists. Roads serve as fuel breaks, suppression fire lines, anchor points, and most importantly as safety zones for firefighters.
- Roads provide efficient access for firefighting crews and other suppression resources, such as engines and heavy equipment for fire line construction, as well as aviation support needs. A lack of access can increase the exposure of firefighters to possible injury due to an increased reliance on hand-treatment methods, which results in multiple trips, longer periods of exposure, and exposure to multiple hazards, including rolling materials, lifting, and burns.
- Larger and more damaging fires could result in the need for extensive and costly restoration and rehabilitation needs within roadless areas. The higher severity and larger fire size could result in increased adverse post fire effects due to erosion and slower vegetation recovery on community or municipal water supplies.

Effects Common to All Alternatives

Hazardous fuels reduction treatments are expected to have a positive impact across the landscape, moving areas conducive to supporting uncharacteristic or unwanted fire behavior and those areas with moderate to high departure from the historical range of variability (FRCC 2 and 3) to desired conditions. Treatments would contribute to reduced potential of insect and disease outbreaks and facilitate safe and effective firefighting efforts.

General Effects

The lack of established travel ways and the inability to construct or reconstruct temporary roads would directly impact the annual number of hazardous fuel reduction acres accomplished, likely resulting in fewer acres treated. Treatments would generally occur near existing roads. Fuel treatments are likely to be more expensive and less efficient to implement. The lack of temporary road access could also limit the removal and use of woody biomass from treated areas, which in turn only minimally mitigates the original hazard. Hazardous fuel reduction objectives could be difficult or impossible to achieve in areas with denser, large trees with limits on all roads, and therefore, limiting options for economical removal. Furthermore, the timeline for treating priority acres would be extended with incrementally increasing costs.

Indirect effects include increased exposure of firefighters and/or contract workers to possible injury because of reliance on hand treatment methods (multiple trips, longer periods of exposure, exposure to multiple hazards (felling, rolling materials, lifting, and burns. The degree of exposure could vary by alternative.

The Energy Policy Act of 2005 gave Federal Energy Regulatory Commission (FERC), the responsibility to protect the reliability of the high-voltage, interstate transmission system through mandatory reliability standards. Although not considered WUI unless identified as a critical infrastructure in a CWPP, trees could still be cut because it would be incidental to implementing the required management activity of line maintenance to comply with the reliability standards.

Hazardous fuel reduction projects could occur under all alternatives with approved project NEPA.

Federal law requires payment for the removal of forest products that contain value for personal or commercial use. Commercial sale includes incidental forest products removed as part of a service

contract, a mix of services and goods as provided in a stewardship contract, or under a commercial timber sale contract. Stewardship contracts and commercial timber sales likely would have identical environmental effects, with the differences between the two primarily associated with the contract provisions and financial aspects.

Alternative 1

The 2001 Roadless Rule is the most restrictive of the four alternatives in treating hazardous fuels. Under this alternative, tree cutting, sale, or removal for fuel mitigation is generally prohibited in IRAs, with limited exceptions.

Direct/Indirect Effects

The one tree cutting exception that could be used to reduce hazardous fuels is the cutting of generally small diameter trees to maintain or restore the characteristics of ecosystem composition and structure within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period. As stated in the Analysis Framework section of this chapter, this exception would be used primarily in the ponderosa pine/Douglas-fir and pinyon-juniper forest cover types. Lodgepole-pine cover types rarely fit this exception. No corresponding road construction exception exists. Fuel reduction activities would generally consist of prescribed burning, mechanical treatments using existing roads, and hand treatments.

Under this alternative, cutting, sale, or removal fuels treatments would treat less than 0.01 percent of the IRA acres per decade, with an additional 0.2 percent of the analysis area outside of the IRAs treated per decade according to forest plan management direction. Additional treatments for other purposes may result in a reduction of hazardous fuel, although it is not the focus of the project.

The prohibition on road construction would result in less hazardous fuels treatment. Fuel-reduction treatments likely would be focused in the substantially altered portion of the IRAs, where there are existing roads. The lack of temporary road access may also limit the removal and use of woody biomass from any treated areas, which in turn only minimally mitigates the original hazard. Hazardous fuel reduction objectives could be difficult or impossible to achieve in areas with denser, large trees with limits on all roads and therefore limiting options for economical removal. Other than in the roaded areas of the IRAs, fuel treatments that are completed are likely to be more expensive and less efficient to implement. Furthermore, the timeline for treating priority acres would be extended with incrementally increasing costs.

There would be a higher risk of a high-severity wildfire than in the other alternatives because of the smaller amount of hazardous fuels treatments. The lack of tree cutting and road construction would impact suppression opportunities and could result in the need for extensive and costly restoration and rehabilitation.

Fewer treatments for maintenance and restoration of ecosystem composition and structure may lead to more dead trees and increase in severity of wildfires, which would release carbon as well as potentially unhealthy levels of smoke and particulates into the atmosphere. Without the ability to remove material from hazardous fuel and other treatments using roads, the opportunity to substitute this material for fossil fuels would be foregone.

Although, many fuel-reduction projects in identified roadless areas do not depend on roads, by not allowing new road construction or reconstruction to improve forest health or reduce hazardous fuels,

temporary road construction and tree cutting restrictions could pose a higher risk of having large-scale, insect-disease outbreaks and high-severity wildfires, compared to the other alternatives.

The reduction of priority treated acres over time is likely to impact the ability to reduce threats to adjoining at-risk communities and other WUI values, which could result in increase fire suppression costs, property loss, and other economic impacts.

Although the 2001 Roadless Rule does not restrict the management response to a wildfire, the restrictions on treatments and road construction could result in fewer tactical options being available to fire management personnel. Neither forest nor temporary roads are generally constructed for wildland suppression purposes. Roads, if they exist on forested lands, under different situations can serve as fuel breaks, suppression fire lines, anchor points, and most importantly, as safety zones for firefighters. In addition, roads provide efficient access for firefighting crews and other suppression resources, such as engines and heavy equipment for fire line construction, as well as aviation support needs. As discussed earlier in this analysis, by modifying the fire's behavior, fuel treatments present suppression opportunities that otherwise might not have been available. With the limited level of treatments projected in this alternative, there will be fewer areas that firefighters could use in suppression efforts.

The lack of established or temporary travel-ways may directly affect the efficiency and timeliness of wildland fire suppression response should it occur in a roadless area. Depending on the point of ignition (within/outside an IRA), as well as other factors, wildland fires would have the potential to become larger and more catastrophic as a result of no road access. This, in turn, could adversely affect other critical resources such as wildlife habitat, vegetation, critical watersheds, and cultural resources. Larger and more catastrophic fires could also result in the need for extensive and costly restoration and rehabilitation needs within roadless areas.

Finally, with the limited level of treatments projected in this alternative, fire severity could be higher and fires could be larger. The higher severity and larger fire size could result in increased adverse post fire effects due to erosion and slower vegetation recovery on community or agricultural water supplies as compared to other alternatives.

Alternative 2

Alternative 2 is less restrictive than the 2001 Roadless Rule within non-upper tier CRA acres, especially within the CPZ, but overall, is more restrictive than Alternative 3 in treating hazardous fuels throughout the CRAs. The upper tier acres are more restrictive than Alternative 1, allowing no tree cutting for the treating of hazardous fuels.

Direct/Indirect Effects

Two of the tree cutting exceptions would be available within the non-upper tier CRAs to reduce hazardous fuels and most CPZs have been removed from upper tier acres in this alternative. However, these exceptions do not apply to the upper tier. Approximately 2% of the 0.5-mile CPZ has an upper tier designation and approximately 8% of the 1.5-mile CPZ has an upper tier designation. Mechanical fuels treatments will not be allowed in these areas.

The Arapaho and Roosevelt, Pike-San Isabel, San Juan National Forest, and White River National Forests are the only forests with either 0.5- or 1.5-mile CPZs with an upper tier designation. Approximately 5% of the 0.5-mile CPZ on the Arapaho and Roosevelt, and Pike-San Isabel National

Forests has an upper tier designation. Less than 1.5% and 1% of the 0.5-mile CPZ on the San Juan National Forest and White River National Forests, respectively, have an upper tier designation. The amount of 1.5-mile CPZ with an upper tier designation ranges from a low of less than 4% on the San Juan National Forest to almost 25% on the Pike-San Isabel National Forests. Less than 11% and 15% of the 0.5-mile CPZ on the Arapaho and Roosevelt and White River National Forests, respectively, have an upper tier designation.

Within the CPZ, trees can be cut to reduce the wildfire hazard to an at-risk community or municipal water supply system in areas without an upper tier designation. The additional conditions that extend the CPZ beyond 0.5 mile are specific to ground conditions or the FRCC, and might not allow for many additional treatments outside the 0.5-mile portion of the CPZ. Temporary road construction is allowed to facilitate the treatments within the first 0.5 mile of the CPZ only. Outside the CPZ, trees can be cut to reduce the wildfire hazard to a municipal water supply system. All of the treatments would focus on small diameter trees to create strategic fuel breaks, while retaining large trees to the maximum extent practical to the forest type. Fuel reduction activities would generally consist of prescribed burning, mechanical treatments, and hand treatments.

Under this alternative, fuels treatments that use tree cutting, sale, or removal would treat less than 1.2 percent of the CRA acres per decade, with an additional 0.1 percent of the analysis area outside of the "substantially altered acres" treated per decade according to forest plan management direction. Additional treatments for other purposes could result in a reduction of hazardous fuel, although it is not the focus of the treatment.

The increased flexibility compared to the 2001 Roadless Rule for temporary road construction in the first 0.5 mile of the CPZ (not in the upper tier) could do the following:

- reduce the costs of treatment
- improve the efficiency of treatment implementation
- increase the tools available to for fire prevention
- facilitate the removal and use of woody biomass from treated areas.

All of the aforementioned items assist in the ability to treat priority acres and achieve desired conditions.

Although there is increased flexibility over Alterative 1, critical locations outside the 0.5-mile CPZ might not be treated due to the limitations on temporary road construction. There would be a higher risk of a high-severity wildfire than in Alternative 3, but less than Alternatives 1 or 4, because of the projected number of hazardous fuels treatments. Although there is a tree cutting exception and a temporary road construction exception for hazardous fuels treatment, the purpose and area available for treatment and temporary road construction is restricted and the implementation of treatments could be affected (see Assumptions Related to Hazardous Fuels Treatment and Tool).

Analysis (Langowski 2009) has shown that, under moderate fire weather conditions, gusts of 20 mph[14] produce spotting distance of over 0.5 mile and that under the influence of stronger gusts, such as those experienced from passing thunderstorms, spotting distances in excess of 1.5 miles are possible from groups of subalpine fir and lodgepole pine. Therefore, the 0.5-mile CPZ might not be

[14] *A maximum probable gust of 20 mph is associated with a 10-minute, average 20-foot wind speed of 6 mph.*

sufficient for community protection goals because spotting could easily breach the treatments. However, the treatments could still be effective in reducing the severity of wildfires within the CPZ and could reduce the potential effects to watersheds and other values at risk.

Suppression opportunities would be impacted by the restrictions on tree cutting and road construction. During their active life, temporary roads constructed for hazardous fuels treatments would provide short-term increased firefighting efficiencies in the event a fire starts in the area near the road. In the event of a wildfire, there could be the need for extensive and costly restoration and rehabilitation.

Intermediate levels of treatments for maintenance and restoration of ecosystem composition and structure might lead to more dead trees and higher severity wildfires than Alternative 3. Dead trees would release carbon and wildfire would release carbon, as well as potentially unhealthy levels of smoke and particulates into the atmosphere. With reduced opportunity to remove material from hazardous fuel and other treatments using roads, the opportunity to substitute this material for fossil fuels would be foregone.

Although prescribed fire is not limited or restricted in this alternative, indirect effects are possible in this alternative due to restrictions on fuels treatments in the CPZ with an upper tier designation, and outside the CPZ. Although the effects may be less than Alternatives 1 and 4, a reduction in the number of acres treated with prescribed fire could occur.

The reduction of priority treated acres over time is likely to impact the ability to reduce threats to adjoining at-risk communities and other WUI values, which could result in increase fire suppression costs, property loss, and other economic impacts.

Although the Colorado Roadless Rule does not restrict the management response to a wildfire, the restrictions on treatments and road construction in the CPZ with upper tier designation and outside the CPZ could result in fewer tactical options being available to fire management personnel. Restrictions on treatments in the CPZ with upper tier designation and outside the CPZ could limit managers' ability to disrupt the flow of fire across the landscape. Under the proposed rule, critical locations in fire pathways could not be treated outside the CPZ, except with prescribed fire. As discussed earlier in this report, by modifying the fire's behavior, fuel treatments present suppression opportunities that otherwise may not have been available. With the level of treatments projected in this alternative there will be fewer areas that firefighters could use in suppression efforts than Alternative 3 but more than Alternatives 1 or 4.

Finally, with the level of treatments projected in this alternative, fire severity might be higher and fires might be larger than Alternative 3. The higher severity and larger fire size could result in increased adverse post fire effects due to erosion and slower vegetation recovery on community or agricultural water supplies as compared to other alternatives.

Similar to the 2001 Roadless Rule, neither forest or temporary roads are constructed specifically for wildland fire management nor post fire needs such as emergency rehabilitation. However, this alternative does provide short-term increased firefighting efficiencies during the active life of the temporary road. In addition, firefighting efforts would indirectly benefit from temporary roads (while still being maintained) if a fire starts in that area, as described in Alternative 1.

Although the proposed rule is silent on the maintenance of fuels treatments within and beyond the CPZ, it is assumed that additional treatments to maintain the effectiveness of the treatments are

authorized because they will incrementally reduce wildfire hazard, which is an authorized treatment within the CPZ, except for tree cutting in areas with upper tier designation.

Alternative 3

This alternative is the least restrictive of the four alternatives in treating hazardous fuels. Under this alternative, tree cutting, sale, or removal and road construction follows the direction in the forest plans. This alternative provides the most management flexibility of the four alternatives. Under this alternative, the options available for fuel reduction include prescribed fire, mechanical treatment, and road construction as needed to facilitate treatment.

Direct/Indirect Effects

Projections show 3.7 percent of the analysis area would be treated per decade under Alternative 3. The increase in treatments being implemented reflects the ability to treat priority acres that are not easily treated under the other three alternatives. The increased flexibility for road construction would allow for cost-effective and efficient implementation of hazardous fuels reduction projects, as well as an efficient means of removing the resulting biomass. In addition, greater access would be available to do maintenance treatments in the long term, and at-risk communities would receive substantial benefit from hazardous fuels reduction treatments.

This alternative likely would have increased benefits to wildland fire management, including a reduction in the cost of suppression. The ability to treat areas without limitation by the distance from the at-risk communities or purpose (i.e., watershed protection rather than municipal water supplies only) could result in reduced fire severity and less adverse fire effects. Firefighters might be able to use more areas in suppression efforts, with a resulting increase in firefighter safety. The increase in projected roads would facilitate efficient initial attack response and increase firefighting efficiencies in both the short- and long-term during the active lifespan of the road.

This alternative allows the most treatment for maintenance and restoration of ecosystem composition and structure, so that there are the fewest dead trees and wildfires compared to other alternatives. Fewer dead trees would release less carbon, and fewer wildfires would release less carbon as well as lower levels of potentially unhealthy levels of smoke and particulates into the atmosphere. With the greatest opportunity to remove biomass from hazardous fuel and other treatments using roads, this alternative provides the best opportunity to substitute biomass for fossil fuels, thereby providing a low carbon energy substitute.

The effects related to fire prevention and wildland fire management would be similar to the effects described in Alternative 2, and likely would have increased positive benefits to wildland fire management. With an increased level of fuels treatments over the other three alternatives, there might be more areas that firefighters could use in suppression efforts. Firefighter exposure could be reduced, along with suppression costs. The ability to treat more acres across the landscape would facilitate safe and effective firefighting operations, as well as provide for increased opportunity for the use of wildland fire. The ability to treat areas without limitation as to the distance from the communities at risk or purpose (i.e., watershed protection rather than municipal water supplies only) could result in reduced fire severity and adverse fire effects.

Alternative 4

This alternative has the same prohibitions and exceptions as Alternative 2. The difference is the 1.4 million more upper tier acres where tree cutting, sale, or removal for hazardous fuels treatment is prohibited, compared to Alternative 2. As with Alternative 2, fuel reduction activities allowed in this alternative would generally consist of prescribed burning, mechanical treatments, and hand treatments.

Direct/Indirect Effects

Under this alternative, approximately 48 percent of the CRA acres within 0.5 miles of the FOTE 2000 at-risk communities (the 0.5 CPZ) are in upper tier where no tree cutting can be done for hazardous fuels treatments. Approximately 52 percent of the CRA acres within 1.5 miles of the FOTE 2000 at-risk communities (the maximum 1.5 CPZ) are in upper tier where no tree cutting can be done for hazardous fuels treatments.

Projections indicate fuels treatments would treat less than 0.3 percent of the CRA acres per decade with an additional 0.1 percent of the analysis area outside of the "substantially altered acres" treated per decade according to forest plan management direction. Additional treatments for other purposes could result in a reduction of hazardous fuel, although it is not the focus of the treatment.

The decrease in projected treatments being implemented in CRAs from Alternative 2 reflects the number of upper tier acres within the CRAs where tree cutting for fuels treatment is prohibited.

On the acres within the CRAs that are not upper tier, the treatment options and effects are identical to those listed in Alternative 2. Because of the large number of upper tier acres within the CPZ in this alternative, there would be a higher risk of a high-severity wildfire than in Alternative 2 or 3, but slightly less than in Alternative 1. Suppression opportunities would be impacted by the restrictions on tree cutting and road construction. During their active life, temporary roads constructed for hazardous fuels treatments would provide short-term, increased firefighting efficiencies if a fire starts near the road. If a wildfire occurs, there could be the need for extensive and costly restoration and rehabilitation.

Compared to Alternatives 2 and 3, fewer treatments for maintenance and restoration of ecosystem composition and structure may lead to more dead trees and higher severity wildfires, which would release carbon as well as potentially unhealthy levels of smoke and particulates into the atmosphere. With lessened ability to remove material from hazardous fuel and other treatments using roads, the opportunity to substitute biomass for fossil fuels would be reduced.

Cumulative Effects

Firefighters do not have control over the timing and amount of emissions released during a wildfire. Smoke produced from wildfires has the potential to affect airsheds across the state and region.

The EPA has proposed to strengthen the National Ambient Air Quality Standards (NAAQS) for ground-level ozone and particulate matter. With stricter standards, smoke from wildfires could result in both ozone and particulate matter exceedances of the NAAQS. The stricter standards could also result in reduced prescribed fire treatments as windows of acceptable environmental conditions might be narrower.

Past fire exclusion, lack of treatment, and insect outbreaks have contributed to an accumulation of fuels and the current number of acres that are in Condition Classes 2 and 3. Laws, regulations, and

policies described in the Affected Environment section, such as the NFP and HFRA, have placed an emphasis on reducing hazardous fuels and unwanted and uncharacteristic wildland fires.

Residential development in the WUI/CPZ has raised concern among natural resource managers, and is recognized as a primary factor influencing management activities. This interface poses a number of challenges, including invasive species, fragmentation and loss of wildlife habitat, and air pollution. Colorado was among the top nine western states with the greatest proportion of WUI expansion from 1970-2000, and is among the top six states from the intermountain west, with the greatest anticipation of WUI expansion from 2000 to 2030 (Theobald and Romme 2007).

As development increases in fire-prone areas, the cost of protecting homes from wildfires is expected to grow. Even with fuels treatments, the rising cost of wildland firefighting would not be controlled without additional controls at the state, county, and local levels to control the pace, scale, and pattern of development in the WUI. Reliance on the federal government to provide wildfire suppression services places an enormous financial burden on the Forest Service. Federal agencies do not have the power to regulate development. Zoning and planning authority rest entirely with State and local governments. (USDA and USDI 2006)

Over the next 15 years, the number of approved CWPPs in the State of Colorado is expected to increase, with an end goal of having them in place for all identified at-risk communities. CWPPs, coupled with other policies and implementation strategies, would identify priority acres that are in need of some type of treatment to reduce the threat to communities, municipal water supply systems, and other critical resources. Fuel treatments are far more effective if they are strategically located and collaboration occurs between landowners and other cooperators. It is likely that other ownerships adjoining roadless areas would engage in implementing hazardous fuels reduction projects concurrent with those occurring on NFS lands.

Projected increases in residential development in the WUI/CPZ could result in community boundaries expanding closer to NFS land. This will result in moderate increases in the percentage of roadless acres within 0.5-mile and 1.5-mile WUI/CPZs. Because no mechanism exists in the rule to modify upper tier boundaries in Alternatives 2 and 4, other than administrative corrections, the restrictions on tree cutting and temporary road construction in upper tier acres would prevent managers from implementing fuels treatments in the new or expanded CPZs. Fewer tactical options would be available to fire management personnel because of restrictions on treatments in upper tier acres. Under the proposed rule, critical locations in fire pathways could not be treated outside the CPZ, except with prescribed fire. Fuel treatments present suppression opportunities that otherwise might not have been available by modifying the fire's behavior.

Invasive Species

Invasive species include non-indigenous plant species that have adverse economic, environmental and/or ecological effects on the habitats they invade. It is recognized that other invasive taxa besides non-indigenous plants (e.g., New Zealand mudsnails, exotic fish, and others) are a threat in Colorado ecosystems. However, with such species, the outcomes associated with disturbance and changes in roadless area management are poorly understood. Non-plant invasives are perceived to be much less predictable and, because much less is known about their dispersal mechanisms, this section will deal only with invasive plants. Although there are differences in definitions between the terms "invasive plants" and "noxious weeds", the two will be used interchangeably for this analysis.

Affected Environment

Invasive plants become established after seed or other plant parts have been imported to an area, and where suitable environments exist. Often ground disturbance creates ideal conditions for invasive plant establishment. Once established, invasive plants often become detrimental to resource values, and these detrimental effects can persist for decades or perhaps indefinitely (Olson, 1997). Sources of soil disturbance that create opportunity for invasive plant invasion include wildfire and prescribed fire, mechanical vegetation treatments, livestock grazing, road construction, LCZ construction, recreation activities, including hiking, horseback riding, off-road vehicle use, and a variety of other activities. Areas, such as road cuts and fills, mines, sites where mechanical vegetation treatment has occurred, and gravel pits, can aid the spread of noxious weeds. For temporary roads, LCZs, and other sources of temporary or longer term disturbance, the risk of invasive plant establishment is elevated during construction. Use of the roads or construction zones by vehicles or equipment also poses a risk due to exotic seed import. Beyond the use period, elevated risk of invasive plant establishment often extends for several years until vegetation and soil characteristics are recovered.

The spread of invasive species may be exacerbated by projected impacts of climate change if native plants become stressed and less competitive.

Currently, there are 71 invasive plant species that are classified as noxious weeds by the State of Colorado (Colorado Department of Agriculture, 2001). Aside from their effects on production agriculture, the effects of noxious weeds can also degrade wild lands, such as national forests, state parks, county open space lands, and other natural areas. Such degradation may be manifested in one or more of the following ways:

- Reduction of biological diversity, which degrades ecosystem health, recreation values, and scenic beauty, all of which can negatively impact resource values
- Declines in terrestrial habitat for wildlife
- Increase in overland water flows, resulting in soil erosion and stream sedimentation, and causing a decline in water quality (Sheley, R. and Petroff, R., 1999)
- Alteration of ecosystem functions, such as nutrient cycling, watershed stability, and others.

Approximately three percent of all lands in Colorado have been estimated to be occupied by invasive plants (Colorado Department of Agriculture, 2001). Within Colorado, important invasive plants are identified as noxious weeds under State agricultural laws, and listed as either A, B, or C list species according to their potential threat to agricultural or wild land values within the State. (The A list includes the newer invaders, generally less abundant with more potential for eradication and control; the B and C list species include less important, and generally more abundant species, which tend to be more widely established.) In Colorado, there are 18 plant species on the A list; 39 on the B list; and 14 species on the C list.

Priority Species are defined in the Rocky Mountain Region Invasive Species Management Strategy, (USDA Forest Service, 2005) as follows:

- are species that are low in abundance
- have the ability to establish dominance in plant communities
- invade a variety of relatively healthy ecosystems.

Each of the national forests in Colorado has identified their priority invasive species. Priority invasive plants by forest are identified in the Forest's Invasive Species Action Plans.

Current noxious weed management programs on national forests in Colorado are attempting to prevent substantial increases in total acres of invasive plant populations by implementing best management practices (USDA Forest Service, 2001). Substantial increases in noxious weeds on a broad scale are likely to have a measurable effect on long-term health of forest and rangelands on all forests. Where populations of invasives currently exist, population expansion by way of existing vectors would continue at current rates, depending on species, site characteristics, and other variables. Indirect effects could result from the gradual steady encroachment of newly established invasive plant populations over the long term, particularly if resources are not available to conduct ongoing detection and treatment of new populations.

Environmental Consequences

Effects Common to All Alternatives

In all alternatives, the classification of areas as roadless could, over the long term, have a lower risk of invasive plant invasion and/or spread. The prohibitions on management activities limit ground disturbing activities, and thereby, reduce the likelihood of the import and spread of invasive species.

In all alternatives, best management practices are implemented for all ground-disturbing activities, which are designed to minimize or prevent the spread of invasive species.

These practices are summarized as follows:

- Use of certified weed free straw or mulch if re-seeding or other restoration practices are used post-project
- Where gravel is imported for road surfacing, acquire from gravel pits that are inspected and known to be weed free
- Inspection of seed by a seed lab, to ensure the absence of noxious weeds
- Washing of vehicles used in off-road operations, such as skid trail construction, skidding, or other equipment before entry into the Forest.

A complete listing of Best Management Practices for Invasive Plant prevention can be found on the Internet at the following website:

http://www.fs.fed.us/rangelands/ftp/invasives/documents/GuidetoNoxWeedPrevPractices_07052001.pdf.

These practices are applicable for all ground-disturbing activities.

Vehicular travel is widely accepted to be a major source of transport of exotic plant seed throughout the western United States (Sheley et al. 1995, USDA Forest Service, 2003). Other mechanisms that spread noxious weeds include heavy equipment, humans, and livestock. LCZs are a short-term use for motorized transport to install linear facilities. Because of the short-term use, there is less likelihood of elevating the risk of invasive plant import, establishment and spread than from road construction and use.

When vegetative manipulation (harvest, prescribed burning, etc.) opens the tree canopy and allows more sunlight to reach the soil, site conditions are often created that are more favorable to invasion. Transported seed in camping equipment, clothing, and equipment unloaded from vehicles by National

Forest users is often inadvertently deposited, allowing new invasive plant populations to become established. Under all alternatives, numerous natural mechanisms also spread weeds, including wildlife (birds, rodents, and big game), livestock, wind, and flowing water. After seed is imported into an area, invasive plants are often able to successfully establish in certain habitats, even without ground disturbance, due to their aggressive nature and adaptability. Once new populations are established by wind, wildlife, etc., subsequent increases of human activity and ground disturbance generally increase the rate of spread.

In all alternatives, road decommissioning could cause a gradual reduction in the likelihood of imported seed. Cleaning of equipment before use and routine roadside monitoring for new populations can minimize the likelihood of roadside populations spreading from the roadway and/or harvest areas into native habitats. While roads can contribute to the importing seed, they can also improve the ease with which invasive plant populations can be managed because of improved access to the site. The traditional cost of chemical or mechanical treatment in Colorado's forests on an acre of weeds is approximately $50-75 where vehicle access is easy because of the presence of roads or motorized trails. Comparatively, remote infestations cost 5-8 times that amount, when treatment must occur using horses, hiking, or other primitive access.

Under each alternative, there are projected or foreseeable activities that likely would result in ground disturbance, increased vehicle activity, construction, and other activities. All activities generally elevate the risk of invasive plant import, establishment, and spread. Comparisons of alternatives disclose the estimated relative degree of elevated risk that could occur as a result of the range of activities. In all alternatives, potential increases in the introduction or spread of invasive plants would be minimized by implementing standard or required mitigation measures.

Some people believe that roadless designations would limit the ability of the Forest Service to manage for healthy forest conditions and decrease fuel accumulations. People with this concern believe that it could, over time, increase the likelihood of catastrophic wildfire, ultimately leading to increases in establishment and spread of invasive plants like we have seen in other areas, including the Hayman burn. Past histories of forest health management efforts and fire history have shown otherwise. Active forest management to retain or restore healthy forest conditions and natural fuel loading has not proven to guarantee the avoidance of future catastrophic fires. In addition, areas managed to enhance healthy forest condition and reduce fuel loading have, more often than not, shown a post-treatment increase in occurrence of invasive plant populations. Therefore, it does not appear that roadless area designation would necessarily lead to higher risk of invasive plant establishment by excluding management practices.

Alternative 1

Under the 2001 Roadless Rule, ground disturbance in the roadless areas resulting from potential future road construction and other management activities is projected to be the lowest of the four alternatives under consideration. By maintaining a high level of limitation on future road construction or reconstruction and tree cutting activities within roadless areas, the introduction or spread of invasive plants would remain limited to the current rate of invasive species spread, which results primarily from the natural mechanisms mentioned earlier in this section. The use of LCZs is not limited in this alternative. Although LCZs are used for only a short time, they provide a window of opportunity for invasive plants to become established as a result of seed transport on equipment and

other avenues. For those areas not included in roadless area classification under this alternative, or IRAs that have been substantially altered, new invasive populations could more readily become established because of vehicular transport of seed, and higher levels of human activity. As a result, the rate of spread likely would be expected to be higher.

The occurrence of accelerated road construction and other ground disturbance as a result of shale operations in the North Fork of the Gunnison could result in elevated risks of establishment and spread of invasive plant populations in those areas where existing leases without NSO stipulations are valid under all alternatives.

Alternative 2

Under Alternative 2, some potential future ground disturbance resulting from management activities is expected within non-upper tier acres; no activity is expected within the upper tier acres. Foreseeable activities that are increased from Alternatives 1 include road construction and tree cutting for maintenance and restoration of ecosystem characteristics and community protection purposes that would be focused within the CPZ acres. Ground disturbance and general risk of invasives establishment from coal development within the North Fork coal mining area likely is higher under this alternative than under Alternative 1 with the additional leases.

Although most roads constructed in this alternative are temporary, there is a moderate risk of importing noxious weed seed during projects that could occur under this alternative. The use of LCZs is limited in this alternative. Increased risks of invasive plant establishment and spread could be expected only in the small percentage of the CRA acreage where activities would occur. For most CRA acres, including newly identified roadless acres within the CRAs and the upper tier acres, there is a minimized risk of future plant establishment and spread. The acres that have been removed from the CRAs might have some increased management activities and might see elevated levels of invasive plant establishment and spread if projects occur in the future.

Alternative 3

Alternative 3 has the highest degree of potential ground disturbance due to projected road construction/reconstruction, tree cutting, fuels management, future oil and gas activities, and coal activities outside the North Fork coal mining area in roadless areas. The use of LCZs is not limited in this alternative. Although LCZs are used for only a short time, invasive plants could be introduced during construction and the actual period of use. Beyond the use period, elevated risk of invasive plant establishment often extends for several years until vegetation and soil characteristics are recovered. This alternative would, therefore, result in a higher risk scenario for invasive plant establishment, compared to the other three alternatives within areas where projects occur.

Under Alternative 3, forest plans include allowances for temporary or forest road construction, and tree cutting, sale, or removal for a variety of purposes on many of the acres. In these cases, there would be a moderately higher risk of import of noxious weed seed, and therefore, a higher risk of establishing and spreading new populations. Indirect effects could result from the gradual steady encroachment of newly established invasive plant populations over the long term. In addition, should GMUG National Forests Land Management Plan guidance include exclusions for road construction in the North Fork coal mining area, there would be increased risks of establishment and spread of invasive plant populations, because of temporary road construction for methane venting and other needs.

The possible occurrence of accelerated road construction and other ground disturbance as a result of shale operations in the North Fork of the Gunnison could result in elevated risks of establishment and spread of invasive plant populations in those areas.

Alternative 4

Alternative 4 has the same prohibitions and exceptions as Alternative 2. The difference is the 1.4 million additional upper tier acres. Future impacts likely would be less than Alternatives 1, 2, and 3 since Alternative 4 has more upper tier acres.

Cumulative Effects

Roads are often the primary vectors for noxious weed establishment and spread. Increased vehicular traffic has proven to increase the transport of invasive plant seeds to our national forests, as well as from place to place within a national forest. Taken cumulatively, an increase in roads and road use combined are likely to represent a measurable, if not quantifiable adverse effect to the extent and distribution of invasive plant populations in and around national forests in Colorado in the future.

Current State and Federal activities and authorities (such as the Rocky Mountain Region's Invasive Species Management Strategy (USDA Forest Service 2005) and the National Strategy and Implementation Plan for Invasive Species Management address some invasive species and their prevention and spread (USDA Forest Service 2004). Other programmatic policy and management direction can also indirectly influence the ability to construct roads.

None of the alternatives are expected to have a measurable cumulative effect on the long-term occurrence of invasive plant populations within either the National Forests of Colorado, or the state of Colorado as a whole.

Threatened, Endangered, and Sensitive Plants

Roadless areas generally contain natural landscapes that could provide habitat for some of the rarest elements of the Colorado flora. This section evaluates threatened, endangered, and sensitive (TES) plant species known or likely to occur within IRAs and newly proposed CRAs. Separate sections of the document cover TES fish and wildlife, and their habitats.

Affected Environment

Taken as a whole, TES plants in Colorado occur in a wide variety of habitats, ranging from aspen forests or pinyon-juniper woodlands to wetlands or alpine tundra. Within these broad habitats, TES plants are typically restricted to small areas having specific combinations of soil type, moisture regime, elevation range, and plant communities, among other factors. Some species (called endemic) grow nowhere else in the world, except Colorado, where they might be restricted to a single mountain range, or even a single peak. Other plant species are rare in Colorado because they are at the edge of their geographic range, or are widely disjunctive from their main area of distribution.

Nothing specific about habitat conditions within roadless areas makes them more likely to harbor TES plants than places outside roadless areas. However, because roadless areas are generally less altered by human activities compared to more intensively managed lands, TES plants in roadless areas are less likely to have been adversely affected by management activities or recreational pursuits enabled by roads. Since vehicles tend to spread weeds along roads (Taylor et al. 2011) roadless areas may also have lower threats from invasive, non-native plants.

Climate change can be expected to alter the distribution of plants and other species (Hansen et al. 2001; Intergovernmental Panel on Climate Change 2007). Some species will be more vulnerable to the effects of climate change than others (Millar et al. 2007). Alpine plants may be among those in the most precarious situations because they already exist at high elevations with little higher terrain available for them to migrate to over time; some are already on the highest peaks in Colorado and are isolated from other potentially suitable habitat. Pollinators might be more capable of migrating but they could leave some plant species behind, making the plants incapable of producing viable seeds. Some of these changes are unlikely to occur to a measurable extent over the next 15 years, but other changes have already been documented. For example, earlier snowmelt near Crested Butte, Colorado, has been found to result in earlier flowering of some subalpine plants (Inouye 2008). The earlier flowering dates subject these plants to frost, which results in significantly lower seed production. This reduced seed production can then lead to changes in plant community composition, which can alter habitat suitability for some plants and their pollinators. In addition, changes in land use challenge the ability of plants to adapt to climate change (USDA Global Climate Change Office 2001).

Threatened and Endangered Species

Three plant species listed as threatened are known to occur within roadless areas: Penland's eutrema (*Eutrema penlandii*), DeBeque phacelia (*Phacelia scopulinai* var. *submutica*, also known as *Phacelia submutica*), and Colorado hookless cactus (*Sclerocactus glaucus*); see Table 3-36 (U.S. Fish and Wildlife Service 1990, 1993, 2008, 2009, 2011). All three species are endemic to Colorado, and have rather small geographic ranges within the state. No other plant species listed under the ESA are known or are likely to occur in roadless areas in Colorado.

Kremling milkvetch (*Astragalus osterhoutii*), listed as endangered under the ESA, was thought to possibly occur in one roadless area (Kelly Creek). But Forest Service personnel familiar with that roadless area said it does not have the type of soil required by this plant species.

Table 3-36. *Occurrence of Threatened and Endangered Plant Species within Roadless Areas (IRAs or CRAs)*

Species: Common Name, Scientific Name (ESA Status)	*Habitat Description*	*Roadless Areas with T&E Species Occurrence*
Penland's eutrema *Eutrema penlandii* (threatened)	Rooted in mosses on stream banks and in wetlands that remain wet all season in the alpine at elevations of 12,300 to 13,100 feet	• Hoosier Ridge IRA & CRA • Silverheels IRA & CRA • Buffalo Peaks East CRA • Buffalo Peaks, 8b, and 3a • various other IRAs
Debeque phacelia *Phacelia scopulinai* var. *submutica* (threatened)	Sparsely vegetated, steep slopes; on expansive clays derived from the Atwell Gulch or Shire members of the Wasatch Formation at elevations of 4,700 to 6,200 feet.	• Battlement Mesa IRA • Sunnyside CRA
Colorado hookless cactus *Sclerocactus glaucus* (threatened)	In shrub communities on rocky hills, mesa slopes, and alluvial benches at elevations of 4,500 to 6,000 feet.	• Battlement Mesa IRA • Sunnyside CRA

Habitat for the Penland's eutrema is treeless and narrowly restricted to the Mosquito Range, where the plant lives in alpine seeps on soils that tend to remain wet year-round. For all of the alternatives, projections of foreseeable activities in roadless areas indicate that there is no likely potential for oil, gas, or coal development, new roads, LCZs or tree-cutting activities in the Penland's eutrema habitat found within roadless areas (IRAs or CRAs).

Debeque phacelia occurs on steep, sparsely vegetated slopes and benches, as well as ridge tops. Projections of foreseeable activities in roadless areas indicate that there is a high likelihood of activity under all alternatives in the Battlements CRA, which is the eastern portion of the Battlements Mesa IRA. However, Debeque phacelia occurs in the western most portion of the Battlements Mesa IRA, which would be called the Sunnyside CRA under the proposed rule, and is approximately 10 miles from the likely activity. Battlement Mesa IRA and the associated Sunnyside CRA also have high development potential for oil and gas based on geologic and other factors, but the No Surface Occupancy lease stipulations would prohibit future development there. The net result is that projections of foreseeable activities in roadless areas indicate that there is no likely potential for oil, gas, or coal development, new roads, LCZs, or tree-cutting activities in the Debeque phacelia habitat found within roadless areas (IRAs or CRAs) under any alternative.

Colorado hookless cactus is restricted to western Colorado, where it grows in shrub communities on gravelly-to-rocky surfaces of river terraces and lower mesa slopes. Colorado hookless cactus has been reported from locations in or near the western edge of Kannah Creek CRA, but searches for the plant in this area from 2005 to 2011 have not found the plant to be present. Kannah Creek CRA has foreseeable future coal activity, but there are no current leases or exploration licenses, and the area of potential coal activity is in the northern part of the CRA at a distance of several miles from the reported occurrences of Colorado hookless cactus. For other roadless areas known or likely to support Colorado hookless cactus, the projections of foreseeable activities discussed above for Debeque phacelia are applicable, with the net result that there is no likely potential for oil, gas, or coal development, new roads, LCZs, or tree-cutting activities in the Colorado hookless cactus habitat found within roadless areas (IRAs or CRAs) under any alternative.

Forest Service Sensitive Species

Forest Service sensitive species are those designated by a Regional Forester for which population viability is a concern (Forest Service Manual 2670.5). Inventories of sensitive plant species on NFS lands in Colorado are incomplete, especially in roadless areas. The available data show that 41 sensitive plant species are known or likely to occur in the roadless areas in Colorado (Table 3-37). This estimate is based on analysis of spatial data and species occurrence information in a geographic information system, using data from the Colorado Natural Heritage Program and from the national forests. One fourth of the existing IRAs and one fourth of proposed CRAs are known or are likely to support sensitive plants. Sensitive plant species that are not known or likely to occur in any roadless areas were eliminated from further analysis for this EIS.

Table 3-37 provides a list of sensitive plant species within roadless areas, grouped by general habitats. Because the general habitat categories used for these groups are not exclusive, it is important to note that some plants could be placed in more than one category. For example, plants that occur in alpine wetlands could be placed under either the alpine group or wetlands group. Some species might occur

naturally in more than one type of habitat. Nevertheless, these general categories provide a broad overview of the range of habitats that support sensitive plants in roadless areas, and the relative distribution of species among these habitats. The wetlands and alpine habitats in roadless areas contain the widest variety of sensitive plant species.

Table 3-37. *List and Distribution of Sensitive Species by Habitat Groups within Roadless Areas*

Habitat group	*Scientific name*	*Common name*
Alpine or subalpine	*Aliciella sedifolia**	stonecrop gilia
	Armeria maritima ssp. sibirica	Siberian sea thrift
	Braya glabella ssp. glabella	smooth northern-rockcress
	*Draba exunguiculata**	clawless draba
	*Draba grayana**	Gray's draba
	*Draba smithii**	Smith's draba
	Festuca hallii	plains rough fescue
	*Oreoxis humilis**	Rocky Mountain alpine parsley
	Parnassia kotzebuei	Kotzebue's grass of Parnassus
	Ranunculus karelinii	ice cold buttercup
Wetlands, seeps, or wet areas	*Aquilegia chrysantha var. rydbergii*	Rydberg's golden columbine
	Carex diandra	lesser panicled sedge
	Carex livida	livid sedge
	Drosera anglica	English sundew
	Drosera rotundifolia	roundleaf sundew
	Eriophorum altaicum var. neogaeum	whitebristle cottongrass
	Eriophorum chamissonis	Chamisso's cottongrass
	Eriophorum gracile	slender cottongrass
	*Mimulus gemmiparus**	Rocky Mountain monkeyflower
	Primula egaliksensis	Greenland primrose
	*Ptilagrostis porteri**	Porter's false needlegrass
	Rubus arcticus ssp. acaulis	dwarf raspberry
	Salix candida	sageleaf willow
	Salix serissima	autumn willow
	Sphagnum angustifolium	sphagnum
	Sphagnum balticum	sphagnum
	Utricularia minor	lesser bladderwort
Meadows or open areas	*Botrychium lineare*	narrowleaf grapefern
	Ipomopsis aggregata ssp. weberi	scarlet gilia
Aspen or conifer forests	*Astragalus ripleyi*	Ripley's milkvetch

Habitat group	Scientific name	Common name
	Cypripedium parviflorum	lesser yellow lady's slipper
	*Penstemon degeneri**	Degener's beardtongue
	*Potentilla rupincola**	rock cinquefoil
	Viola selkirkii	Selkirk's violet
Pinyon-juniper or shrublands	*Astragalus proximus*	Aztec milkvetch
	*Penstemon harringtonii**	Harrington's beardtongue
Shale/clay barrens or other sparsely vegetated areas	*Astragalus missouriensis var. humistratus**	Missouri milkvetch
	Lesquerella pruinosa	Pagosa Springs bladderpod
	Machaeranthera coloradoensis	Colorado tansyaster
	*Neoparrya lithophila**	Bill's neoparrya
	*Thalictrum heliophilum**	Cathedral Bluff meadow-rue

** Endemic plants, occurring only in Colorado.*

Thirteen of the sensitive plant species that are known or are likely to occur in roadless areas (IRAs or CRAs) are considered endemic because they occur only in Colorado[15]. Endemic species could be at higher risk of extinction due to their small number of populations and very limited geographic range.

Populations of one sensitive plant species, plains rough fescue (*Festuca hallii*), occur in portions of IRAs (in Alternatives 1 and 3) that are not included in CRAs (in Alternatives 2 and 4).

Four sensitive plant species occur in portions of CRAs (in Alternatives 2 and 4) that are not included in IRAs (in Alternatives 1 and 3). The first is endemic to Colorado:

- Rocky Mountain monkeyflower (*Mimulus gemmiparus*)
- Rydberg's golden columbine (*Aquilegia chrysantha var. rydbergii*)
- Greenland primrose (*Primula egaliksensis*)
- Sphagnum (*Sphagnum balticum*)

Management actions, such as road construction or tree cutting, typically include mitigation measures that adjust locations of these activities to avoid populations of sensitive plants. In addition, projects could also be designed to have beneficial effects for sensitive plant populations. For example, projects implemented in roadless areas for forest health, fuel reduction, or other purposes could be designed to correct poor road alignment or to address existing soil-erosion impacts on sensitive plants, or to reduce the risk of a high-severity wildfire that might eliminate a sensitive plant population and its seed bank. Thus, some management actions in roadless areas could benefit sensitive plants over the long term, even if there are short-term adverse impacts.

Of the 41 sensitive plant species known or likely to occur in roadless areas, five grow in forest habitats (the aspen/conifer habitat group listed in Table 3-37) that might benefit from tree-cutting to

[15] Aliciella sedifolia, Astragalus missouriensis var. humistratus, Draba exunguiculata, Draba grayana, Draba smithii, Mimulus gemmiparus, Neoparrya lithophila, Oreoxis humilis, Penstemon degeneri, Penstemon harringtonii, Potentilla rupincola, Ptilagrostis porteri, Thalictrum heliophilum.

reduce the risk of severe stand-replacing wildfires. It is possible that other sensitive plants could also benefit from reduced risk of severe wildfires, because wildfires could spread from forest habitats into (or otherwise adversely affect) other habitat groups as well. However, depending on where and how equipment is brought on-site for fuel reduction projects in forested habitats, there also could be increased risk of adverse impacts on sensitive plant species in other habitats (for example, temporary road construction or skidder operations across shrublands or open areas near forest habitats). Similarly, road construction for oil and gas exploration or development could increase the risk to sensitive plants in an array of different habitats.

Environmental Consequences

There would be no adverse impacts to threatened or endangered plants in IRAs or CRAs from road construction or reconstruction, tree cutting and removal activities, LCZs, or oil, gas or coal development activities because none of these activities is projected to occur under any of the alternatives in any roadless areas where federally listed plants occur (Penland's eutrema, Debeque phacelia, and Colorado hookless cactus). Potential direct impacts on threatened or endangered plants from future projects not foreseen in this analysis would be minimized through site-specific project analysis and design.

Effects Common to All Alternatives

Under all of the alternatives, there is some risk of indirect impact to federally listed plants from the spread of invasive non-native plants. The spread of invasive non-native plants could increase with road construction or reconstruction, tree cutting and removal activities, LCZs, or oil, gas and coal development activities. This is because increased ground disturbance is known to enable expansion of existing infestations, and because new populations of weeds could become established from seeds (or even root fragments) carried by vehicles or heavy equipment operating on or off roads (Taylor, et al. 2011).

For sensitive plants, the potential risk of direct adverse impacts from road construction, tree cutting, LCZs, and oil, gas or coal development depends on whether those activities could take place within the specific areas where sensitive plant species occur. These activities would pose some risk of injuring or killing sensitive plants, as well as indirectly rendering the habitat unsuitable (temporarily, long term, or permanently) or promoting invasion by non-native plants. The relative difference between alternatives in terms of risk is tied to differences in the likelihood of projected activities. Such activities are assumed not to pose a risk in IRAs or CRAs where sensitive plants are not known or likely to occur.

Authorized activities are designed and conducted to avoid habitat containing sensitive plant species when practical, or to at least, to avoid a loss of population viability over the species' geographic range (as described in the Affected Environment section). Nevertheless, under any alternative, there would be some level of risk of accidental damage to sensitive plants or their habitats during project implementation, or other unintended consequences from management activities projected to occur over the next 15 years.

The spread of invasive plants could be an indirect effect of projected activities, which could adversely impact sensitive plants. The abundance and distribution of invasive, non-native plants likely would increase over time as a result of road construction, tree cutting activities, LCZs, or oil, gas and coal development. Some invasive plants can spread from more distant activity areas (inside or outside of

roadless areas) into habitat for threatened, endangered, or sensitive plants via wind, water, animal vectors, human activities, or other mechanisms.

Sensitive plants would be more likely than threatened plants to be affected by the spread of invasive non-native plants because there are more habitats in roadless areas for sensitive plants, more occurrences, and more species. Some of the potential indirect impacts from invasive plants would be avoided or mitigated by implementation of the Forest Service's weed management and prevention programs (see Invasive Species section). However, over time, weeds could spread from infested activity areas into sensitive plant habitat, even if the activities are conducted at some distance from these habitats (e.g., via wind).

There would be some potential for beneficial effects on sensitive plants from management activities in roadless areas associated with improving ecosystem conditions. But the projected activities under any of the four alternatives would not likely be of sufficient magnitude to measurably reduce, for example, soil erosion or the risk of severe wildfires within sensitive plant habitat.

Alternative 1

Threatened and Endangered Species

Under the 2001 Roadless Rule, no activities are projected as likely to occur in any IRA where federally listed plants occur. As discussed in the Environmental Consequences section for all alternatives, there is some risk of indirect impacts to federally listed plants from the spread of invasive non-native plants.

The risk under Alternative 1 is low because of the limited restrictions on road construction and other activities in the IRAs.

Sensitive Species

The available data show approximately 150 sensitive plant occurrences to be known or likely within IRAs. Various types of activities are projected to be highly likely under the 2001 Roadless Rule in approximately 25 percent of the IRAs where these sensitive plants are known or likely to occur. These activities pose a higher level of risk to nearly 50 occurrences of sensitive plants than would be the case if the activities did not take place. Under Alternative 1, sensitive plants in the balance of the analysis area (outside of IRAs) would be managed under existing forest plans.

Based on the number of sensitive plant occurrences known or likely to occur in IRAs for which a high likelihood of activities has been projected, the risk of adverse direct and indirect impacts is essentially the same for Alternatives 1 and 4. Alternatives 2 and 3 pose higher risks than Alternatives 1 and 4.

Overall, the 2001 Roadless Rule may adversely affect individual sensitive plants, but it is not likely to result in a loss of viability for sensitive plant species on any national forest in Colorado, nor cause a trend toward federal listing for the sensitive plant species analyzed in this document. The programmatic biological evaluation in the EIS record will contain additional details about the potential effects on sensitive species, in accordance with policy requirements in FSM 2670.32.

Alternative 2

Threatened and Endangered Species

Under this alternative, similar to the 2001 Roadless Rule, no projected activities would occur in any CRA where federally listed plants are found. As discussed in the Environmental Consequences

section for all alternatives, there is some risk of indirect impacts on federally listed plants from the spread of invasive non-native plants. There is some risk under Alternative 2 because of the amount of projected activities, especially within the CPZ areas, but limited risk within the upper tier acres. Management under Alternative 2 might pose a lower risk to threatened plants over the long term than Alternative 3 because of its restrictions on new road construction, LCZs, and other management activities within CRAs in general, as well as on the upper tier acres.

Sensitive Species

Approximately 170 sensitive plant occurrences are known or likely in CRAs under the proposed rule. Activities such as road construction or tree cutting are projected to be highly likely under the proposed action in one third of the CRAs where these sensitive plants are known or likely to occur. These activities pose a higher level of risk to over 60 sensitive plants occurrences than would be the case if the activities did not take place. Sensitive plants in the balance of the analysis area (outside of CRAs) would be managed under existing forest plans.

Based on the number of sensitive plant occurrences known or likely to occur in CRAs for which a high likelihood of activities has been projected, the risk of adverse direct and indirect impacts under Alternative 2 is essentially the same as in Alternatives 3, potentially affecting about 65 sensitive species. Alternatives 1 and 4, with a high likelihood of activities in CRAs potentially affecting only about 45 sensitive plant occurrences, both carry a substantially lower risk than Alternative 2.

Compared to the 2001 Roadless Rule, the projected hazardous fuels treatments in CRAs under Alternative 2 might have a better chance of reducing the potential for high severity wildfires to eliminate a sensitive plant population and its seed bank. However, only about 5 of the 41 sensitive plant species in roadless areas are found in forests or similar habitats that would benefit from projected activities intended to reduce the risk of severe wildfires. Most sensitive plant species in roadless areas would not benefit from projected activities intended to reduce fire hazards because they grow in non-forested habitats.

Overall, Alternative 2 might adversely affect individual sensitive plants, but is not likely to result in a loss of viability for sensitive plant species on any national forest in Colorado or cause a trend toward federal listing for the sensitive plant species analyzed in this document. The programmatic biological evaluation in the EIS record will contain additional details about the potential effects to sensitive species, in accordance with policy requirements in FSM 2670.32.

Alternative 3

Threatened and Endangered Species

Under Alternative 3, no activities projected as highly likely would occur in any IRA where federally listed plants are found. As discussed in the Environmental Consequences section for all alternatives, there is some risk of indirect impacts on federally listed plants from the spread of invasive non-native plants. The risk of weed spread under Alternative 3 is the highest of the four alternatives because management under the forest plans is generally not as restrictive as the other three alternatives.

Sensitive Species

There are approximately 175 occurrences of sensitive plants that are known or likely in the roadless areas (IRAs and CRAs) that comprise the analysis area. In Alternative 3, all of these areas would be managed under the forest plans for each of the respective national forests. Projected activities

considered to be highly likely could potentially affect approximately 65 of the sensitive plant occurrences in the analysis area.

The risk to sensitive plants under Alternative 3 would be about the same as under Alternative 2, and substantially higher than Alternatives 1 and 4, which poses risk to only about 45 of the sensitive plant occurrences in the analysis area.

The potential for beneficial effects to sensitive plants would be the same as described for Alternative 2 and would affect only a small percentage of the habitats where sensitive plants are known or likely to occur in roadless areas. Most sensitive plants in roadless areas do not occur in habitats where tree-cutting would reduce wildfire hazard.

Overall, Alternative 3 could adversely affect individual sensitive plants, but is not likely to result in a loss of viability for sensitive plant species on any national forest in Colorado or cause a trend toward federal listing for the sensitive plant species analyzed in this document. The programmatic biological evaluation in the EIS record will contain additional details about the potential effects on sensitive species, in accordance with policy requirements in FSM 2670.32.

Alternative 4

Threatened and Endangered Species

No activities projected as highly likely would occur in any CRA where federally listed plants are found under this alternative. As discussed in the Environmental Consequences section for all alternatives, there is some risk of indirect impacts on federally listed plants from the spread of invasive non-native plants. This risk of weed spread is lower than under Alternatives 2 or 3, but might be slightly higher than under the 2001 Roadless Rule, which is more restrictive in terms of allowable activities in roadless areas.

Management under Alternative 4 might benefit threatened plants because it restricts or limits new road construction, LCZs, and other management activities within CRAs in general, as well as on the upper tier acres, which could be particularly important for Colorado hookless cactus and DeBeque phacelia in the Sunnyside CRA.

Sensitive Species

Under Alternative 4, activities are projected as highly likely to occur in 25 percent of the CRAs where sensitive plants are known or likely to occur. These activities potentially affect about 45 of the 175 sensitive plant occurrences in the analysis area. Sensitive plants in the balance of the analysis area (outside of CRAs) would be managed under existing forest plans.

The risk of direct or indirect adverse impacts to sensitive plants under alternative 4 would be about the same as under alternative 1, and substantially lower than alternatives 2 and 3 which could adversely affect about 65 sensitive plant occurrences.

Compared to Alternative 1, the projected hazardous fuels treatments in CRAs under Alternative 4 would have a better chance of reducing the potential for wildfires to eliminate a sensitive plant population and its seed bank. However, only about 5 of the 41 sensitive plant species in roadless areas occur in forests or similar habitats that would benefit from projected activities intended to reduce the risk of severe wildfires. Most sensitive plant species in roadless areas would not benefit from projected activities intended to reduce fire hazards.

Overall, Alternative 4 could adversely affect individual sensitive plants, but is not likely to result in a loss of viability for sensitive plant species on any national forest in Colorado or cause a trend toward federal listing for the sensitive plant species analyzed in this document. The programmatic biological evaluation in the EIS record will contain additional details about the potential effects to sensitive species, in accordance with policy requirements in FSM 2670.32.

Environmental Consequences Summary

Table 3-38 displays the overall relative risks to TES plants associated with each of the alternatives, and reflects the previous narrative discussions. Although LCZs are limited in Alternatives 2 and 4, their projected use is similar in all alternatives except for an increased use in Alternative 3.

Table 3-38. *Relative Risk to Rare Plants under Each Alternative due to Projected Activities and Associated Threats from Weed Invasion or Fragmentation*

Activity or threat	*Relative risk to T&E plants*	*Relative risk to sensitive plants*
Coal development	None anticipated	None anticipated
Oil and gas development per se	None anticipated	None anticipated
Road construction	None anticipated	Alt 1 < Alt 4 < Alt 2 < Alt 3
Linear construction zones	None anticipated	Alt 2 = Alt 4< Alt 1 < Alt 3
Tree-cutting	None anticipated	Alt 4 < Alt 1 < Alt 2 < Alt 3
Invasive species	Alt 1 < Alt 4 < Alt 2 < Alt 3	Alt 1 = Alt 4 < Alt 2 < Alt 3
Fragmentation*	None anticipated	Alt 1 = Alt 4 < Alt 2 = Alt 3

Abbreviations and symbols: Alt means "alternative"; < means "less than"; = means "essentially equal".

** See discussion of fragmentation under Cumulative Effects.*

Cumulative Effects

There are a number of past, present and reasonably foreseeable programs, activities, or events in roadless areas and on lands of all ownerships immediately surrounding them that are likely to affect TES plants. These activities primarily include tree-cutting, livestock grazing, road work, oil, gas, or coal development, and land conversion (for example, home construction on private lands outside roadless areas). These actions could adversely affect TES plants, their habitats, or their pollinators, and could contribute to habitat fragmentation for the plants or their pollinators. Some of these actions might also provide beneficial effects, such as mimicking natural disturbance regimes to which such plants are adapted, or controlling erosion. The activities considered for cumulative effects analysis are described more fully at the beginning of this Chapter.

Fragmentation of TES plant species' habitat can result from the combined effects of a wide array of ongoing, future, or past management actions in and around roadless areas. Habitat fragmentation has been cited frequently as a concern for wildlife, and its impact on plants can vary widely depending on the species' breeding system, capacity for migration, and other factors (Lienert 2004). Although some plant species are able to persist in very small populations over long periods of time, there is also evidence for the disruption of plant–pollinator relationships in fragmented landscapes (Harris and Johnson 2004). The causes can include a lack of nesting sites for insect pollinators or reduced pollinator visits to small plant populations, which can lead to lower seed production, with subsequently reduced seedling establishment and eventually smaller plant populations or local

extirpation of populations. Habitat fragmentation can also affect plant populations through a loss of genetic diversity within populations (USDA Forest Service and University of California 2006).

The effects of all these past, present, and reasonably foreseeable activities, likely would combine with the effects previously described for each of the roadless rulemaking alternatives to raise the risk to TES plants. These adverse cumulative effects cannot be quantitatively described in this programmatic evaluation. However, many human activities occurring in and adjacent to roadless areas would be likely to further (cumulatively) increase the risk of invasive plant spread or inadvertent impacts on TES plants in roadless areas. For example, continuing population growth and land development adjacent to roadless areas, plus recreation activities within roadless areas, pose an increased risk of additive adverse impacts to TES plants in roadless areas. Based on the discussion of direct and indirect effects, the risk of adverse cumulative effects would be lowest under Alternative 1 because the total amount of projected activity would be less under this alternative.

Aquatic Species and Habitat

The fishery resources and associated aquatic habitat in Colorado are a result of evolution, migration, climatic changes, and influences from non-native settlers. The Continental Divide forms a barrier between fish migrations from the western United States and the Mississippi drainage to the east. Periodic changes in climate and topography have resulted in isolation, movement, and subsequent evolution of the current native fish found in the State. There are a wide range of aquatic habitats and species in the roadless areas in Colorado, which range from approximately 4,000 to 14,000 feet in elevation. Relatively few fish species are able to survive the varying and often harsh conditions associated with the mountain streams in the higher elevations of the roadless areas in Colorado. This is due to variability in temperature, limited stream size, low nutrient input and the short growing season in streams at higher elevations.

Affected Environment

Historically, native fish populations were greatest in the mid- to large-sized streams in lower elevations in Colorado, with headwater streams containing relatively fewer fish populations. The results of historic logging and many other management practices in the Colorado Rockies have negatively influenced current aquatic habitat conditions (Allan 1995). However, past commercial timber harvesting in the roadless areas has been limited because of the lack of road access. Management activities have occurred more frequently and extensively in the lower elevations of Colorado, including the roadless areas. Historic management activities in the larger rivers and lower elevation streams in Colorado included stocking of non-native fish species, mining, road construction, and other development activities. De-watering of streams has resulted in a loss of habitat and native fish species, and it is unlikely that they can be restored to their pre-settlement condition in many areas (Behnke 2002). As a result of the numerous human activities along these larger, lower elevation streams, these areas are typically not considered for restoration efforts. (USDI Fish and Wildlife Service 1998).

Historically, aquatic habitat quality has been inversely proportional to elevation in the Colorado Rockies (Wohl 2001). The largest impacts on aquatic habitats have been occurring where streams are adjacent to human population centers, roads, and other human activities.

Recreational and land management activities are generally concentrated at the lower-to mid-elevation portions of roadless areas that are more accessible (Winters et al. 2004). Therefore, while historically the highest quality aquatic habitats in Colorado would have occurred at the lower elevations, aquatic habitat has been degraded from proximity to human population centers, roads, and other activities that occur more frequently in the lower elevations.

Native fish species populations have declined from their historic levels on all national forests in Colorado, even those further from large population centers, in part, due to a variety of human disturbances (Winters and Staley 2008).

Non-native fish species, such as rainbow, brook, and brown trout, have affected native trout populations in Colorado (Behnke 2002). Colder water temperatures might limit the expansion of some of these non-native trout species into upper elevation streams in the roadless areas in Colorado (Vincent and Miller 1969), but not their primary competitor, the brook trout. These high-elevation streams might also serve as refugia for native cutthroat trout if stream temperatures rise with climate change. Restrictions on road construction and tree cutting could reduce fragmentation and sedimentation on fragile, high-elevation streams, conserving suitable habitat for native cold-water species under moderate climate change scenarios.

Managing for native fish species must be balanced with the high recreational and economic value of non-native fish species. While fishing pressures have influenced the range of native trout, roadless areas generally do not contain roads open to public vehicular use. Therefore, there is a reduced risk of over-fishing, invasive species, and other impacts to fish populations in roadless areas.

This analysis examines the activities that are identified as part of the Roadless Rule alternatives for Colorado and their associated risks. Road construction, LCZs, and tree cutting activities are prohibited with few exceptions in three of the four alternatives.

Threatened, Endangered and Sensitive Species

Threatened, endangered (T&E) and proposed species are evaluated in accordance with requirements set forth under Section 7 of the Endangered Species Act (ESA), in the Code of Federal Regulations (50 CFR 402), and in Forest Service Manual 2670.31-2672.42. The ESA candidate species are discussed as Forest Service sensitive species later in this section; they are automatically included on the regional list of sensitive species.

The greenback cutthroat trout is federally listed as a threatened species that occurs within affected roadless areas. The yellow fin trout was historically found in the Arkansas River basin on the Pike-San Isabel National Forest, is presumed extinct, and will not be analyzed further in this analysis. There are no fish species currently identified as proposed under ESA, and there is no designated critical habitat for TES fish on NFS lands Colorado.

Forest Service sensitive species are species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or in habitat capability that would reduce existing distribution of their species (Forest Service Manual 2670.5). The Forest Service policy for sensitive species is to conserve sensitive species so that they do not become TES species and their habitats remain well distributed throughout their geographic range on NFS lands (Forest Service Manual 2670.22). The list of

sensitive species includes federal candidate species. Table 3-39 lists the threatened and sensitive species that are likely to occur in roadless areas by national forest.

Table 3-39. *Threatened, Endangered, or Sensitive Fish Species[1] That Occur or Are Likely to Occur in Roadless Areas in Colorado*

Common Name	*Scientific Name*	*Major River Drainage(s)*	*National Forest Occupied*	*Federal Listing*	*State Listing*
Native *Cutthroat trout*[2]	NA	All	All	Greenback: Threatened All others: regionally Sensitive	
Flannelmouth Sucker	*Catostomus latippinis*	Colorado	• San Juan National Forest • GMUG • White River	R2 Sensitive	NA
Bluehead Sucker	*Catostomus discobolus*	Colorado	• San Juan National Forest • GMUG • White River	R2 Sensitive	NA
Mountain Sucker	*Catostomus platyrhynchus*	Colorado	• San Juan National Forest • GMUG • White River • Routt	R2 Sensitive	Special concern

1) Subspecies of native fish associated with roadless areas in Colorado with federal and state designations.

2) For this analysis the 3 existing subspecies of cutthroat trout (Rio Grande, Colorado River, and Greenback) will be identified as "Native cutthroat trout".

The four native trout species listed in Table 3-39 (one threatened and three sensitive) represent some of the very few fish that are historically found in high elevation portions of Colorado. These native cutthroat trout currently inhabit only a small fraction of their historic range. In the past, most mountainous streams in Colorado that were not impeded by natural barriers and elevated stream temperatures harbored populations of native cutthroat (Behnke 2002). Because of a variety of human influences, these trout populations are now primarily limited to areas, such as wilderness, roadless, national parks, and other relatively remote areas of the State. More recently, human activities have introduced invasive species, such as the whirling disease parasite, other diseases, and possibly mollusks, such as the New Zealand mud snail, which threaten the sustainability of native fisheries. In the less altered stream systems in roadless areas, the whirling disease parasite does not appear to be well established.

Populations of all three native suckers that are listed as sensitive species appear to be declining. Bluehead and flannelmouth suckers generally tend to inhabit larger stream and river habitats, while mountain suckers are found sporadically throughout the western slope of Colorado in small streams. All three of these suckers are apparently being out-competed by, and hybridized with more common western white suckers (*Catostomus commersoni*) and longnose suckers (*Catostomus catostomus*) that

have been introduced west of the Continental Divide. While scientists are only beginning to understand the exact mechanism for this replacement, it appears that competition, hybridization, habitat fragmentation and stocking have contributed to this problem.

Special Aquatic Habitats

There are aquatic habitats in many of the roadless areas in Colorado that have been identified as being ecologically important, as well as rare. In particular, fens (peat-forming wetlands) are considered irreplaceable, because they have taken thousands of years to form, and contain many unique forms of flora and fauna (Winters et al. 2004). Fens act as carbon sinks, are typically produced at the toes of slopes, and are often associated with high-elevation glaciated valleys. Other wetlands are also important habitats for many species and have been reduced in Colorado by as much as 50 percent of their historic extent by numerous management activities (Dahl 1990). In some areas in Colorado, conversion of riparian forest and shrub dominated ecosystems to unvegetated and grass dominated habitat has resulted in a loss of important habitat for a variety of plants and animals (Dahl et al. 1991).

Management Indicator Species

Management Indicator Species (MIS) are species used as indicators of the effects of management activities on specific habitat types or features and are identified in forest plans developed under the 1982 National Forest Management Act Planning Rule. Forest plans for the national forests in Colorado identify six MIS species of fish (trout), one mammal (American beaver), and an array of benthic (bottom-dwelling) macroinvertebrates (such as insects, mollusks, and/or crustaceans); see Table 3-40. While native species would be ideal to use as MIS, aquatic biologists are faced with several problems when attempting to use native species. These issues include the fact that most native species were eliminated from most of their historic range; have very specific ecological requirements; do not respond directly to management activities; or are not well understood and might be considered a nuisance in some situations (e.g., American beaver). For these reasons, non-native trout are often chosen as MIS in Colorado and meet the National Forest Management Act 1982 regulations. In addition to being well-distributed and often well-studied, non-native trout species represent an economic benefit to Colorado as an important game species.

The American beaver is discussed as an MIS in the Terrestrial Species and Habitat section because it lives on both land and in water. It is a species that plays an important ecological role and has a major influence on aquatic ecosystems and the species of plants and animals within them (Wohl 2001). Historically, beaver dams played an even more important role in reducing the effects of flooding and increasing the extent and quality of aquatic habitats. Today, as roads encroach on numerous stream systems, beavers are often perceived as a nuisance as the water backed up from their dams spreads across floodplains and roads.

Table 3-40. *Aquatic Management Indicator Species for National Forests in Colorado.*

Forest	Common Name	Scientific Name
Arapaho-Roosevelt	Brook Trout	*Salvelinus fontinalis*
	Brown Trout	*Salmo trutta*
	Greenback Cutthroat Trout*	*Oncorhynchus clarki stomias*
	Colorado River Cutthroat Trout*	*Oncorhynchus clarki pleuriticus*
GMUG	All Trout	
Manti-La Sal	Benthic Macroinvertebrates	
Pike-San Isabel	Brook Trout	*Salvelinus fontinalis*
	Greenback Cutthroat Trout*	*Oncorhynchus clarki stomias*
Rio Grande	Rio Grande Cutthroat Trout*	*Oncorhynchus clarki virginalis*
	Brook Trout	*Salvelinus fontinalis*
	Brown Trout	*Salmo trutta*
	Rainbow Trout	*Oncorhynchus gairdneri*
Routt	Common Trout	
	American Beaver	*Castor canadensis*
San Juan	Cutthroat Trout*	
	Brook Trout	*Salvelinus fontinalis*
	Brown Trout	*Salmo trutta*
	Rainbow Trout	*Oncorhynchus gairdneri*
	American Beaver	*Castor canadensis*
White River	All Trout	
	American Beaver	*Castor canadensis*
	Benthic Macroinvertebrates	

** Due to the recent improvements in genetic analysis the distribution and historic range of native cutthroat trout has changed significantly. As a result, the term "native cutthroat trout" will be used to represent all subspecies of cutthroats in this analysis*

Environmental Consequences

This section describes the consequences of various roadless-related decisions on aquatic species. Protection of existing populations is paramount to the future of these taxa, while the addition of roadless acres and associated streams is extremely important for identifying recovery areas.

Currently, areas outside of wilderness and other specifically protected areas are available for a wide range of management activities, including road construction and various vegetation management activities. Restoration of native fish, and even beavers, generally requires that disturbance from these activities is minimal or non-existent. Roads, in particular, provide access to an increasing public that can directly or indirectly limit the ability to recover them. Roads constructed within valley bottoms and associated riparian areas are often "flooded" by colonizing beavers and are a constant source of conflict. As a result, both the protection of and the addition to suitable habitat and existing populations are important in describing environmental consequences to aquatic taxa.

Effects Common to All Alternatives

This general effects discussion provides the background for understanding the environmental consequences that are subsequently described in more detail for each alternative. It is intended to minimize the need to reiterate effects of activities associated with the roadless area management alternatives by providing a general discussion of potential effects of road construction and reconstruction, tree cutting and removal activities on aquatic species and their habitats. The potential effects for the use of LCZs are limited. They are used only for the time it takes to install a linear facility, which must follow best management practices and mitigation, and then the disturbed area is reclaimed as prescribed in the authorization. The activities differ by alternative and potentially would affect aquatic species or habitat.

The effects of livestock grazing, recreational activities, prescribed burning, fire suppression, road maintenance, ski area operations, mining hard-rock minerals, existing oil and gas leases and other authorized activities expected to continue to occur in roadless areas that do not significantly differ by alternative are not analyzed, except as part of the cumulative effects analysis at the end of this section. While large ski resorts are known to alter natural hydrological cycles and increase traffic congestion and land use activities that can impair water quality and aquatic species, the projected activities in roadless areas related to ski area development are not anticipated to vary by alternative within the analysis period, despite the differences in IRA and CRA boundaries in relation to those ski areas. Therefore, the effects of ski area developments on aquatic habitat and species in roadless areas do not warrant detailed discussion in this EIS.

The alternatives allow for development of oil and gas production on areas leased before the date of the rule. There is very little difference in projected oil and gas activities which include, pipelines, well heads, pumping stations, power generating stations, electrical transmission lines, fluid storage facilities, and roads, all of which can have effects on aquatic habitat and species. Alternative 3 projects only a slight increase in development and based on projections could result in an increase in potential effects to aquatic habitat and species from oil and gas development scenarios.

In all alternatives, there is a relatively small amount of ground-disturbing activity likely to occur in or close to aquatic habitat in roadless areas, and best management practices and other mitigation measures would be applied where needed to minimize impacts on aquatic habitat. As human populations continue to grow adjacent to roadless areas, there would be increasing demand for management activities on NFS lands, such as conducting wildland fire hazard reduction treatments that could ultimately impact aquatic species.

General Effects of Tree cutting and Removal Activities

The amount of tree cutting and removal activities projected to occur in roadless areas varies by alternative and can influence aquatic habitat and species. Many trout species spawn and rear in forested watersheds, often using small streams with linkages to adjacent forests (Chamberlin et al. 1991). Where these habitats are occupied by threatened and endangered trout, such as species of inland cutthroat trout, land-use activities like tree harvests can have implications for their persistence.

Tree cutting with wood product removals in the roadless areas can cause a hierarchy of effects to aquatic habitat and species (modified from Chamberlin et al. 1991), such as biophysical changes in the following areas:

- water, energy, nutrients and sediment
- structural changes in soil, vegetation, stream networks, and channel morphology
- habitat changes in water depth and velocity, water quality, streambed composition, riparian vegetation, and amount of woody material in streams
- aquatic biota changes in food web integrity, abundance, and composition of producers and consumers.

Tree cutting and removal activities vary widely in magnitude and intensity, and therefore, in resulting consequences. Projected tree cutting activities for fuel reduction purposes anticipated to occur in roadless areas would involve thinning and/or removing groups of dead and dying trees that are a result of insect or disease infestations and contribute to wildland fire severity. Cutting larger acreages can affect water yield, water temperature and nutrient loading (Windell et al. 1986).

Most potential effects would be minimized or avoided by avoiding major ground-disturbing activities in or connected to water-bodies, riparian areas, and wetlands. With the emphasis on use of best management practices and other protective measures in the design and implementation of tree cutting activities, the effects can often be mitigated to some extent. Proactive management (e.g., riparian planting) and best management practices would protect aquatic habitat and species from the direct effects of tree cutting activities.

Tree cutting and removal activities projected to occur in roadless areas could have beneficial effects, particularly if treatments reduce the magnitude and size of severe wildland fire events in those areas. Proper planning could reduce the potential of wildfire while not having impacts on aquatic, riparian and wetland ecosystems.

The amount of prescribed fire in roadless areas is not anticipated to substantially vary by alternative, and prescribed fire would not likely substantially affect aquatic habitat due to mitigation measures that would be applied to minimize adverse effects.

General Effects of Road Construction, Reconstruction, and Use

The broad view of the ecological effects of roads reveals a multiplicity of effects; it also suggests that it is unlikely that the consequences of roads will ever be completely mitigated or remediated (Trombulak and Frissell 2000). Roads can degrade native aquatic (including riparian and wetland) ecosystems by altering natural drainage patterns, promoting ground-disturbing processes (e.g., mass wasting), and providing conduits for invasive, non-native organisms and pathogens. Roads have facilitated the consumptive (fishing) use of native species. The degree to which a road will negatively affect aquatic habitat is strongly associated with the specific road design, placement, construction practices, uses, and other factors. Roads can have a big influence on riparian areas and wetlands even where roads are located a distance away. While the localized effect of an individual road-stream crossing may not have a substantial adverse effect, the cumulative effect of road networks and multiple crossings increases the potential for major adverse effects to aquatic habitats (USDA Forest

Service 2000b). In addition, there will always be unwanted illegal, user-created roads that must be removed.

During project-level analysis, areas sensitive to surface erosion are identified and appropriate mitigation measures are used to reduce surface erosion and sediment production. New road location or facility construction would be done to minimize placement on highly sensitive soil. Roads would typically not be located on steep slopes (over 40 percent) where landslides are more common. Resource protection measures would be used, such as those in the Forest Service regional watershed conservation practices handbook and other best management practices. Post-project rehabilitation of disturbed soil would be applied during any ground disturbing activities to minimize soil loss. Erosion is a naturally occurring event; the objective is to retain erosion rates following project implementation that approximate pre-existing background rates. Implementation of a well-prepared surface erosion and sediment control program in conjunction with tree cutting, road construction, or LCZs can mitigate the potentially degrading impacts of surface erosion. Additional mitigation, proactive management (e.g., riparian planting) and best management practices would protect aquatic habitat and species from the direct effects of new roads.

A beneficial effect of the presence of roads in roadless areas is that they provide easier access to remote locations so that natural resource managers can collect data and implement aquatic habitat restoration projects. Roads can be closed to motorized use by the general public to prevent access for recreation uses that bring in non-native pathogens, reduce populations by fishing and introduce toxins.

Extent and Duration of Effects

For aquatic habitats, the effects of disturbances associated with road construction and tree cutting could extend well beyond those areas directly affected, given the influence that upslope areas and upstream reaches have on the condition of downstream habitat (Chamberlin et al. 1991). Generally the disturbance associated with LCZs would not extend beyond the area directly affected due to the very limited nature of their use. Native species receive a higher level of protection wherever they are found. Additional measures are taken if species designated as “sensitive” or threatened or endangered are identified in a project area regardless of the alternative.

The duration of effects, or recovery time, depends on a variety of factors. Site productivity, rainfall, and length of growing season influence the rate and success of vegetation regrowth. Some of the other factors influencing the duration of physical effects on a watershed and associated stream channels include the following:

- the type, location, extent, and duration of an activity
- magnitude of adverse effects
- dominant hydrologic and geomorphic processes within the watershed
- overall watershed condition
- effectiveness of mitigation and reclamation activities.

The duration of biological effects can extend beyond the recovery time for the physical environment and can be irreversible if a species is extirpated from the watershed.

Environmental Consequences of the Alternatives

As mentioned previously, native cutthroat have been identified as a high priority for fisheries resources. Other federally listed fish are also a high priority, although all but the greenback cutthroat trout occupy habitats in the Colorado River drainage and tributaries downstream from Forest Service managed lands. Table 3-41 shows the approximate miles of occupied habitat for the three remaining subspecies of cutthroat trout as identified in 2008 by the Colorado Division of Wildlife (CDOW). Until the genetics of each of these subspecies is fully understood, there is some overlap with these taxa and distribution. However, this and subsequent tables will be important to understand the potential protection between the various alternatives. Of particular note is that these miles of occupied habitat represent a rather small percentage of the historical range of these fish. To restore native cutthroat trout to their historical habitats, efforts are being made in other streams. In addition to protecting their current locations, some discussion will be made concerning protection of potential habitats for future restoration efforts.

Table 3-41. *Distribution by Forest in Stream Miles of The 3 Subspecies of Cutthroat Trout Currently Known to Occupy Streams on Forest Service Lands in Colorado (CDOW Data 2009).*

Forest	*Miles of Streams Occupied by Greenback Cutthroat Trout*	*Miles of Streams Occupied by Colorado River Cutthroat Trout*	*Miles of Streams Occupied by Rio Grande Cutthroat Trout*
Arapaho-Roosevelt	596.00	77.00	0.00
GMUG	0.00	1074.00	0.00
Pike-San Isabel	705.00	0.00	0.00
Rio Grande	0.00	0.01	1304.00
Routt	0.00	1255.00	0.00
San Juan	0.00	785.00	0.00
White River	0.00	1795.00	0.00
Total	***1301.00***	***4986.01***	***1304.00***

Alternative 1

The 2001 Roadless Rule identifies the most acres for roadless designation. In this alternative, there are an estimated 1,235 miles of existing roads within the IRA designation boundaries. While Alternative 1 places strong emphasis on no new road construction, most existing roads are expected to remain. Based on analysis within national forests in Colorado, a relatively high percentage of these roads could be adjacent to streams and be contributing impacts to at least some native cutthroat trout streams. Table 3-42 illustrates the miles of native cutthroat trout identified within the 2001 Roadless Rule IRAs. Compared with the miles of stream occupied in the state of Colorado, there are a relatively small number of native cutthroat trout streams within the 2001 Roadless Rule IRAs. However, there are more miles of stream occupied by native trout within the IRAs than within the CRAs of Alternatives 2 and 4.

All 2001 Roadless Rule IRAs have the same set of prohibitions and exceptions. There are no upper tier designations with more restrictive prohibitions. This alternative identifies the least acres of

vegetation treated of any alternative with the highest amount identified for ecosystem restoration and a limited amount for maintaining or improving habitat for TES species.

This alternative also identifies the least number of roads constructed per year. The low estimate of road construction would be regulated to standard. There is no prohibition on the use of LCZs in this alternative; however, the projections show a similar number as Alternatives 2 and 4. It is difficult to determine if any of the activities proposed would be detrimental to native or MIS fish, although with the extremely limited amount of development identified and project-specific NEPA done before any activities, there would be protection for fish and aquatic habitat.

Table 3-42. *Total Stream Miles Occupied by Native Cutthroat Trout Subspecies within the 2001 Roadless Area Boundary.*

Analysis Area	*Greenback Cutthroat Trout Occupied Area Miles (% Of State Total)*	*Colorado River Cutthroat Trout Occupied Area Miles (% Of State Total)*	*Rio Grande Cutthroat Trout Occupied Area Miles (% Of State Total)*
2001 IRA Acres	333 (26%)*	2210 (44%)*	333 (6%)*

**Percentages are for the amount of cutthroat inhabited streams compared to the state wide number of inhabited streams.*

While native fish protection was not the focus of Alternative 1, the large acreage that allows for tree cutting for TES habitat improvement projects in this alternative should provide additional opportunities for cutthroat trout restoration efforts. It is expected that with current Forest Service regulations, there would be limited influences to Sensitive or MIS fish under this, or any alternative. There would be few impacts to greenback cutthroat trout or downstream federally listed fish under this alternative. Roads related to oil and gas development with existing leases will be constructed to standard, preventing impact to existing habitat.

Alternative 2

The total number of acres of CRA designation for Alternative 2 is similar to those in the 2001 Roadless Rule. One of the primary differences between the alternatives is that the boundaries have been changed to eliminate areas of NFS roads that are located within the IRAs of Alternative 1, and the addition of new roadless areas to the CRAs.

A subset of the CRA acres is designated as upper tier acres, with limited exceptions to the prohibitions. For an explanation of the upper tier designations, see Chapter 2. Based on the CDOW information identified in Table 3-43, there are far fewer occupied stream miles in upper tier under Alternative 2, when compared to the overall distribution of native cutthroat trout within the NFS boundaries of Colorado. In addition, there are streams identified as being populated by native cutthroat trout within national forest lands that are outside of the CRAs.

Projected tree cutting for this alternative is focused on hazardous fuel reduction adjacent to at-risk communities and municipal supply systems. Based on experience over the last decade, fuel treatment associated with cutthroat trout populations could be invaluable for protecting populations from severe wildfire effects. In addition, tree cutting where it is needed to improve the habitat for TESP in coordination with the Colorado Division of Parks and Wildlife is allowed, similar to Alternative 1.

There are projected to be few miles of roads constructed or reconstructed in Alternative 2, with most being temporary roads. LCZs are prohibited, with limited exceptions. An added provision of this

alternative is the Responsible Official must determine, before any road construction or use of LCZs, that when the proposed construction lies within a native cutthroat trout catchment or identified recovery watershed, whether the road construction will diminish conditions in the water influence zone and in the occupied native cutthroat trout habitat over the long-term.

These cutthroat-trout-related provisions on road construction and additional restrictions within upper tier acres could benefit the fish populations as human activities and associated impacts occur in the future.

Table 3-43. *Upper Tier Occupied Stream Miles for All Forests in Alternative 2 for Native Cutthroat Trout*

Forest	Upper Tier GBCT Stream Miles (Alternative 2)	Upper Tier Colorado River Cutthroat Trout Stream Miles (Alternative 2)	Upper Tier Rio Grande/ Colorado River Cutthroat Trout Stream Miles (Alternative 2)
Arapaho-Roosevelt	70.00	21.00	0.00
GMUG	0.00	39.00	0.00
Pike-San Isabel	15.00	0.00	0.00
Rio Grande	0.00	0.00	180.00
Routt	0.00	613.00	0.00
San Juan	0.00	231.00	0.00
White River	0.00	15.00	0.00
Total	***85.00 (38%)****	***920.00 (47%)****	***180.00 (72%)****

** Represents the percentage of miles in Upper Tier for native cutthroat in Alternative 2 areas compared to Alternative 4.*

Alternative 3

Alternative 3 follows direction in the current forest plans. As with all alternatives, for fishery resources, the direction provided in the Regional Foresters Sensitive Species program, MIS, and the Endangered Species Act pertain. While there is protection under each of these different levels of management "direction", there is also considerable flexibility, especially for MIS. Other management activities can be mitigated and there is limited consistency between forests for direction and MIS.

Continued management of numerous other activities illustrates that the highest amount of tree cutting, road construction, and LCZ use would occur in this alternative. This type of management would limit the amount of restoration for native fish species because conflicts would restrict opportunities. With mitigation identified in forest plans, impacts to sensitive species would be negligible, federally listed species would be insignificant, but MIS could be highly variable across the landscape. With the limited funding and management direction for these species, additional impacts could occur, especially indirect impacts from sedimentation, elevated stream temperatures and the cumulative effects of increased demands on NFS lands. Based on these results, this alternative could be considered the least protective for management of native and MIS fish of the 4 alternatives. Roads and indirect effects from roads, such as fragmentation, habitat loss, and more recently, the introduction of non-native fish would most likely continue albeit slowly over time (Williams et al, 2011).

Alternative 4

Alternative 4 has the same prohibitions and exceptions and CRA acres as Alternative 2. The difference is the 1.4 million additional upper tier acres. One of the criteria for identifying upper tier acres by the public in this alternative was the identification of subwatersheds with populations of native cutthroat trout. The upper tier acres do not include all of the native cutthroat species in streams in the state, but they do represent most of the subspecies identified (see Table 3-44).

There is less tree cutting in Alternative 4 than all alternatives, except the 2001 Roadless Rule, and about the same amount of road construction. While this alternative does not provide for "proactive" vegetation treatment in upper tier acres for fuel removal, it does provide a high degree of protection for the existing populations and a considerable amount of roadless designation to help fishery biologists identify new restoration areas, with fewer conflicts from other management activities. Other TES fish species would also benefit from the added protection and large area of roadless designation.

Table 3-44. *Upper Tier Occupied Stream Miles for All Forests in Alternative 4 for Native Cutthroat Trout*

Forest	Upper Tier GBCT Stream Miles (Alternative 4)	Upper Tier Colorado River Cutthroat Trout Stream Miles (Alternative 4)	Upper Tier Rio Grande/ Colorado River Cutthroat Trout Stream Miles (Alternative 4)
Arapaho-Roosevelt	134.00	29.00	0.00
GMUG	0.00	349.00	0.00
Pike-San Isabel	91.00	0.00	0.00
Rio Grande	0.00	0.00	250.00
Routt	0.00	772.00	0.00
San Juan	0.00	267.00	0.00
White River	0.00	551.00	0.00
Total	***225.00 (68%)****	***1968.00 (89%)****	***250.00 (75%)****

**Percentage of Upper Tier stream miles of occupied native trout populations compared to total native cutthroat trout miles in Alternative 1*

Summary of Environmental Consequences

The large scale and non-site-specific nature of this analysis makes it difficult to develop conclusions that are not somewhat subjective in nature. Information on project and population location, true cumulative effects, and lack of certainty in project development make it difficult to articulate the consequences. However, there is enough information available to make predictions on the comparisons between different alternatives. Table 3-45 shows whether a particular alternative is predicted to be beneficial or detrimental to a resource group. Alternatives 1, 2, and 4 provide additional restrictions above that provided within forest plans and in laws and other regulations that will help protect MIS and potentially sensitive species. They will also limit other potentially conflicting management activities that could limit restoration efforts in the future. A numerical "rating" was used to identify the highest protection for aquatic habitats and species, with the highest

number representing the most protection. Alternatives with no discernible difference were scored the same.

Table 3-45. *Comparison of Alternatives of Predicted Effects on Aquatic MIS, Sensitive Species, and Native Cutthroat Trout by Alternative*

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Roadless acres and miles of cutthroat stream within	2	2	1	2
Road presence and new construction	2	2	1	3
Tree Cutting	3	2	1	3
Cutthroat Trout Protection	3	2	1	3
Cumulative Effects	4	2	1	3
Totals	14	10	5	14

Alternatives 1 and 4 are very similar in protection for slightly different reasons. Alternative 4 scores slightly higher protection when rating road presence or absence now and road construction projected in the future. There are over 1,200 miles of system roads remaining in 2001 Roadless Rule IRA boundaries. However, Alternative 1 would rank somewhat higher due to the IRA acres and miles of native cutthroat trout streams within its boundaries. Alternative 2 provides 1.4 million fewer acres of upper tier than Alternative 4 and has higher tree cutting estimates than Alternative 4. Alternative 3 illustrates the "multiple-use management" scenario, with few road construction restrictions and vegetation treatment based on forest plans. While species listed under the Endangered Species Act are protected to a large extent, Management Indicator Species and, to some extent, Sensitive Species are protected to a less degree. Based on the analyses conducted for this project, either Alternative 1 or 4 could be considered to provide the highest protection and future management opportunities for fisheries resources.

Cumulative Effects

There are a number of cumulative effects on aquatic species and habitat from the additive influences from other human activities, such as historic settlements and ongoing land uses. The cumulative effects of management activities on native fishery resources have resulted in most of Colorado's native fish having special regulatory considerations because of their rarity (Behnke 2002). While non-native trout, such as brown, brook, and rainbow appear to be thriving on most national forests in Colorado, continual change in human influences suggests that in some areas, native aquatic populations might be suppressed or non-viable. Historic activities have resulted in a considerable loss of wetlands and riparian areas in Colorado; the State has lost approximately 50 percent of its natural wetlands (Dahl 1990).

Where there are more roadless area acres in near large population centers in Colorado, such as on the Arapaho-Roosevelt or Pike-San Isabel National Forests, there is a higher potential for cumulative impacts on aquatic species and habitat. The roadless areas on these forests that are close to large population centers experience a wide array of recreational, developmental, and municipal uses that affect the associated streams, wetlands, and other aquatic habitat within those areas. These various

land use activities, when they occur in the same vicinity, may cumulatively limit the potential for reestablishment of threatened greenback cutthroat trout, a threatened fish species that only occurs on these two national forest units in Colorado.

When oil and gas development or coal mining occur in the same roadless areas as recreational uses, fuel reduction projects, and other land management activities, there can be cumulatively adverse impacts on aquatic habitat. This would be most likely to occur in roadless areas on the GMUG National Forests, as well as the San Juan National Forest or White River National Forests. In roadless areas on the GMUG and San Juan National Forests, unique features like fens and wetlands are relatively more abundant, and therefore, are more vulnerable to cumulative effects from the many activities expected to occur over the next 15 years.

Additive impacts on aquatic resources on the White River National Forest might be related to roadless area proximity to populated areas that continue to experience rapid growth. Recreation use is considered very high in several areas, with Summit County having the highest concentration of ski areas in the State. The White River National Forest contains numerous roads, including roads that cross streams. Road crossings and multiple use activities on the White River could be limiting movement of native and non-native fish throughout a considerable portion of the forest, particularly in the southern and eastern portions.

On the Manti-La Sal National Forest, the Roc Creek roadless area contains an eligible wild and scenic river based on its scenic, geologic, and hydrologic values, along with waterfalls and riparian vegetation complexes. There are several oil and gas leases in the area that could add to recreational uses and other ongoing activities to additively affect the unique riparian resources in this roadless area.

There are roadless areas on the national forests that are not adjacent to large population centers and are not expected to have oil, gas, or coal operations in the next 15 years, such as areas on the Rio Grande and Routt National Forests. Despite those expectations, there would still be a variety of human developments and land-use activities that continue to increase over time and have additive effects on the streams that historically supported Rio Grande cutthroat trout or other sensitive or MIS fish, as well as riparian areas and wetlands.

Considering all past, ongoing, and projected future activities within the same watersheds as the roadless areas in Colorado, cumulative effects are clearly evident and would be likely to continue to occur.

Terrestrial Species and Habitat

There are approximately 600 species of terrestrial animals that occur within the State of Colorado. Roadless areas have high species richness (variety of species), and often harbor more threatened, endangered and sensitive species than adjacent national forest lands having higher levels of resource development and human activities (see analysis in Colorado Division of Wildlife's February 2006 petition comments submitted to Colorado's Inventoried Roadless Areas Task Force).

Affected Environment

Terrestrial Wildlife Habitats

Roadless areas in Colorado are predominantly comprised of coniferous forests in mountainous terrain, ranging in elevation from about 7,000 to 14,000 feet above sea level. There are no roadless areas within the national grasslands (Pawnee and Comanche) located in Colorado. The dominant vegetation cover types in roadless areas of Colorado are spruce-fir, aspen, lodgepole pine and Douglas-fir, with smaller amounts of ponderosa pine, pinyon-juniper and oak brush at lower elevations. Habitat structural stages ranging from grass/forb and shrub/sapling through late successional forest are represented. Mature and old forest conditions are currently predominant in roadless areas, although extensive stands of mature lodgepole are now almost entirely dead due to a recent mountain pine beetle epidemic and are reverting to an early successional stage.

Roadless areas have special importance for many wildlife species because they provide large blocks of habitat in which natural processes are largely allowed to operate and human disturbance is relatively low. A high level of security and seclusion is particularly important during periods when animals are birthing and rearing their young. Compared to more developed landscapes, a higher degree of habitat diversity, complexity, and higher densities of snags and coarse woody debris are typically found within roadless areas. Many roadless areas adjoin wilderness area, forming larger, more well-connected blocks of unfragmented habitat. Roadless areas often serve an important function as corridors for wildlife movement and dispersal. Roadless areas will likely play an increasingly important role in sustaining viable populations of wildlife in the face of rapid human population growth, associated land development, and climate change. Roadless areas are also significant in providing wildlife-associated recreation opportunities in a remote backcountry setting, which likely will become increasingly valuable in the future as well. (Summarized from literature syntheses in Forman et al. (2003), Wisdom et al. (2000), Trombulak and Frissell (2000), and Montana Chapter of The Wildlife Society (1999)).

Federally Listed Species and Designated Critical Habitat

Several sources of information were compiled to identify known and potential occurrence of threatened and endangered species in roadless areas. These included Forest Service species occurrence matrices (available at the Rocky Mountain and Intermountain Regional Offices), information available from the U.S. Fish and Wildlife Service, comments submitted by the Colorado Division of Wildlife (available online at http://wildlife.state.co.us/Land/Water/Roadless), Colorado Natural Heritage Program databases, and professional knowledge of the Forest Service's wildlife staff.

Three federally-listed terrestrial species (whooping crane, piping plover, and least tern) are known to occur in Colorado, but there is no habitat for them within the roadless areas. Therefore, there is no effect to these species and they are not analyzed further in this EIS.

Three federally-listed threatened or endangered species (grizzly bear, gray wolf and black-footed ferret) are extirpated from NFS lands in Colorado. There is no effect to these species and they are not analyzed further in this EIS. If populations of these species should become re-established on NFS lands in Colorado in the future, effects of land management activities on them will be evaluated then.

Six federally-listed terrestrial species are known or likely to occur within the analysis area. Table 3-46 displays key habitat requirements for each listed species and whether the species or suitable habitat is known to occur in IRAs or CRAs within the analysis area.

Critical habitat has been designated for the Preble's meadow jumping mouse and Mexican spotted owl on two national forests in Colorado. Four roadless areas on the Arapaho-Roosevelt National Forest contain critical habitat for the Preble's meadow jumping mouse; the Pike-San Isabel National Forest provides critical habitat for the Preble's meadow jumping mouse in two roadless areas, and for the Mexican spotted owl in 10 roadless areas.

Currently, no terrestrial wildlife species are proposed for listing that occur in Colorado.

The Gunnison sage-grouse, greater sage-grouse, lesser prairie-chicken, yellow-billed cuckoo, Gunnison's prairie dog, wolverine, and New Mexico meadow jumping mouse are species that occur in Colorado that have been identified by the U.S. Fish and Wildlife Service as candidates for listing under the Endangered Species Act (ESA). Candidate status means that the best scientific and commercial data available suggest that a proposal for listing might be warranted, but the full review has not yet been conducted because it is precluded by other higher-priority listing actions. Candidate species are also listed as Forest Service sensitive species and are discussed in more detail in the following section.

Table 3-46. *National Forests in Colorado with known presence of threatened and endangered animals or their habitats within roadless areas.*

Species and status (T) or (E)	*Habitat Description*	*National Forests with T&E species occurrences or suitable habitat within roadless areas*
Birds		
Southwestern willow flycatcher (E) *Empidonax trailii extimus*	Dense riparian thickets of willow, cottonwood, and other deciduous shrubs and trees about 13–23 ft. or more in height. At higher elevations, shrub willows are a major component.	Rio Grande, Manti-La Sal
Mexican spotted owl (T) *Strix occidentalis lucida*	In CO, nests in caves or on ledges in steep, narrow canyons with uneven-aged stands of mixed-conifer forests. Might also use ponderosa pine, Gambel's oak, and riparian woodlands. Frequent, low-intensity surface-dominated fires maintain open-canopy stands used for foraging.	GMUG, Pike-San Isabel, Rio Grande, San Juan National Forest, White River
Insects		
Pawnee montane skipper (T) *Hesperia leonardus montana*	Restricted to the South Platte River drainage in Colorado; dry open ponderosa pine woodlands at 6,000–7,500 ft., sparse understory with blue grama (larval food) and prairie gayfeather (nectar). Frequent low-intensity surface fires maintain open-canopy structure.	Pike-San Isabel
Uncompahgre fritillary (T) *Boloria acrocnema*	Above timberline in patches of its larval host plant, snow willow. Most often found on cool, moist, north- and east-facing slopes.	GMUG, Pike-San Isabel, Rio Grande, White River
Mammals		
Canada lynx (T) *Lynx canadensis*	Spruce-fir forest with cold winters, deep snow, and an adequate prey base of snowshoe hares. Habitat connectivity across large lynx home range. Cover types include spruce, fir, lodgepole pine, aspen, and Douglas-fir. Dense horizontal cover is a key component of snowshoe hare habitat.	Arapaho-Roosevelt, GMUG, Pike San-Isabel, Rio Grande, Routt, San Juan National Forest, White River
Preble's meadow jumping mouse (T) *Zapus hudsonius preblei*	Riparian vegetation and adjacent upland vegetation up to ~7600 ft. elevation Lush undergrowth of grasses or forbs in riparian areas and moist meadows, often with tree and shrub cover.	Arapaho-Roosevelt, Pike-San Isabel

Source: *U.S. Fish and Wildlife Service and Forest Service list of federally listed species that may occur on national forests in Colorado, April 2008 (in EIS record).*

Forest Service Sensitive Species

Forest Service sensitive species are those identified by a Regional Forester for which population viability is a concern (Forest Service Manual 2670.5). Forest Service policy is to conserve sensitive species so that they do not become endangered or threatened as a result of Forest Service authorized activities, and to maintain their habitats well-distributed on NFS lands (Forest Service Manual 2670.22). Sensitive species, therefore, receive special emphasis and management attention. The list of sensitive species incorporates those that have been identified as candidates for listing under the Endangered Species Act, and also includes many of those identified in Colorado's 2006 Comprehensive Wildlife Conservation Plan as species of greatest conservation concern (Colorado Division of Wildlife 2006).

Most sensitive species are known or thought to be likely to occur within roadless areas in Colorado. A few are not, such as species whose distributions within the Rocky Mountain and Intermountain Regions are limited to states other than Colorado. Several species that inhabit shortgrass prairies in Colorado, such as black-tailed prairie dog, burrowing owl, and lesser prairie chicken (a candidate species) are not expected to occur within the roadless areas. Similarly, the habitat of the New Mexico meadow jumping mouse and the yellow-billed cuckoo (both candidate species) occur in low elevation, valley-bottom riparian habitats that do not overlap with roadless areas in Colorado. Therefore, these species were not carried forward for further analysis in this EIS.

There are 39 sensitive species of terrestrial wildlife that are known to occur or are likely to occur in roadless areas. These species include 3 amphibians, 19 birds, 13 mammals, 3 insects, and 1 mollusk. Table 3-47 displays those sensitive species that are known or likely to occur within roadless areas in Colorado (either IRA or CRA boundaries), and on which national forest(s).

Table 3-47. *National Forests with Known or Likely Occurrence of Sensitive Animal Species Within Roadless Areas in Colorado[1].*

Scientific Name	*Common Name*	*Habitat Description*	*National Forest with Sensitive Species Occurrences or Suitable Habitat in Roadless Areas*
Amphibians			
Anaxyrus boreas boreas	Boreal toad	Wetlands near ponds, lakes, reservoirs, rivers, and streams between approximately 7,500 and 12,000 ft. elevation. Disperses through upland habitats.	Arapaho-Roosevelt, GMUG[2], Manti-La Sal, Pike-San Isabel, Rio Grande, Routt and White River
Lithobates pipiens	Northern leopard frog	Smaller, semi-permanent ponds with emergent vegetation; disperses along creeks and small riparian areas.	Arapaho-Roosevelt, GMUG[**], Rio Grande, Routt, San Juan National Forest, White River
Lithobates sylvatica	Wood frog	Semi-permanent and temporary pools of natural origin and adjacent wet meadows; hibernacula in upland forest habitat.	Arapaho-Roosevelt, Routt
Birds			
Accipiter gentilis	Northern goshawk	Large tracts of mature, closed canopy, deciduous, coniferous	Arapaho-Roosevelt, GMUG, Manti-La Sal, Pike-San

Scientific Name	Common Name	Habitat Description	National Forest with Sensitive Species Occurrences or Suitable Habitat in Roadless Areas
		and mixed forests with an open understory.	Isabel, Rio Grande, Routt, San Juan National Forest, White River
Aegolius funereus	Boreal owl	Mature, mixed stands of subalpine fir and Engelmann spruce with large nest cavities.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Rio Grande, Routt, San Juan National Forest, and White River
Amphispiza bellii	Sage sparrow	Sagebrush communities, forages on the ground under bushes.	Pike-San Isabel
Buteo regalis	Ferruginous hawk	Open grasslands east of the Continental Divide and shrub-steppe west of the CD; preys on small rodents.	White River
Centrocercus minimus (Candidate)	Gunnison sage-grouse	Relies almost entirely on sagebrush communities; wet meadow habitats interspersed within the sagebrush type are also important for brood-rearing.	GMUG, Pike-San Isabel, Rio Grande
Centrocercus urophasianus (Candidate)	Greater sage-grouse	Sagebrush communities; sagebrush overstory, and grass/forb understory without human disturbance important as breeding and brood-rearing habitat.	Routt, White River
Charadrius montanus	Mountain plover	Short-grass prairie; bare ground or prairie dog towns.	Pike-San Isabel
Circus cyaneus	Northern harrier	Open wetlands, meadows and adjoining upland habitats; undisturbed habitat during breeding season.	White River
Contopus cooperi	Olive-sided flycatcher	Forest openings and edges in mature forests and following natural and anthropogenic disturbances, such as tree fall gaps, fire, and logging; presence of snags.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Rio Grande, San Juan National Forest, White River
Cypseloides niger	Black swift	Rock ledges associated with waterfalls.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Rio Grande, San Juan National Forest, White River
Falco peregrinus anatum	American peregrine falcon	Cliff habitat more than 200 ft. high with ledges suitable for nesting, usually associated with river corridors, reservoirs, or lake basins.	Arapaho-Roosevelt, GMUG, Manti-La Sal, Pike-San Isabel, Rio Grande, Routt, San Juan National Forest, White River
Haliaeetus leucocephalus	Bald eagle	Large trees for nesting and perching near fish-bearing	Arapaho-Roosevelt, GMUG, Manti-La Sal, Pike-San

Scientific Name	*Common Name*	*Habitat Description*	*National Forest with Sensitive Species Occurrences or Suitable Habitat in Roadless Areas*
		lakes, streams and rivers.	Isabel, Rio Grande, Routt, San Juan National Forest, White River
Lagopus leucurus	White-tailed ptarmigan	Alpine ecosystems at or above treeline; adjoining riparian and meadow habitats within the subalpine zone; primary winter food is willow.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Routt, Rio Grande, San Juan National Forest, White River
Lanius ludovicianus	Loggerhead shrike	Open habitats such as deserts, sagebrush, grasslands, and pastures.	GMUG, Pike-San Isabel, Rio Grande, Routt, San Juan National Forest, White River
Melanerpes lewis	Lewis's woodpecker	Open forest (< 30 percent canopy cover) and abundant snags; preference for pine forests and for riparian cottonwoods at low elevation.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Rio Grande, Routt, San Juan National Forest, White River
Otus flammeolus	Flammulated owl	Open ponderosa pine or mixed conifer forests with cavities for nesting; intermixed grassy openings and dense thickets.	Arapaho-Roosevelt, GMUG, Routt, San Juan National Forest, White River
Progne subis	Purple martin	Mature aspen forest with nest cavities; nearby meadows and open water for foraging.	GMUG, White River
Spizella breweri	Brewer's sparrow	Sagebrush communities dominated by big sagebrush <1.5 m in height; also in shrubby openings in pinyon-juniper, mountain mahogany woodlands and mountain shrub.	GMUG, White River
Tympanuchus phasianellus columbianus	Columbian sharp-tailed grouse	Mid-tall prairie grasslands, upland sagebrush, and montane scrub during breeding; riparian shrub and open coniferous forests in winter.	GMUG, Routt, White River
Mammals			
Conepatus leuconotus	American hog-nosed skunk	Riparian areas, rocky canyonlands, pinyon-juniper woodlands, shrublands, and grasslands with brushy and rocky habitat.	Pike-San Isabel
Corynorhinus townsendii	Townsend's big-eared bat	A wide variety of habitats from arid sagebrush and juniper breaks to high-elevation forests including caves, mines, and rock crevices.	Arapaho Roosevelt, GMUG, Manti-La Sal, Pike-San Isabel, Rio Grande, White River
Cynomys gunnisoni (Candidate)	Gunnison's prairie dog	Grassland habitat with some sagebrush or other shrub cover.	GMUG

Scientific Name	Common Name	Habitat Description	National Forest with Sensitive Species Occurrences or Suitable Habitat in Roadless Areas
Euderma maculatum	Spotted bat	Xeric and riparian habitats in deep, narrow canyons with cliffs and rocky outcrops	Manti-La Sal, San Juan National Forest, White River
Gulo gulo (Candidate)	North American wolverine	Late spring snow in cirque basins and subalpine forests; dens placed in snow often associated with talus and coarse woody debris; carrion and small mammal prey.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Rio Grande, Routt , San Juan National Forest, White River
Lasiurus cinereus	Hoary bat	Summer roosts are in foliage of deciduous and coniferous trees, often along clearing edges. Forest cover types include mixed conifer, lodgepole pine, ponderosa pine, pinyon-juniper, cottonwood, and willow.	Arapaho Roosevelt, GMUG, Pike-San Isabel, Routt, Rio Grande, San Juan National Forest, White River
Lontra canadensis	River otter	Streams, lakes, and reservoirs.	Arapaho-Roosevelt, Rio Grande, Routt, San Juan National Forest, White River
Martes americana	American marten	Mesic, dense coniferous forests with complex physical structure; mature and old-growth conifers in winter; summer habitat use is somewhat broader; large snags, large logs, large spruce-fir trees, and squirrel middens.	Arapaho-Roosevelt, GMUG, Rio Grande, Routt, San Juan National Forest, White River
Myotis thysanodes	Fringed myotis	Low- and mid-elevation caves and mines in steep river valleys, large canyons, or other sites having steep and rocky terrain.	Arapaho-Roosevelt, GMUG, Pike-San Isabel, Rio Grande
Ovis canadensis	Bighorn sheep	Open habitats, such as alpine meadows, grasslands, and shrub-steppe in proximity to conifer cover, cliffs, talus slopes.	Arapaho Roosevelt, GMUG, Pike-San Isabel, Rio Grande, Routt, San Juan National Forest, White River
Sorex hoyi	Pygmy shrew	In Colorado, occurs in moist coniferous forest, possibly preferring late-seral stands and the edges between wet and dry forest types.	Arapaho-Roosevelt, GMUG, Routt, White River
Vulpes macrotis	Kit fox	Desert and semiarid habitats, inhabiting mixed-grass shrublands, shrublands, and margins of pinyon-juniper woodlands.	GMUG, Manti-La Sal
Vulpes velox	Swift fox	Shortgrass and mid-grass	Routt

Scientific Name	*Common Name*	*Habitat Description*	*National Forest with Sensitive Species Occurrences or Suitable Habitat in Roadless Areas*
		prairies, plowed fields, and sagebrush; low-growing vegetation and relatively flat terrain. Dens in prairie dog towns/burrows, badger burrows, friable soils.	
Invertebrates			
Acroloxus coloradensis	Rocky Mountain capshell snail	Clean boreal lakes with rocky substrate.	Arapaho-Roosevelt, Routt
Ochrotrichia susanae	Susan's purse-making caddisfly	Cold, clear spring or fen water. Tolerance is likely narrow, as it is known from only 2 sites in Colorado.	Arapaho-Roosevelt
Somatochlora hudsonica	Hudsonian emerald dragonfly	Wetlands and natural ponds.	Arapaho-Roosevelt
Speyeria nokomis nokomis	Nokomis fritillary butterfly	Wetlands with flowing water (springs, seeps, wet meadows); larval food plant is bog violet; and adult nectar sources, mostly Composites.	White River

1) Likely occurrence may be inferred from presence of suitable habitat within the known distribution of the species and/or proximity of known occurrences.

2) GMUG = Grand Mesa, Uncompahgre, and Gunnison National Forests

Management Indicator Species (MIS)

MIS are species identified in each forest plan as indicators of the effects of management activities or because of their economic, scientific or other importance. Collectively, there are a total of 36 terrestrial animals identified as MIS by the National Forests in Colorado (excluding those MIS selected only for national grasslands, which do not have any roadless areas, and therefore, are not relevant to this analysis).

All of the terrestrial MIS are likely to occur within one or more IRAs or CRAs within the analysis area. Table 3-48 displays the population and habitat trend for each terrestrial MIS, based on MIS monitoring reports produced by each national forest in Colorado, as well as the reason the species was selected as a MIS. For analysis purposes, MIS are grouped as follows:

- Those that represent certain vegetation types and/or structural stages: American pipit, bald eagle, Brewer's sparrow, brown creeper, Columbian sharp-tailed grouse, golden-crowned kinglet, green-tailed towhee, hermit thrush, Lincoln's sparrow, Merriam's wild turkey, mountain bluebird, northern goshawk, pygmy nuthatch, red-naped sapsucker, vesper sparrow, Virginia's warbler, warbling vireo, Wilson's warbler, Abert's squirrel, American marten, bighorn sheep, deer mouse, elk and mule deer.
- Those that represent unique habitat features, such as snags, caves, or wetlands and streams: boreal toad, hairy woodpecker, beaver, cave bats, and river otter.
- Those that respond to road density and management: elk, mule deer.

- Those that are economically important or have high public interest: black bear, elk, mallard.
- Those that are listed under the Endangered Species Act: Canada lynx, Mexican spotted owl, southwestern willow flycatcher, Uncompahgre fritillary butterfly.

Migratory Birds

More than 400 species of birds have been recorded in Colorado, and over 250 species nest in the State. Because roadless areas encompass a wide diversity of vegetation and range of elevations, a great diversity of migratory birds occur within the analysis area.

The Colorado Bird Conservation Plan identifies priority species and habitats and establishes objectives for bird populations and habitats in the State of Colorado. The roadless areas of Colorado are located within the Southern Rocky Mountains and the Colorado Plateau Physiographic Areas, PA62 and PA87 (Partners in Flight 2007).

Migratory bird monitoring has been conducted annually since 1998 through Monitoring Colorado Birds, in a partnership between the Forest Service, Colorado Division of Wildlife, the Rocky Mountain Bird Observatory, the Bureau of Land Management, and the National Park Service. Originally a road-based monitoring program, it has been redesigned. Starting in 2008, of the 184 sampling units in Colorado, 44 (24 percent) occur in IRAs and 42 (23 percent) occur in CRAs.

The National Audubon Society identifies Important Bird Areas (IBA) that are vital to bird migration, breeding, and wintering. Of the 53 IBAs designated in Colorado, six are located on National Forests and Grasslands. Two IBAs occur in roadless areas or adjoining wilderness areas on the White River National Forest: Hanging Lake IBA in the Grizzly Creek roadless area and the Alfred M. Bailey Bird Nesting Area IBA in Eagle's Nest wilderness adjacent to the Maryland Creek roadless area

Table 3-48. *Terrestrial Management Indicator Species, Their Habitat and Population Trends in Colorado, and Reason for Selection[1].*

MIS Species	A/R[2]	GMUG	MLS	PSI	RG	ROUTT	SJ	WR	Reason for Selection
Mammals									
Abert's squirrel		D/U[3]	U/S	I/U			S/S		Ponderosa pine forest management (GMUG, Pike-San Isabel, Manti-La Sal)
American marten (S)[4]		D/U					I/S		Spruce-fir forest management (GMUG, Rio Grande)
Beaver							I/I		Riparian habitat (San Juan National Forest)
Bighorn sheep (S)	D/U								Management of forest openings (Arapaho-Roosevelt)
Black bear							D/S		Economically important, forest generalist (San Juan National Forest)
Canada lynx (T)							S/S		T&E species (San Juan National Forest)
Cave bats (S)								S/D	Management of cave recreation (White River)
Deer mouse							I/I		Early successional stages (San Juan National Forest)
Elk	S/U	S/U	S/S	I/I	D/S		S/D	D/U	Road management (GMUG, Rio Grande, White River), public interest (Pike-San Isabel); juxtaposition of openings and forest cover (Arapaho-Roosevelt, Manti-La Sal)
Mule deer	D/U		I/S		I/S		S/D		Habitat interspersion (Arapaho-Roosevelt, Manti-La Sal); road density (Rio Grande)
River otter (S)							I/I		Stream habitat (San Juan National Forest)
Birds									
American pipit								U/U	Alpine grasslands (White River)
Brewer's sparrow (S)		D/U						U/U	Sagebrush shrubland management (GMUG, White River)
Bald eagle (S)							S/S		T&E species, riparian habitat (San Juan National Forest)
Brown creeper					I/I				Late succession spruce-fir forest management (Rio Grande)

MIS Species	A/R[2]	GMUG	MLS	PSI	RG	ROUTT	SJ	WR	Reason for Selection
Columbian sharp-tailed grouse (S)							U/S		Sensitive species (San Juan National Forest)
Golden-crowned kinglet	D/U					S/D			Interior forest (Arapaho-Roosevelt), Spruce-fir forest management (Routt)
Golden Eagle			I/I						Vegetation composition and human disturbance (Manti-La Sal)
Green-tailed towhee							S/S		Mountain shrub communities (San Juan National Forest)
Hairy woodpecker	I/U						S/S		Snag management (Arapaho-Roosevelt)
Hermit thrush					S/S				Forest management (Rio Grande)
Lincoln's sparrow					S/S				Riparian willow management (Rio Grande)
Mallard							I/I		Economically important, wetlands (San Juan National Forest)
Merriam's wild turkey		I/U					I/S		Management of oak, pinion/juniper, and ponderosa pine (GMUG)
Mexican spotted owl (T)							U/S		T&E species (San Juan National Forest)
Mountain bluebird	S/U						S/S		Openings adjacent to forest (Arapaho-Roosevelt)
Northern goshawk (S)		D/U	U/U			S/U	S/S		Mature and older aspen, mixed conifer, and spruce-fir forest (GMUG, Manti-La Sal); Lodgepole pine management (Routt)
Pygmy nuthatch	S/U				S/S				Late succession ponderosa pine (Arapaho-Roosevelt, Rio Grande)
Red-naped sapsucker		S/U							Mature aspen in riparian areas (GMUG)
Southwestern willow flycatcher (E)							U/S		T&E species (San Juan National Forest)
Vesper sparrow					S/S	S/U			Rangeland residual forage and mountain grasslands (Routt, Rio Grande)

MIS Species	***A/R[2]***	***GMUG***	***MLS***	***PSI***	***RG***	***ROUTT***	***SJ***	***WR***	***Reason for Selection***
Virginia's warbler								U/U	Shrub management (White River)
Warbling vireo	S/U								Aspen community status (Arapaho-Roosevelt)
Wilson's warbler	S/U				S/S	D/U			Mountain riparian and wetland communities (Arapaho-Roosevelt); riparian habitat (Routt); riparian willow (Rio Grande)
Amphibians and Insects									
Boreal toad (S)	D/U								Mountain riparian and wetland communities (Arapaho-Roosevelt)
Uncompahgre fritillary butterfly(T)							S/S		T&E species (San Juan National Forest)

Source: *MIS monitoring and evaluation reports completed for each national forest in Colorado (in EIS record).*

1) Trends are summarized, for example, as D/U = declining habitat trend and unknown population trend (abbreviations in footnote below).

2) National Forests are as follows: A/R = Arapaho-Roosevelt; GMUG=Grand Mesa, Uncompahgre, and Gunnison; MLS = Manti-La Sal; PSI = Pike-San Isabel; RG = Rio Grande; SJ = San Juan National Forest; and WR = White River.

3) Habitat and population trends are indicated with "I" for increasing, "D" for decreasing, "S" for stable, and "U" for unknown.

4) (T)(E)(S)after the species name indicate MIS that are listed as threatened (T), endangered (E), or sensitive (S) species.

Big Game

Big game species (elk, deer, moose, bighorn sheep, mountain goat, black bear and mountain lion) are very important socially and economically to the State of Colorado. Colorado contains the largest elk and mule deer herds in the United States. Hunting and fishing generates about $1 billion annually to the state's economy, with wildlife viewing contributing an additional $1.3 billion (U.S. Department of the Interior-Fish and Wildlife Service and U.S. Dept. of Commerce-U.S. Census Bureau 2008). Roadless areas provide important habitats for big game throughout the year.

Winter range is the primary limiting factor for most ungulate (elk, mule deer, moose, bighorn sheep, and mountain goat) populations. More than half of the roadless areas in Colorado provide ungulate winter range, and are very important to sustaining ungulate populations.

Roadless areas also provide important summer habitat for ungulates. The quality of summer habitat has been shown to be very important to overall nutritional status. Roadless areas tend to hold elk on the higher-elevation public lands longer during the hunting season, compared to areas with more motorized use where elk are often displaced onto private agricultural lands in the fall.

Ungulates use traditional migration corridors to move between winter and summer ranges. Severing a migration corridor can result in less effective use or even loss of winter and/or summer ranges. About one-third of roadless areas in the state provide seasonal migration corridors for big game animals.

Roadless areas provide high-quality backcountry hunting recreational opportunities. Road density is an important factor determining the vulnerability of elk to hunters in the fall (Hayes et al. 2002). For this reason, management units with a large amount of roadless and other undeveloped lands typically offer longer hunting seasons and more recreational opportunity, and harvest success rates tend to be higher than in heavily-roaded settings.

Mountain lions have large home ranges overlapping with their ungulate prey. Roadless areas contribute to maintaining healthy and well-distributed ungulate populations and provide secluded habitats to sustain source populations of mountain lions. Similarly, roadless areas provide important forage resources and security needed to sustain a healthy black bear population in the state.

Climate Change

Climate change is affecting terrestrial and aquatic animal species and habitats across Colorado and the U.S. Average annual temperature increases due to increased greenhouse gases such as carbon dioxide (CO2) are affecting snowpack, peak runoff, and base flows of streams and rivers. Predictions are that spring snowpack will probably be less, that more precipitation will probably fall as rain rather than as snow, and that spring peak runoff will be earlier (Backlund et al. 2008). For species such as white-tailed ptarmigan, lynx and wolverine that require cold, snowy alpine environments to survive, warmer temperatures could lead to significant decreases in available suitable habitat.

With climate change, tree line will move higher in elevation. Alpine habitats will contract in size and mountain-top patches will become increasingly isolated. This will result in a decline and possibly even loss of alpine-associated species such as the Uncompahgre fritillary butterfly.

Climate change is affecting phenology (the timing of biological events), involving aspects such as animal hibernation and migration. For example, bird migration, which formerly was synchronized with maximum food availability, may now occur too late, resulting in lowered reproductive success.

Climate change is likely to exacerbate the scale and intensity of natural disturbances such as wildfire and bark beetle epidemics. Larger and more intense fires and insect outbreaks might be expected in Colorado in the future. This may affect the ability of individual members of a species to survive the direct effects of fire. While many adult vertebrate species are mobile enough to flee burning areas or seek refuge, the young of the year are often most vulnerable to injury and mortality from fire (Smith 2000). Colorado forests currently are experiencing significant mortality as a result of severe mountain pine beetle and spruce beetle outbreaks. This has reduced the extent of mature forest significantly and likely will contribute to larger and more severe wildland fires occurring in and around roadless areas in the future.

Environmental Consequences

Land management activities in roadless areas often are costly to implement because of the lack of access and their typically rugged, remote location. It is unlikely that roadless areas would be the primary focus of future land management activities that involve road construction, road reconstruction, or tree cutting because of these logistical constraints. The possible exceptions to this generalization are areas that have a high priority for fuels treatment within CPZs, and areas with significant oil, gas or coal resources. Past and projected future land management activities in roadless areas have been and are expected to remain relatively low overall.

One of the defining characteristics of roadless areas is providing habitat for threatened, endangered, proposed, candidate and sensitive species and for those species dependent on large, undisturbed areas of land. Future projects or activities conducted in roadless areas would be designed to maintain roadless area characteristics to the extent possible and to be consistent with direction in the land management plan. Planning and implementation of projects or activities within roadless areas would include design criteria and/or mitigation measures aimed at conserving featured wildlife species and their habitats.

Effects Common To All Alternatives

This section provides the background for understanding the environmental consequences described in more detail in the next part of this evaluation, while minimizing the need to reiterate effects of activities common to all alternatives. A general discussion of potential impacts on animal species and their habitats from road construction and reconstruction, tree cutting and removal activities, and oil, gas and coal resource operations is presented. The extent to which these activities would be permissible varies by alternative. The general discussion on wildlife effects is followed by a more specific evaluation of the effects of each alternative to threatened and endangered species, sensitive species, management indicator species, migratory birds, and big game.

None of the alternatives by themselves will authorize any ground-disturbing activities. The extent to which these effects could be realized will depend on site-specific factors such as the type, location, timing, duration, frequency, and magnitude of the management actions. Forest plans contain objectives, standards and guidelines designed to maintain or improve habitat for terrestrial animals, specifically for threatened and endangered species, sensitive species, and MIS. Some of the potential impacts described programmatically here likely would be avoided or reduced through site-specific planning and implementation, which will include design criteria and/or mitigation measures aimed at conserving T&E, candidate and sensitive species and those dependent on large, undisturbed areas of land.

Road Construction, Reconstruction and Maintenance

Although the amount and conditions vary by alternative, all alternatives include provisions that would allow construction, reconstruction or maintenance of roads within roadless areas under certain circumstances. The potential impacts of roads on terrestrial species and their habitats are well-documented in the scientific literature. Comprehensive syntheses on this topic are available in Forman et al. (2003), Wisdom et al. (2000), Trombulak and Frissell (2000), and Montana Chapter of The Wildlife Society (1999). The following discussion of the effects of roads on terrestrial wildlife is organized into the following categories: habitat availability and effectiveness; habitat fragmentation; spread of non-native invasive species; and human-caused disturbance and mortality.

Habitat Availability and Effectiveness

Road construction and road use can affect habitat availability. Construction and reconstruction of roads contribute to a direct loss of habitat by removing existing vegetation and altering the substrate (Forman et al. 2003). Because forest roads, especially in roadless areas, tend to be narrow (approximately 12 to 14 ft. wide), their direct contribution to habitat loss on a landscape scale may appear minimal. However, the indirect effects discussed below may amplify the direct effect of habitat loss. In addition, the total extent of the landscape that is roaded should be considered, as that has consequences for overall habitat availability (Forman et al. 2003). The higher road densities that exist outside roadless and wilderness areas accentuate the function of undeveloped areas as refugia for terrestrial animal species by providing landscapes that are not readily subject to high levels of hunting or frequent human disturbances.

The indirect effects of road construction and use include noise and visual disturbance that can displace wildlife by causing them to avoid suitable habitats that would otherwise be available to them. This pattern, in which the habitat nearest the road is avoided, diminishing as distance from the road increases, is referred to as a reduction in habitat effectiveness (Thomas et al. 1979).

The reduction in habitat effectiveness can be substantial. With an open road density of two miles per square mile, half of all elk habitat within a square mile of land (640 acres) can be removed from use by elk (Lyon 1983). Once the original purpose of a forest road has been satisfied, many roads have been gated except for administrative use. However, it has been shown that even a limited amount of administrative traffic behind closed gates is sufficient to reinforce the avoidance behavior by elk (Lyon 1979).

Various avian species have demonstrated sensitivity to the presence of roads. In selection of nest sites, some bird species, including bald eagles (Anthony and Isaacs 1989), golden eagles (Fernandez 1993), and sandhill cranes (Norling et al. 1992) avoided areas close to roads. Lyon and Anderson (2003) noted that even light traffic (1-12 vehicles per day) on roads associated with natural gas development appeared to alter nesting behavior (nest initiation rates and movement from leks) of female sage-grouse.

Temporary roads present some of the same risks posed by forest roads, although the impacts generally would be of shorter duration. Some of the roads constructed for energy development are expected to be in use for several decades before they are decommissioned. Gated or temporary roads facilitate recreational uses, such as camping, hiking, mountain biking, and OHV use, which negatively influence elk, deer and bighorn sheep distributions and activities.

Road reconstruction can result in substantial changes in the kinds and amount of human uses in an area. For example, improving road surfacing or gradient to provide easy access for low clearance vehicles may increase the amount of human disturbance, traffic volume and/or speeds, resulting in increased wildlife impacts.

Fragmentation and Connectivity

Roads contribute to fragmentation of habitats in previously connected landscapes (Reed et al. 1996). As road densities increase, edge habitats increase and interior patches decrease, reducing habitat available to species requiring interior habitats. In addition to changing configuration and availability of interior habitats, edges created by roads can alter environmental conditions within interior habitats bordering roads, such as microclimate (e.g., increased temperatures, humidity, exposure to direct sunlight, etc) and humidity (Chen et al. 1996, Chen et al. 1993). Such changes may make these areas less hospitable to particular species (Marsh and Beckman 2004). This can facilitate incursions by nest parasites such as the brown-headed cowbird, reducing the nesting success of forest interior species. These edges may also favor generalist predators such as coyotes.

Fragmentation can lead to demographic fluctuations, inbreeding, loss of genetic variability, and local population extinctions (USDA Forest Service 2000, Findlay and Bourdages 2000). Roads can function as barriers to movement of species such as small mammals, reptiles (including turtles), snails, and salamanders (Trombulak and Frissell 2000, Swihart and Slade 1984, Oxley et al. 1974, Marsh et al. 2005, Baur and Baur 1990). This can result in substantial amounts of suitable habitat being unavailable to these species, as well as fragmenting populations into smaller subpopulations through loss of habitat connectivity (Shine et al. 2004). Roads have been shown to act as barriers to gene flow in a common frog (*Rana temporaria*) and can lead to significant genetic differentiation among populations (Reh and Seitz 1990). Forest fragmentation can increase the risk of local extirpations or extinctions (Noss and Cooperrider 1994).

Refugia are necessary for persistence of some wildlife species by providing source populations that can repopulate adjacent landscapes via dispersal and emigration. Mid- to large-sized carnivores characteristically have large home ranges and make long-distance movements and are particularly vulnerable to habitat fragmentation (Ruggiero et al. 1994). Roadless and wilderness areas serve a key role in providing refugia.

Spread of Non-native Invasive Species Associated with Roads

The construction of roads creates new edge habitat, and consequently, edge-dwelling species of plants and animals can be introduced into forest and grassland environments, adversely affecting interior-adapted species. Many non-native plants establish themselves preferentially along roadsides and in other disturbed habitats (Trombulak and Frissell 2000, Parendes and Jones 2000), as described in the Invasive Plants section. The establishment of these non-natives can lead to habitat loss, inter-specific competition, loss of quality forage, and lowered reproductive success of native wildlife.

Non-native disease organisms also affect native animal species and their habitats. For example, local die-offs of boreal toads have occurred in Colorado from infection by the chytrid fungus (*Batrachochytrium dendrobatidis*) (Loeffler 2001). While the environmental factors causing susceptibility to this pathogen are not well understood, it is reasonable to assume that increased road access could make boreal toad populations more susceptible to exposure to the chytrid fungus.

Human-caused Disturbance and Mortality

Roads facilitate human access into areas that would otherwise be difficult to reach. The presence of people can result in both direct and indirect impacts, such as increased mortality from traffic collisions and crushing, flight behavior and increased physiological stress, increased vulnerability to hunting and recreational shooting, and decreased reproductive success.

Winter range is often the primary limiting factor for wild ungulates (such as deer, elk, moose, bighorn sheep). Human disturbance during winter months can result in displacement and physiological stress that lead to lowered reproduction and survival rates of wild ungulates (Freddy 1986, Freddy et al.1986, Morrison et al. 1995).

Large numbers of animals are killed annually on roads, including NFS roads. Amphibians and reptiles appear to be especially vulnerable to roadkill for a variety of reasons (Andrews and Gibbons 2005, Mazerolle et al. 2005, Vestjens 1973, USDA Forest Service 2000).

Tree Cutting, Sale, and Removal

All alternatives have provisions that would allow tree cutting for certain purposes. These include reducing hazardous fuels; maintaining or restoring ecosystem function; improving habitat for threatened, endangered, proposed and sensitive species; providing for public health and safety; or for removal that is incidental to other purposes.

Within roadless areas, tree cutting generally would be done without roads, but road construction, reconstruction or maintenance could be allowed under certain circumstances under some alternatives. Felling trees could be masticated, chipped, or removed from the site. The slash (small trees, tops, and limbs remaining on-site after tree cutting) could be scattered or piled and then may be burned. Seeding of disturbed soils with native grasses and forbs could occur.

All tree cutting and removal treatments in roadless areas would comply with applicable forest plan standards and guidelines and other environmental protection requirements.

The effects of tree cutting and removal activities on wildlife habitats are organized into the following categories: habitat availability and effectiveness; habitat fragmentation; spread of non-native invasive species; and human-caused disturbance and mortality.

Habitat Availability and Effectiveness

Tree cutting, sale, and removal alter patch sizes, arrangement, tree species composition, and the total amount of habitat for terrestrial wildlife species. Vegetation management through timber harvest and use of wildfire can have beneficial effects when it is designed to create or maintain appropriate forest age-class diversity and habitat mosaics (Wisdom et al. 2000, USDA and USDI 2000). In fire-adapted ecosystems where fire suppression has altered plant species composition and the spatial arrangement, tree cutting to reduce fuels is a tool that can be used to improve habitat conditions and ecosystem sustainability. In ponderosa pine stands, for example, thinning followed by prescribed fire is a very important tool to maintain the older trees and the old growth characteristics that provide essential habitat for some wildlife species.

The length of time for stands to regenerate following tree cutting or prescribed fire varies depending on the productivity of the site. Response of trees and shrubs is more rapid on lower elevation sites and mesic sites, and much slower on high-elevation sites that are cold and dry. This influences the duration of effects and the length of time until the treatment would need to be repeated.

Reynolds et al. (1991) and Wiens et al. (2006) suggest that forest thinning can be beneficial in producing and maintaining the desired conditions to sustain goshawks and their prey species. Thinning densely stocked conifer stands has been found to decrease the abundance of some bird species while favoring others (Hayes et al. 2003).

Some species of bats appear to respond favorably to thinning in forested ecosystems if snags or caves are available for roosting (Loeb et al. 2002). Patriquin and Barclay (2003) documented differential responses of bats depending on species. For example, bat species that glean prey from surfaces did not forage in clear-cut plots whereas aerial foragers frequented areas along the forest edges.

Opening the forest canopy can increase the production of food resources: such as acorns and berries: beneficial to birds, black bears (Mitchell and Powell 2003) and other fructivores. In spruce-fir and lodgepole pine forests, thinning reduces snowshoe hare populations, at least in the short-term, which in turn negatively affects Canada lynx (Ruediger et al. 2000), goshawks, and other predators.

Fragmentation and Connectivity

In terrestrial ecosystems, the edge effect of timber harvest can extend substantial distances from the harvest area. Research over the past two decades has shown that creating habitat edge negatively affects many wildlife species (Noss and Cooperrider 1994). Edge effects include changes in air and soil temperature, wind velocity, radiation and soil and air moisture in the adjacent forest stands (Chen et al. 1995). Further, creation of edge due to harvest can favor species such as cowbirds or starlings, which can out-compete the indigenous species (Rosenberg et al. 1999, Baker and Lacki 1997, Robinson et al. 1995). Edge effect is more pronounced for moist closed-canopy forests, such as mature spruce-fir forests, than forest that typically have an open canopy structure, such as ponderosa pine.

As with roads, fragmentation from timber harvest can create movement barriers to some species, which may isolate populations into smaller subpopulations subject to inbreeding, loss of genetic variability, and local population extinctions. Amphibian species, because of their temporally and spatially dynamic populations, may be especially prone to local extinction resulting from human-caused fragmentation (Gibbs 1998). Many amphibian species have been found in lower densities in some timber harvest areas as compared to mature, unmanaged forests (deMaynadier and Hunter, Jr. 1999, deMaynadier and Hunter, Jr. 1998, Ash 1997, Petranka et al. 1993).

Spread of Non-native Invasive Species Associated with Vegetation Management

Vegetation management and associated ground-disturbing activities can provide favorable conditions for establishment of invasive species. Opening or removal of the canopy increases the sunlight reaching the interior forest floor, which can accelerate rates of spread of invasive plants.

Introduction and movement of invasive species can also be enhanced by equipment, clothing and other human-related transport associated with tree cutting activities. This may include invasive plants, invasive aquatic animals (e.g., zebra mussels) and pathogens (e.g., chytrid fungus) that can also have dramatic effects on native wildlife.

Human Access and Disturbance

Disturbance associated with tree cutting activities can displace animals that previously occurred on or in proximity to the treatment locations. Felling of trees and snags can destroy the nests of birds and squirrels and roost sites for bats.

Minerals and Oil, Gas and Coal Resource Operations

The analysis area contains salable, leasable, and locatable mineral resources. Locatable minerals, such as gold and silver, are managed under the General Mining Law of 1872, as amended. Removal of salable mineral resources (i.e., sand, stone, gravel, pumice, pumicite, cinders and clay) from roadless areas is typically very limited due to a lack of commercial interest.

Although it varies by commodity, surface use associated with the exploration and development of leasable minerals generally requires access and haul roads, open pits, facilities, power lines, pipelines, and communication sites. The alternatives differ in the extent to which new road construction will be permitted for exploration and development of leasable minerals. Under some alternatives, no surface occupancy stipulations would be required for new leases in roadless areas. Exceptions to the general prohibitions in the North Fork coal mining area also vary by alternative.

Oil and gas and mining operations can remove or reduce habitat, increase fragmentation, facilitate new introductions or increase the spread of non-native invasive species, increase disturbance, and increase the potential for road-related mortality of wildlife due to vehicle collisions.

Linear Construction Zones (LCZs)

LCZs are areas used for motorized transport to install or maintain a linear facility such as an oil or gas pipeline, electrical power line, telecommunications line, or water conveyance structure, such as a ditch or canal. Some of the alternatives place prohibitions or restrictions on development of LCZs within roadless areas.

Development of LCZs can remove or degrade habitat, increase fragmentation, facilitate new introductions or increase the spread of non-native invasive species, and increase noise and human-caused disturbance of terrestrial wildlife. The linear feature constructed, reconstructed or maintained by use of an LCZ, such as a power line, can essentially be permanent features on the landscape.

Alternative 1

Based on the general prohibitions and limitations on road construction, tree cutting and removal, and oil, gas or coal resource operations in IRAs, the 2001 Roadless Rule would provide a high level of protection to terrestrial wildlife, including TES species, MIS, and migratory bird species, compared to the other alternatives. Under this alternative, new road construction within IRAs would be very limited and projected at the lowest of the alternatives.

Tree cutting could be used as a tool to restore or enhance habitat for T&E or sensitive species, where needed, projected as less than 100 acres per year of this activity. Use of prescribed fire is the most common method currently used for wildlife habitat improvement, and there would not be any restrictions on its use under this alternative. Under this alternative, additional acres of tree cutting are projected to occur in non-roadless acres (those are not included in the IRA inventory) managed in accordance with the respective forest plan.

There is no prohibition on construction and maintenance of LCZs, making the 2001 Roadless Rule less protective of wildlife in this respect than Alternatives 2 or 4. Most of these would be for oil and gas pipelines and electrical or telecommunications lines, with relatively few for water conveyance.

The road construction and tree cutting allowed under the exceptions and that exist in the substantially altered acres, along with the development of LCZs could potentially have detrimental effects on terrestrial wildlife. However, the magnitude of this effect likely would be small, and is not likely to

measurably reduce the amount of habitat, increase habitat fragmentation, or otherwise adversely impact terrestrial wildlife. Roads constructed for development of existing oil and gas and mineral resources, and LCZs are of most concern because they likely would be in place for a long duration. Site-specific effects would depend on the location, timing, duration, and frequency of the ground-disturbing activities, which would be designed and conducted in accordance with the applicable direction in forest plans.

Endangered and Threatened Species and Critical Habitat

The Pawnee montane skipper and Mexican spotted owl inhabit ponderosa pine forests that have frequent, low-intensity fire regimes, and could benefit from fuels treatments, if applied to the appropriate areas and at the proper time of year. Tree removal could be beneficial where needed as a pre-treatment to reduce fuel loads and enable application of prescribed fire. Road construction could adversely modify small acreages of critical habitat for these species by removing habitat from the road prism. Road construction and development associated with existing oil, gas, and coal leases could remove some habitat and cause displacement, although site-specific analysis and design likely would reduce those potential impacts.

It is anticipated that prescribed burning would occur in many of the IRAs that contain the lower-elevation riparian habitats that are used by the Preble's meadow jumping mouse. It is important to avoid or minimize habitat alteration and disturbance during the short period when this species is not hibernating, as well as to consider protective measures for the species and its habitat during hibernation. These would be evaluated during site-specific project planning. In the long term, reducing the risk of uncharacteristically severe wildfires through prescribed fire or mechanical treatment would be beneficial for this species.

For all but one of the IRAs containing habitat for the southwestern willow flycatcher, no tree cutting is projected to occur. One exception is an area where fuels treatments within a wildland urban interface might be proposed, which would be unlikely to impact the riparian willow habitat used by this species.

Lynx habitat occurs within most IRAs. There is at least a low likelihood for some tree cutting activities in many of those IRAs. Tree cutting would be primarily for the purpose of fuels treatments. Fuels treatments that occur in the spruce-fir habitats used by lynx could reduce available snowshoe hare prey, which would adversely affect lynx. Under the forest plans as amended by the Southern Rockies Lynx Amendment, those projects would apply the management guidance for lynx in their design, and would be subject to the caps on the total acreage of fuels treatments within the WUI. All forest plans include management direction to maintain lynx habitat connectivity, which would remain in effect.

A review of the IRAs that contain known populations or habitat for the Uncompahgre fritillary butterfly shows that very little tree-cutting would be expected in those IRAs within the planning horizon.

Overall, based on the protective direction that would apply to the 4.2 million acres of IRAs, and the low level and intensity of tree cutting, LCZ construction, and minerals and oil and gas development under this alternative, the anticipated effects are mostly beneficial, with the potential for minor, local adverse effects to the Southwestern willow flycatcher, Mexican spotted owl, Pawnee montane

skipper, Uncompahgre fritillary butterfly, Canada lynx, and Preble's meadow jumping mouse, and to designated critical habitat for the Mexican spotted owl and Preble's meadow jumping mouse.

Sensitive Species

Sensitive species associated with wetland, stream, lake, and waterfall habitats are boreal toad, northern leopard frog, wood frog, river otter, Nokomis fritillary butterfly, Susan's purse-making caddisfly, Hudsonian emerald, Rocky Mountain capshell snail, and black swift. Road construction in association with existing energy leases would have the greatest potential for adverse effects, including crushing and creating movement barriers for amphibians and the capshell snail, introducing sediment or chemicals into aquatic habitats, and by providing avenues for the spread of non-native invasives and disease organisms. Because of the limited amount of road construction anticipated under the 2001 Roadless Rule, the probability of adverse effects is low.

Sensitive species associated with lower elevation coniferous forests include flammulated owl, Lewis' woodpecker, olive-sided flycatcher, bald eagle, and northern goshawk. Large diameter trees and snags are used by these species for nesting, perching and foraging. These lower-elevation forests are typically sustained by frequent low-intensity ground fires. Treatment of unnaturally heavy fuels could be beneficial to maintain habitat for these species over time. The emphasis on removal of small diameter, rather than large diameter trees would help to create favorable habitat conditions for these species. The low level of tree cutting under this alternative would have only minor effects on these species.

Sensitive species associated with subalpine conifer forests include boreal owl, American marten, and pygmy shrew. These forests typically have infrequent but higher intensity fires, and treatment of fuels is generally not needed to restore natural conditions. Large diameter trees, snags and down logs, and moist microclimate are important habitat components for these species. Because of the low level of vegetation treatment expected under this alternative, there is a low risk of adverse effects from these actions.

Purple martin is strongly associated with mature aspen stands. Several of the roadless areas where this species is known to occur on the Grand Mesa, Uncompahgre and Gunnison National Forests and the White River National Forest have existing oil and gas, methane, and natural gas developments within them, and there is potential for additional development to occur, which could have local adverse effects on this species if its habitat is removed.

The white-tailed ptarmigan inhabits alpine tundra and adjoining subalpine forest where willow is present. Most fuels treatments likely would occur at lower elevations, but oil and gas development could cause impacts, although at a low level under this alternative.

Sensitive species inhabiting cliffs, caves, talus and canyonlands include peregrine falcon, bighorn sheep, spotted bat, fringed myotis, hoary bat, Townsend's big-eared bat, wolverine, and American hog-nosed skunk. Overall, only minor disturbances to these species and their habitats would occur under this alternative.

Sensitive species inhabit grassland and meadow habitats include: mountain plover, northern harrier, ferruginous hawk, loggerhead shrike, Gunnison's prairie dog, swift fox, and kit fox. These habitats within IRAs would largely be protected, but could be impacted by road construction associated with oil, gas or coal development or incidental to other management activities. These impacts likely would be minimal and localized.

Greater sage-grouse, Gunnison sage-grouse, Columbian sharp-tailed grouse, sage sparrow, and Brewer's sparrow inhabit shrublands dominated by sagebrush. As with the grassland habitats, there could be some local impacts on individuals or their habitats, but effects are expected to be minor under this alternative.

Management Indicator Species

Existing forest plans are designed to maintain or improve the population and habitat trends for MIS. This alternative could result in some positive changes in the projected population trends of MIS, and in no case would reduce the probability of maintaining viable populations of any species. There is some limited potential for local habitat reduction and displacement as a result of road construction, LCZs, and other management activities. Due to the low level of development in IRAs, any negative effects on habitat or species would not likely be measureable. Forest plan standards and guidelines would be applied as part of project design, in order to meet forest plan objectives for MIS.

Migratory Birds

The Forests would continue to adhere to requirements under the Migratory Bird Treaty Act and the Executive Order (EO 13186) for protection of migratory birds. Project level design and implementation would evaluate potential effects to migratory birds and seek to promote their conservation.

The status and protection of important bird areas (IBAs) within roadless areas would remain the same as the existing condition. Previous project-level environmental analysis has not identified any major threats to those IBAs from roads, road uses, or land use actions that have been authorized in those areas.

Big Game

The general prohibition on road construction and reconstruction within IRAs would be beneficial to big game by providing secure habitat throughout the year. This alternative is projected to provide the lowest level of tree cutting of any alternative, which could limit opportunities for big game habitat enhancement. This is of most concern for winter ranges where tree cutting in conjunction with prescribed fire would be desirable. Without the ability to reduce fuel loadings, for example in pinyon-juniper forests, application of prescribed fire may not be possible.

Alternative 2

This alternative proposes limited exceptions to the prohibition against road construction. The projected road construction and reconstruction under this alternative is similar to Alternatives 1 and 4, and much lower than under Alternative 3. This alternative allows for more tree cutting to improve forest health, reduce fuels, and enhance habitat for T&E and sensitive species than Alternatives 1 and 4, but on fewer acres and for more limited purposes than Alternative 3. Vegetation management involving tree cutting could be beneficial for species that inhabit lower elevation forests with frequent low-intensity fire regimes. Prescribed fire likely would continue to be the primary tool used to improve terrestrial wildlife habitat.

This alternative also identifies upper tier areas within the CRAs. The CRAs selected for upper tier are not within CPZs, do not have existing oil and gas leases within them, and provide excellent fish and wildlife habitat. Upper tier CRAs allow fewer exceptions to the prohibitions applicable to road construction, and tree cutting, and would provide a high level of resource protection.

The 8,300 acres of ski area terrain that was excluded from CRAs include 6,600 acres in ski areas under existing permits and 1,700 acres outside permit boundaries but within forest plan allocations for future ski area development (see Developed Ski Areas section in Chapter 3). Under this alternative, all of the acres eliminated from the CRAs would be managed according to their respective forest plans. Three areas are of concern for wildlife habitat connectivity: Williams Fork Ptarmigan Adjacent (Loveland ski area on Arapaho-Roosevelt National Forest), Game Creek (Vail ski area on White River National Forest), and Porcupine Creek (Arapaho Basin ski area on White River National Forest). Williams Fork is a critical connecting land bridge for large carnivores and other wide-ranging species across I-70 between the north and south parts of the state. Game Creek on the west side of Vail is a lynx linkage area (Dowd Junction), deer migration corridor, and elk winter range that is experiencing growing recreational use. The Porcupine Creek roadless area provides a critical movement area for wildlife between the Arapaho Basin and Keystone ski areas and is identified as a lynx linkage area (Loveland Pass linkage). Any future development within these areas will be subject to project-level analysis that would carefully consider impacts on habitat connectivity.

Endangered and Threatened Species

The Pawnee montane skipper and Mexican spotted owl could benefit from fuels treatments that restored more natural conditions to their ponderosa pine habitat. Tree cutting, generally without roads, is allowed for certain purposes under this alternative. Except in upper tier CRAs, tree cutting, sale, and removal is allowed to treat hazardous fuels within the CPZ, restore ecosystems, and to improve T&E and sensitive species habitats. Temporary road construction and oil, gas or coal development could remove some habitat and cause displacement, although site-specific analysis and design likely would reduce those potential impacts.

For all but one of the CRAs containing habitat for the southwestern willow flycatcher, no road construction or tree cutting are projected to occur during the planning horizon. The one exception may have fuels treatments within a CPZ, although such treatments would be unlikely to impact the riparian willow habitat used by this species.

It is anticipated that fuels treatments and possible associated temporary road construction would occur in many of the CRAs that contain Preble's meadow jumping mouse habitat. This species is vulnerable to habitat alteration and disturbance during the short period during summer when it is not hibernating, and protective measures are also needed to minimize mortality risk when the species is hibernating. It is expected that project design would attempt to avoid the low-elevation riparian habitat of this species, but that may not always be possible. Over the long term, however, reducing the risk of uncharacteristically severe wildfires through prescribed fire or mechanical treatment would be beneficial for this species.

Most of the CRAs provide lynx habitat, and there is at least a low likelihood that some road construction and tree cutting activities could occur in a number of those CRAs, primarily for the purpose of fuels treatments. Fuels treatments that occur in the spruce-fir habitats used by lynx could reduce available snowshoe hare prey, which would adversely affect lynx. However, those projects would be subject to the management direction under the forest plans as amended by the Southern Rockies Lynx Amendment, including acreage caps for fuels treatments in WUI, which will limit the amount of impact. All forest plans also include management direction to maintain lynx habitat connectivity, which would remain in effect.

Some of the CRAs overlap with landscape linkages identified for the Canada lynx. Under this alternative, where the forest plan would allow further development of these areas, the roadless prohibitions would apply. Because several areas adjacent to ski areas were removed from CRAs, this elevates the risk to lynx somewhat as compared to the 2001 Roadless Rule. However, under the forest plans as amended by the Southern Rockies Lynx Amendment, any projects would have to be designed in a way that maintains habitat connectivity.

Fourteen CRAs contain populations or potential habitat for the Uncompahgre fritillary butterfly. No road construction or tree-cutting are projected to occur, except in three of those CRAs, where a fuels treatment, watershed restoration project, and road access to a private land inholding could occur within the next 15 years. However, these projects are unlikely to occur in the high-elevation habitat of this species.

Overall, the level of protection for the 4.19 million acres of CRAs under the Colorado rule is higher than under current forest plan direction, with a generally low level and low intensity of road construction, tree cutting, oil and gas development, and LCZ development. The anticipated effects are mostly beneficial, with the potential for some minor, short-term adverse impacts to the Southwestern willow flycatcher, Mexican spotted owl, Pawnee montane skipper, Uncompahgre fritillary butterfly, Canada lynx, and Preble's meadow jumping mouse, and to designated critical habitat for the Mexican spotted owl and Preble's meadow jumping mouse.

Sensitive Species

The effects from Alternative 2 are similar to those described previously for the 2001 Roadless Rule, although the exceptions allow higher levels of road construction and tree cutting in areas surrounding cities and towns, for oil, gas or coal development, and 1,700 acres that might be added to ski area permits. The prohibition on development of LCZs within CRAs makes Alternative 2 more protective than Alternatives 1 or 3, the existing forest plans.

Sensitive species associated with wetland, stream, lake and waterfall habitats are boreal toad, northern leopard frog, wood frog, river otter, Nokomis fritillary butterfly, Susan's purse-making caddisfly, Hudsonian emerald, Rocky Mountain capshell snail, and black swift. Road construction would have the greatest potential to have negative effects on these species and their habitats. Because of the limited circumstances under which roads could be constructed, the potential for adverse impacts is low.

Vegetation treatments to reduce fuels within lower elevation conifer forests could have long-term benefits to flammulated owl, Lewis's woodpecker, olive-sided flycatcher, bald eagle, and northern goshawk, by reducing the threat of uncharacteristically severe wildfires.

Tree cutting and removal and road construction and reconstruction in subalpine forests would be expected to occur at a low level. This would create a low risk of adverse impacts on boreal owl, American marten, and pygmy shrew. There could be local impacts on these species primarily from increasing edge effects and fragmentation.

Several of the CRAs where the purple martin is known to occur on the Grand Mesa, Uncompahgre and Gunnison National Forests and the White River National Forest have existing oil and gas, methane, and natural gas development within them, and there is potential for additional development to occur, which could have local adverse effects on this species if the activities occur in its aspen habitat.

The white-tailed ptarmigan inhabits alpine tundra and adjoining subalpine forest where willow is present. Ski area expansion and oil and gas development could cause some impacts, although the extent of area affected in a statewide context would be at a low level under this alternative.

Sensitive species inhabiting cliffs, caves, talus and canyonlands include peregrine falcon, bighorn sheep, spotted bat, fringed bat, Townsend's big-eared bat, wolverine, and American hog-nosed skunk. Overall, only minor disturbances to these species and their inherently stable habitats would be expected.

Sensitive species inhabiting grassland and meadow habitats include mountain plover, northern harrier, ferruginous hawk, loggerhead shrike, swift fox and kit fox. These habitats would largely be protected but could be impacted by road construction incidental to other management activities. These impacts would be minimal and localized.

Sensitive species that inhabit shrublands include greater sage-grouse, Gunnison sage-grouse, Columbian sharp-tailed grouse, sage sparrow, and Brewer's sparrow. Although there could be some local impacts on individuals or their habitats, effects are expected to be minor.

Management Indicator Species
Existing forest plans are designed to maintain or improve the population and habitat trends for MIS populations. Given the large acreage afforded roadless protection under this alternative, any changes in population trends for MIS likely would be an increase above current forest plan projections.

Some adverse habitat modifications or species impacts could occur from the exceptions allowing temporary roads, tree cutting activities, and oil, gas or coal resource exploration and development, as described previously. The risks are associated with direct habitat loss, reduction in habitat effectiveness, fragmentation, increased risk of establishment and spread of invasive species and pathogens, and human-caused disturbance and mortality.

Migratory Birds
The Forests would continue to adhere to requirements under the Migratory Bird Treaty Act and the Executive Order for protection of migratory birds. Similar to the 2001 Roadless Rule, the status and protection of important bird areas within roadless areas would not change. There would be no increased risk to IBAs existing in CRAs.

Big Game
The general prohibition on road construction and reconstruction and development of LCZs within roadless areas would be beneficial to big game by providing secure habitat throughout the year. Exceptions for tree cutting in non-upper tier CRAs would allow for ecosystem restoration that may also benefit big game habitat in some areas, and the use of prescribed burning would be allowed in all CRAs.

Alternative 3
Alternative 3 would manage roadless areas (IRAs and CRAs) within the analysis area based on direction in the forest plans for the eight national forests. Under the forest plans, roadless areas fall into various land management allocations, some of which would maintain their roadless area characteristics and some that would not.

The annual miles of road construction and reconstruction are higher than under the other alternatives.

The higher levels of road construction and vegetation management under Alternative 3 would allow habitat reduction, fragmentation and disturbance of terrestrial wildlife as discussed previously. The specific location and design of these activities would influence the actual effects and would be addressed during project planning.

In contrast to the other alternatives, the roads allowed under Alternative 3 may be added permanently to the forest road system. However, based on recent trends on NFS lands in Colorado, it is likely that many of the roads would be temporary and closed to public motorized use, and would be decommissioned after completion of the activity. The increased mileage of road construction and reconstruction under this alternative would facilitate recreation uses such as hiking, biking, and horseback riding in the backcountry. This could increase the duration of impacts related to human disturbance to terrestrial species and habitat.

The increased flexibility for vegetation management under this alternative could result in improved habitats for species utilizing early successional stages. Reducing fuel loading in areas of high importance to T&E and sensitive species could be beneficial by reducing the risk of uncharacteristically severe wildfires.

The amount of road construction associated with oil, gas or coal resource exploration and development is predicted to be higher under Alternative 3 than the other alternatives. Stipulations would be set for each lease, in contrast to Alternatives 2 and 4 that specify no surface occupancy stipulations for future leases in upper tier CRAs. In the long term, Alternative 3 would allow the most impact on wildlife habitat within IRAs or CRAs as a result of oil, gas or coal development.

Roadless areas within ski area permit boundaries and within the forest plan management allocation for future ski area development if added to the ski area permits would be managed in accordance with the forest plan direction. Alternative 3 could result in some adverse effects on lynx habitat connectivity, deer migration corridors, elk winter range, and other habitats of concern in those areas. Project planning likely would incorporate design criteria that would minimize adverse impacts.

The much higher level of anticipated road construction, vegetation management and other activities under Alternative 3 could result in adverse impacts on key wildlife habitats. However, the current forest plans were designed to ensure that viable populations of wildlife would be maintained through time across the forest planning area. Project analysis and design would address the location, timing, duration, and magnitude of activities to minimize any possible adverse effects.

Endangered and Threatened Species and Critical Habitat

Under the current Pike-San Isabel forest plan, current management direction is less restrictive for all roadless areas where the Pawnee montane skipper and its habitat are known to occur than under the other three alternatives. For the Mexican spotted owl, all of the roadless areas on the Pike-San Isabel, GMUG and San Juan National Forests with known occurrences or suitable habitat have less restrictive management direction under those forest plans, while the management direction on the Arapaho-Roosevelt, Rio Grande and White River forest plans is generally comparable to Alternatives 1 or 2. If applied in appropriate areas and at the proper time of year, these two species could benefit from fuels treatments and the use of prescribed fire that restored more natural conditions. This would be allowed in many areas. Road construction could adversely modify small acreages of habitat for these species by removing habitat from the road prism. Site-specific analysis and design could likely reduce potential impacts to these two species.

Current management direction for the roadless areas containing habitat for the southwestern willow flycatcher is generally comparable to the other alternatives, with less restrictive direction in some portions of the roadless areas. Thus there is a somewhat higher potential for adverse impacts to these species under existing forest plans. Again, site-specific analysis and design could likely reduce potential impacts to the specific habitats used by these two species.

Lynx habitat occurs within most roadless areas, and for a number of those roadless areas there is the potential for road construction, tree cutting and other developments and activities under the current forest plans. Fuels treatments that occur in the spruce-fir habitats used by lynx could reduce available snowshoe hare prey, which would adversely affect lynx. Under the forest plans as amended by the Southern Rockies Lynx Amendment, projects must be consistent with the management guidance for lynx in their design, and would be subject to specific caps on the total acreage of fuels treatments in WUI areas. All forest plans include management direction to maintain lynx habitat connectivity, which would remain in effect.

Under the current forest plans, vegetation management and associated road construction could occur in many of the roadless areas that contain the lower-elevation riparian habitats that are used by the Preble's meadow jumping mouse. It is important to avoid or minimize habitat alteration and disturbance during the short period when this species is not hibernating. These would be considerations during site-specific project planning. At the same time, reducing the risk of uncharacteristically severe wildfires would be beneficial for this species in the long term.

A review of the roadless areas that contain known populations or habitat for the Uncompahgre fritillary shows much less restrictive management direction under the current forest plans for the GMUG and Pike-San Isabel National Forests, with generally comparable direction for the Rio Grande and White River forest plan, compared with the other alternatives.

Overall, based on the activities allowed and projected to occur in roadless areas, Alternative 3 may affect but is not likely to adversely affect any T&E species. In addition, Alternative 3 would not likely result in adverse modification of designated critical habitat for the Mexican spotted owl or Preble's meadow jumping mouse. There is a substantially increased risk of negative effects or adverse habitat modification on those forests with older forest plans: the GMUG; Pike-San Isabel; Manti-La Sal; and San Juan National Forests.

Sensitive Species

Potential effects on sensitive species would be higher than under the other alternatives, based on the increased level of development in roadless areas. As with any of the alternatives, project level analysis and design likely would minimize the potential impacts to sensitive species.

Sensitive species associated with wetland, stream, lake and waterfall habitats are boreal toad, northern leopard frog, wood frog, river otter, Nokomis fritillary butterfly, Susan's purse-making caddisfly, Hudsonian emerald, Rocky Mountain capshell snail, and black swift. Road construction would have the greatest potential to have negative effects on these species and their habitats.

As described for the other alternatives, vegetation treatments to reduce fuels and restore ecosystem structure and function within lower elevation conifer forests could have long-term benefits to flammulated owl, Lewis' woodpecker, olive-sided flycatcher, bald eagle, and northern goshawk if designed and implemented appropriately.

Vegetation treatment and road construction in subalpine forests could have local adverse impacts on boreal owl, American marten, and pygmy shrew. These impacts would be attributed to the potential for increased edge effects, fragmentation and spread of invasive species associated with the much higher level of development allowed within roadless areas under some forest plans.

Several of the areas where the purple martin is known to occur on the Grand Mesa, Uncompahgre and Gunnison National Forests and the White River National Forest have existing oil and gas, methane, and natural gas development within them, and there is potential for additional development to occur, which could have local adverse effects on this species if the activities occur in its aspen habitat.

The white-tailed ptarmigan inhabits alpine tundra and adjoining subalpine forest where willow is present. There is a higher potential under this alternative for adverse impacts to this species.

Sensitive species inhabiting cliffs, caves, talus and canyonlands include peregrine falcon, bighorn sheep, spotted bat, fringed myotis, hoary bat, Townsend's big-eared bat, wolverine, and American hog-nosed skunk. Overall, only minor disturbances to these species and their habitats would be expected.

Sensitive species inhabiting grassland and meadow habitats include mountain plover, northern harrier, ferruginous hawk, loggerhead shrike, swift fox and kit fox. These habitats could be impacted by road construction and other development and activities within roadless areas. These impacts likely would be localized and would be evaluated during site-specific analyses.

Sensitive species that inhabit shrublands include greater sage-grouse, Gunnison sage-grouse, Columbian sharp-tailed grouse, sage sparrow and Brewer's sparrow. The forest plans could allow some local impacts on individuals or their habitats, but project planning and design likely would minimize the effects.

Based on the effects on sensitive species and habitats described for this alternative, Alternative 3 may adversely impact individuals but would not likely result in a loss of viability or cause a trend toward federal listing of any sensitive species on the national forests in Colorado.

Management Indicator Species

Existing forest plans are designed to maintain or improve the population and habitat trends for MIS populations. This alternative would not change current direction, and therefore there would not be any changes expected in habitat or population trends projected under the current forest plans.

Some local adverse habitat modifications or species impacts could occur from road construction and reconstruction, tree cutting activities, and oil, gas or coal resource exploration and development, and development of LCZs, as described previously. The risks are associated with direct habitat loss, reduction in habitat effectiveness, fragmentation, increased risk of establishment and spread of invasive species and pathogens, and human-caused disturbance and mortality.

Migratory Birds

The status and protection of important bird areas within roadless areas differ with Alternative 3 with respect to one designated IBA. The Alfred M. Bailey Bird Nesting Area IBA occurs within the Eagles Nest wilderness Area but adjacent to the Maryland Creek Roadless Area on the White River National Forest. As described in the Affected Environment section, this IBA provides one of the most diverse bird breeding sites in Colorado. Because the actual IBA is within the wilderness area outside the roadless area, this potential impact would not occur directly at the IBA location. However, under

Alternative 3, the Maryland Creek Roadless Area would be managed for general forest products, and timber harvesting could indirectly affect the IBA.

The Forest Service would continue to conserve migratory birds through application of forest plan management direction and project planning and design.

Big Game
Several of the big game species are also forest plan MIS. As described above, management direction in the forest plans is designed to maintain or increase habitat for MIS. Over time, the increased level of development in roadless areas would be expected to reduce security habitat and diminish backcountry hunting opportunity from current levels.

Alternative 4
Alternative 4 also has the same general prohibitions and exceptions and Alternative 2, with an additional 1.6 million acres of upper tier acres designated.

The estimated miles of road construction and reconstruction is similar to Alternatives 1 and 2 and much lower than under Alternative 3. The amount of tree cutting is estimated to be intermediate between Alternatives 1and 2 and much lower than under Alternative 3.

Use of prescribed fire is the most common method currently used for wildlife habitat improvement and there would not be any restrictions imposed on its use under this alternative.

Endangered and Threatened Species and Critical Habitat
The effects of Alternative 4 on T&E species would be similar to Alternative 2 because of the identical prohibitions and exceptions within roadless areas. Because this alternative contains more acres within the upper tier CRAs, there is a lower risk of adverse effects to T&E species as a result of temporary road construction and other resource management activities in these areas than under the other alternatives.

For the Mexican spotted owl, the removal of the provision allowing tree cutting, sales or removal for habitat improvement of threatened, endangered or sensitive species in the large acreage of upper tier roadless areas may result in higher risk over the long term of adverse impacts from uncharacteristically severe wildfires in its lower elevation montane forest habitat.

None of the CRAs that provide habitat for Pawnee montane skipper are included in the upper tier, so the effects are identical to Alternative 2 for this species. This species could benefit from fuels treatments that restored more natural conditions to its ponderosa pine habitat. Temporary road construction and oil, gas or coal development could remove some habitat and cause displacement, although site-specific analysis and design likely would reduce those potential impacts.

For all but one of the CRA containing habitat for the southwestern willow flycatcher, no road construction or tree cutting are projected to occur during the planning horizon. The one exception might have fuels treatments within a CPZ, although such treatments would be unlikely to impact the riparian willow habitat used by this species.

Fuels treatments and possible associated temporary road construction could occur in CRAs that contain Preble’s meadow jumping mouse habitat. This species is vulnerable to habitat alteration and disturbance during the short period when it is not hibernating. It is expected that project design would

attempt to avoid or minimize these impacts. Over the long term, reducing the risk of uncharacteristically severe wildfires by reducing fuel loadings would be beneficial for this species.

Most of the CRAs provide lynx habitat, and there is at least a low likelihood that some road construction and tree cutting activities could occur in a number of those CRAs, primarily for the purpose of fuels treatments. Fuels treatments that occur in the spruce-fir habitats used by lynx could reduce available snowshoe hare prey, which would adversely affect lynx. However, those projects would be subject to the management direction under the forest plans as amended by the Southern Rockies Lynx Amendment, including acreage caps for fuels treatments in WUI, which will limit the amount of impact. All forest plans also include management direction to maintain lynx habitat connectivity, which would remain in effect.

Some of the CRAs overlap with landscape linkages identified for the Canada lynx. The protection afforded these areas under this alternative would be beneficial. Because several areas adjacent to ski areas were removed from CRAs, this elevates the risk to lynx somewhat as compared to the 2001 Roadless Rule. However, under the forest plans as amended by the Southern Rockies Lynx Amendment, any projects would have to be designed in a way that maintains habitat connectivity.

There is only a low likelihood of any road construction or tree cutting in one or two of the CRAs that contain known populations or habitat for the Uncompahgre fritillary butterfly.

Overall, the level of protection for the 4.2 million acres of roadless areas along with the large acreage included as upper tier acres, would result in a low level and intensity of road construction, tree cutting, oil and gas development, and LCZ development. The anticipated effects are mostly beneficial, with the potential for some minor, local, short-term, adverse impacts to the Southwestern willow flycatcher, Mexican spotted owl, Pawnee montane skipper, Uncompahgre fritillary butterfly, Canada lynx, and Preble's meadow jumping mouse, and to designated critical habitat for the Mexican spotted owl and Preble's meadow jumping mouse.

Sensitive Species

Alternative 4 will have similar effects as Alternatives 1 and 2. Because this alternative contains significantly more acreage within upper tier CRAs, there is a lower risk of adverse effects as a result of temporary road construction and other resource management activities to sensitive species in these areas. However, the removal of the provision allowing tree cutting, sales or removal for habitat improvement of threatened, endangered or sensitive species may result in higher risk over the long term of adverse impacts from uncharacteristically severe wildfires in lower elevation montane forests.

Sensitive species associated with wetland, stream, lake and waterfall habitats are boreal toad, northern leopard frog, wood frog, river otter, Nokomis fritillary butterfly, Susan's purse-making caddisfly, Hudsonian emerald, Rocky Mountain capshell snail, and black swift. Road construction would have the greatest potential to have negative effects on these species and their habitats. Because of the limited circumstances under which roads could be constructed, the potential for adverse impacts is low.

Vegetation treatments to reduce fuels within lower elevation conifer forests could have long-term benefits to flammulated owl, Lewis's woodpecker, olive-sided flycatcher, bald eagle, and northern goshawk, by reducing the threat of uncharacteristically severe wildfires.

Tree cutting and removal and road construction and reconstruction in subalpine forests would be expected to occur at a low level. This creates a low risk of adverse impacts on boreal owl, American marten, and pygmy shrew. There could be local impacts on these species from increasing edge effects and fragmentation.

Several of the CRAs where the purple martin is known to occur on the Grand Mesa, Uncompahgre and Gunnison National Forests and the White River National Forest have existing oil and gas, methane, and natural gas development within them, and there is potential for additional development to occur, which could have local adverse effects on this species if the activities occur in its aspen habitat.

The white-tailed ptarmigan inhabits alpine tundra and adjoining subalpine forest where willow is present. Ski area expansion and oil and gas development could cause some impacts, although the extent of area affected in a statewide context would be at a low level.

Sensitive species inhabiting cliffs, caves, talus and canyonlands include peregrine falcon, bighorn sheep, spotted bat, fringed bat, Townsend's big-eared bat, wolverine, and American hog-nosed skunk. Overall, only minor disturbances to these species and their habitats would be expected.

Sensitive species inhabiting grassland and meadow habitats include mountain plover, northern harrier, ferruginous hawk, loggerhead shrike, swift fox and kit fox. These habitats would largely be protected but could be impacted by road construction incidental to other management activities. These impacts would be minimal and localized.

Sensitive species that inhabit shrublands include greater sage-grouse, Gunnison sage-grouse, Columbian sharp-tailed grouse, sage sparrow, and Brewer's sparrow. Although there could be some local impacts on individuals or their habitats, effects are expected to be minor.

Management Indicator Species

Alternative 4 will have similar effects to Alternatives 1 and 2. Given the large acreage afforded roadless protection under this alternative, any changes in population trends for MIS likely would be an increase above current forest plan projections.

As this alternative contains more acres within the upper tier Colorado Roadless areas, there is a slightly lower risk of adverse effects to management indicator species as a result of temporary road construction and development of LCZs in these areas.

Migratory Birds

The Forests would continue to adhere to requirements under the Migratory Bird Treaty Act and the Executive Order for protection of migratory birds. The status and protection of important bird areas within roadless areas would not change. There would be no increased risk to IBAs.

Big Game

The large acreage of CRAs in the upper tier under this alternative would limit road construction and reconstruction more than Alternatives 2 and 3. The general prohibition on road construction and reconstruction within roadless areas would be beneficial to big game by providing secure habitat throughout the year. This alternative would maintain high-quality backcountry hunting opportunities.

This alternative is projected to provide the lowest level of tree cutting of any alternative, which could limit opportunities for big game habitat enhancement. This is of most concern for winter ranges where tree cutting in conjunction with prescribed fire would be desirable. Without the ability to

reduce fuel loadings, for example in pinyon-juniper forests, application of prescribed fire may not be possible.

Cumulative Effects

This cumulative effects analysis considers how other factors might combine with the direct and indirect effects of the alternatives just described, to have an additive impact. Past, present, and reasonably foreseeable future actions were evaluated.

The effects of projected activities in roadless areas that result in habitat loss or degradation, fragmentation, disturbance, and/or increases in invasive species and pathogens were previously discussed as potential direct and indirect effects. Those are the effects that may combine with effects from other activities or land uses in or adjacent to roadless areas to result in a cumulative effect. The following discussion addresses ongoing or expected activities in the next 15 years in the Colorado, especially those adjacent to or potentially affecting roadless areas.

Increasing Human Population Growth and Development

Colorado's residential population in 2006 was 4.8 million, and is expected to be 7.3 million by 2030 (Colorado DOLA State Demography Office 2007). The increased demands these residents will place on the lands surrounding roadless areas will increase the importance of the roadless areas in providing habitat for terrestrial wildlife. An increasing population and associated resource demands could also limit options for any future protection of new roadless acres that might otherwise be possible. Roadless areas will likely continue to provide some of the best terrestrial wildlife habitat in Colorado into the future.

The effects of population growth on wildlife are evident in the amount of habitat that has been converted or fragmented by human development across the state. Housing developments and malls are built on what used to be open space. Five-acre ranchettes have replaced large tracts of private land that used to belong to ranching families. Much of that development has been in lower elevation areas that have historically provided habitat that allowed species such as bears and ungulates to survive harsh winters. Providing for the intact structure and function of high-value but limited low and middle elevation roadless areas is important now and will be even more essential into the future. Human-associated encroachment is expected to continue to erode habitat availability and effectiveness, and increase disturbance and fragmentation.

Colorado's Comprehensive Wildlife Conservation Strategy provides a foundation for sustaining Colorado's wildlife and the habitats upon which they depend (Colorado Division of Wildlife 2006). The strategy provides general direction for wildlife conservation and a stimulus to engage partners in conservation of Colorado's wildlife resources. These efforts will increase the probability of terrestrial species habitats on non-federal land remaining stable over the long term. However, considering the growth rate of the state and the high demand for resources available in Colorado, some non-federal lands will continue to experience impacts on natural resources from urbanization and development, resource demands (for example, minerals), and recreation. Some effects that result in lower habitat quality on non-federal land may limit the potential effectiveness of habitat conservation and restoration on federal lands.

Increasing Recreation Demand

The growing population will continue to be drawn to the natural beauty, seclusion, and undeveloped nature of roadless areas in Colorado for enjoyment of outdoor recreation pursuits. Demand for

additional snowmobile, hiking, mountain bike, and cross-country ski trails will continue to increase, thereby increasing the use of roadless areas. The trend in mountain bike use in particular has greatly increased in the past decade. Habitats previously secluded and undisturbed now experience unpredictable human presence. The physiological effects of these types of occurrences and impacts on survival have been discussed in previous sections. Recreational activities can affect the quality and quantity of habitat, displace wildlife from core habitats, fragment habitat, and increase the establishment and spread of invasive species and pathogens. Thus, increases in recreational use could compound the effects of increased road construction and vegetation treatment for many wildlife species.

Increasing Energy Demand

Oil, gas, and coal reserves are among the valuable natural resources found within the roadless areas and surrounding lands in Colorado. The national focus on energy independence combined with the high demand for energy has resulted in a surge of exploration and development of those resources across the state. Many of the areas where exploration and development are occurring also provide valuable wildlife habitat and in some cases habitat critical to the survival of individuals and populations of species. Although most development occurs on non-federal lands, development is occurring on NFS lands and within or in close proximity to roadless areas. Pipelines and other distribution systems also are needed to move the product, and may be routed through the national forests. This development results in direct loss of habitat as well as the indirect effects of disturbance during construction and operation, which may become permanent for above-ground structures.

Development of non-federal lands may displace animals onto adjacent NFS lands, accentuating the need to provide effective habitat that is free from disturbance. The Mamm Peak CRA is an example of that situation, with concentrated gas field development on adjacent private and BLM lands in areas important for elk calving and winter range. Consequently, the Mamm Peak CRA, which provides very important habitat, is critical to the survival of that elk population.

The current interest in wood fiber and biofuels as economical energy sources is anticipated to increase, placing additional attention on NFS resources. It can be anticipated that harvesting wood fiber to meet increasing demand will increase as technology improves. Tree harvesting and sale requires road infrastructure, resulting in the associated impacts on wildlife that have been thoroughly discussed previously in this document.

Development of wind energy and associated interstate transmission lines are anticipated to receive increasing focus in the effort to become energy independent, and national forests are beginning to receive inquiries about tower placement. Mortality of migrating bats and a variety of birds by striking wind towers has been documented in numerous locations. Like other intrusions into previously undisturbed habitats, these structures directly remove habitat and have the potential to modify habitat effectiveness, create disturbance, and fragment landscapes, thus adding to the cumulative effect of activities in the proposed alternatives.

Analysis of Cumulative Effects

Based on scientific literature (Stein et al. 2000, Flather et al. 1999, Noss and Cooperrider 1994), it is possible to conclude that our native wildlife is at an increased risk of adverse cumulative effects from increased human population growth and associated land uses, land conversions, and the spread of

non-native invasive species. Maintenance of roadless areas characteristics and retention of relatively large blocks of undisturbed habitat may lessen this risk at least in the near term (15 years).

The 2001 Roadless Rule conserves 4.2 million acres of IRAs, when combined with other cumulative effects, would be beneficial overall in maintaining terrestrial wildlife habitats and populations. The 2001 Roadless Rule provides for considerably more secure habitat and protection for T&E species, sensitive species and other terrestrial wildlife than under forest plans (Alternative 3). The substantially altered acres would remain in the roadless inventory but most likely would continue to have roads and other development within them. The few exceptions for tree cutting and road construction may have minor adverse effects that could combine with other cumulative effects in certain areas to reduce the value of the terrestrial wildlife habitats within some IRAs.

Alternative 2, with its general prohibitions and limited exceptions for road construction, tree cutting and removal, oil, gas or coal development and LCZ development, along with fewer exceptions allowed in upper tier CRAs, when combined with other cumulative effects overall would be similar to the 2001 Roadless Rule. Designating approximately 4.2 million acres of roadless area will represent a net benefit to T&E species, sensitive species, and other terrestrial wildlife. A no surface occupancy stipulation would be required for any future oil and gas leases within upper tier CRAs. Although the substantially altered acres would be removed from the roadless inventory, a nearly equivalent acreage of areas that are currently roadless would be added. The limited exceptions for tree cutting and road construction may have minor adverse effects that could combine with other cumulative effects in certain areas to reduce the terrestrial wildlife habitats within some CRAs.

Alternative 3, because of less restriction of land use activities in roadless areas, would pose a higher risk of adverse effects on terrestrial wildlife habitats and populations than the other alternatives. However, these effects would not be uniform across forests or roadless areas. As previously described, some forest plans limit road construction or tree cutting activities in some of their roadless areas (similar to Alternatives 1, 2, and 4). For those forest plans that are less restrictive on activities within roadless areas, effects from activities outside the roadless area boundary would add to the potential adverse effects described for this alternative.

Alternative 4 will have similar effects to Alternative 2, except that a much larger acreage of CRAs are included in the upper tier. The fewer exceptions allowed in upper tier would result in a slightly lower risk of adverse cumulative effect to terrestrial wildlife species.

Livestock Management

Livestock management is an important traditional and cultural use of National Forest System (National Forests and Grasslands) land. In addition, proper management of livestock grazing can play a role in rangeland ecosystem health and sustainability, offering potential beneficial effects, such as maintaining soil quality, biodiversity, wildlife forage habitat, water retention and release processes, and some visual and recreational qualities. On the other hand, depending on the timing, location, and intensity of permitted livestock grazing, this use can result in detrimental impacts on the abundance and diversity of native plant communities; soil, water and riparian conditions; wildlife and fisheries habitat features; and visual and recreational resources.

Affected Environment

Livestock grazing is authorized on NFS lands, identified through the agency forest planning processes, to be suitable and capable for livestock use. Management of livestock grazing in roadless areas is based on site-specific analysis, allotment management plans, permit requirements, and forest plan management direction, in accordance with statute, regulations, and agency policies. .

Livestock grazing occurs on several portions, some significant in acreage, of the identified roadless areas, as displayed in Table 3-49. In addition to actively grazed allotments (lands currently under grazing authorization), there are a number of vacant allotments where there is no current grazing permit in effect but where livestock grazing might be permitted in the future. Permitted livestock can include cattle, sheep, or other kinds of livestock, such as horses. Rangeland vegetation is defined as plant communities containing a preponderance of herbaceous (grass, grass-like, and forb) or shrub species (at times including aspen, pinyon-juniper, and riparian/wetlands). Often these communities are identified as grasslands, shrublands, forblands, and wetlands or riparian areas. For this analysis, rangeland vegetation can also be found as an understory to trees (conifer, aspen, and pinyon-juniper) or shrubs (oak brush). For the most part, rangeland vegetation consists of native species and communities but, in some places, introduction of non-native grasses and forbs has occurred for revegetation or restoration purposes. Plant communities with desirable non-native herbaceous or shrubby species will be considered in the context of rangeland vegetation.

Livestock grazing use in roadless areas occurs on open grasslands, meadows, riparian areas, shrublands, and to a lesser degree in forested areas containing sufficient herbaceous (grassy or non-woody) understory vegetation. Approximately 60 percent of the roadless areas are dominated by forest cover types which, when dense provide less forage for livestock and wildlife grazing. In general, roadless areas contain relatively small portions of open grasslands, meadows, and other expanses of herbaceous or shrubby vegetation. Thus, authorized livestock grazing use occurs less extensively in the roadless areas compared to many other portions of the National Forests and National Grasslands in Colorado. Road construction, tree cutting activities and linear construction can affect rangeland vegetation. Those activities can also affect the proper management of livestock movement within the roadless areas.

Historically, grazing management occurring on remotely located allotments including those within roadless areas have been effectively managed over long time periods without the necessity of additional roads. Permittees typically rely on pack and saddle stock to manage the livestock and maintain their range improvement structures. In specific instances, grazing permits may include temporary authorized use of motorized vehicles to access certain locations for specific needs associated with proper management of the allotment. Such actions would not require construction of a road, and would be time-specific, over-ground motorized access to the management area. In addition, some incidental tree cutting occurs where improvements or facilities have to be maintained for safety or function. Rangeland management personnel on the National Forests in Colorado do not foresee a need for additional roads in roadless areas in support of livestock grazing management in those areas over the next 15 years under any alternative.

The limited roads accessing roadless areas with grazing allotments can cause increases in operating costs for permit holders, over other allotments with extensive roads due to the increased costs in time and labor of trailing livestock and transporting structural improvement materials into unroaded portions of the allotment. However, most permit holders operating in these areas have been doing so

for several years, and have already factored in these costs and are accustomed to operating under the given conditions and restrictions dictated in roadless areas. For some permittees, the added costs of operating in roadless areas are offset by lower costs associated with operating in other more proximate areas outside of areas with roadless areas characteristics. Some types and locations with road access, especially prolific roads can increase livestock management costs, due to the fact they increase the potential for the public to leave livestock gates open, cut fences, damage water developments, harass or harm livestock, or disrupt grazing systems.

Table 3-49. *Colorado Roadless FEIS - Rangeland and Livestock Management Acres*

Forest	Allotment Status	IRA/CRA Common		CRA Not IRA		Upper Tier Alt 2		Upper Tier Alt 4		IRA Not CRA	
ARP	Active	37,600		300		6,500		26,800		1,400	
	Vacant		42,800		400		15,400		13,700		900
GMUG	Active	616,660		90,600		93,200		430,300			
	Vacant		89,700		15,600		15,100		78,000		31,600
Manti-La Sal	Active	7,200		400		7,700		7,700		3,800	
	Vacant		0		0		0		0		0
PSICC	Active	133,600		59,100		46,700		51,600		23,900	
	Vacant		16,000		9,200		400		14,800		6,000
Rio Grande	Active	347,300		2,000		229,200		214,100		11,100	
	Vacant		33,400		500		20,600		29,600		700
Routt	Active	303,000		1,300		149,700		260,200		6,400	
	Vacant		51,300		<100		3,400		58,800		1,300
San Juan	Active	214,600		52,600		24,900		204,200		58,700	
	Vacant		46,600		13,900		39,700		55,500		6,400
White River	Active	360,000		2,300		71,300		237,500		2,700	
	Vacant		105,300		800		25,900		55,400		1,000
Total R2 Colorado	Active	2,019,900		208,700		490,700		1,432,400		343,000	
	Vacant		385,100		40,400		106,300		276,200		48,000
	All	**2,405,000**		**249,100**		**735,500**		**1,708,600**		**390,900**	

GMUG = Grand Mesa, Uncompahgre, and Gunnison. PSICC = Pike, San Isabel, Cimarron, Comanche. ARP = Arapaho, Roosevelt, and Pawnee

Totals rounded to nearest 100 acres. Totals might not add due to rounding.

Environmental Consequences

The alternatives considered in this analysis are programmatic, which either may allow or may not permit certain access and activities dictated by each alternative and its associated land status. No site-specific activities or effects are address in this analysis. Outcomes affecting rangeland vegetation are therefore expressed in general terms, with no site-specific information provided. Future proposed activities within any of the areas would undergo additional site-specific NEPA analysis which would asses any localized impacts at that time.

Effects Common to All Alternatives

In general, the more potential for fuels reduction, wildlife habitat improvement, and small tree removal projects, the greater the positive effect on production of rangeland vegetation. The typical response to overstory removal and thinning activities on forest type vegetation is an increase in the quantity and quality of herbaceous understory vegetation available for both livestock and wildlife. Prescribed burning that might accompany forest management projects involving tree cutting usually results in further increasing the growth and abundance of herbaceous forage vegetation. In addition, if forest treatments in roadless areas reduce the severity and size of a wildland fire, the treatments likely would have long term beneficial effects in protecting fences and other livestock improvements and facilities within, and adjacent to, the treated area.

Management activities associated with fuels projects such as un-piled or un-burned downed woody material and/or the corresponding non-use of a portion of the allotment during project implementation can impede livestock movement and affect the reliability of internal pasture fences or natural barriers. Immediately after some forest management treatment projects, livestock grazing may be restricted from the disturbed areas that are being reseeded and revegetated. However, recent past tree cutting activities, such as for fuel reduction treatments, have not typically resulted in significant adverse impacts on permitted grazing management in those affected allotments.

Road construction, LCZs, and related management activities in roadless areas have a greater potential than vegetation activities for displacing livestock within the management unit, for a period of one to several years. Adverse effects might occur on livestock grazing management, similar to those described for roaded areas open to the public, such as leaving gates open, cutting fences, etc.

Under Alternatives 2 and 4, new roads would be temporary and closed to public motorized access, and most those roads would be closed or decommissioned after the road is no longer needed for authorized uses. Although increases in road miles in roadless areas under any alternative potentially would increase unauthorized public motorized use in roadless areas, illegal public use of single-use roads in roadless areas would not be likely to occur extensively or frequently in any specific roadless area grazing allotment. Therefore, under any alternative, there would be a low likelihood that the projected new roads would significantly affect authorized livestock management use in the roadless areas.

Alternative 3 does not involve any roadless rule-related prohibitions on road construction or tree cutting activities in roadless areas. If new roads are constructed or reconstructed in roadless areas, and if vegetation management activities occur in those areas, best management practices would be implemented. Although there would certainly be impacts on native rangeland vegetation, and a potential for increases in non-native and invasive plant occurrence, much of the impact can be prevented or mitigated by proper project level planning.

Thus, under all alternatives, the roadless areas would be expected to continue to contain significantly lower road densities than adjacent NFS lands (other than wilderness areas). Under all alternatives the risk would be low for the potential tree cutting activities to result in significant adverse impacts on livestock management in roadless areas.

Minor and offset-able differences among the alternatives in the restrictions on road construction and tree cutting in roadless areas have been described. Overall, none of the roadless area management alternatives would be expected to have any substantial beneficial or adverse impacts on livestock management operations in roadless area livestock grazing allotments.

Alternative 1

Of the 4.24 million acres of IRAs, approximately 2.4 million acres are within the boundaries of established grazing allotments. Under this alternative, retention of substantially altered areas, tree cutting activities and developed ski areas inside the IRAs would result in a continuation of impacts to rangeland vegetation similar to those occurring currently and over the past decade or more. Vegetation management in all areas identified as roadless is likely to occur for purposes of forest or rangeland health, management of wildlife habitats, fuels management, minerals or oil and gas management, and other purposes.

Treatment of these acres could have effects to rangeland vegetation including opening of canopies and thereby increasing the amount of herbaceous or shrubby vegetation, altering the composition of the rangeland species, and changing soil and water relationships. In the short term, these activities could affect the amount of soil protection and cover provided by rangeland vegetation as caused by ground disturbance.

Depending on the actual activity, the scope and extent of the activity, and the timing, these effects could include an increase in native herbaceous and shrubby species in areas where the canopy cover is opened or could include detrimental impacts such as invasive plant establishment and/or spread, a disruption in water relationships as would occur through diverting of surface or subsurface flow from road construction, or increased erosion potential through ground disturbance.

Alternative 2

Of the 4.19 million acres of CRAs, approximately 2.4 million acres would overlap with existing range allotments as described in Alternative 1. Under this alternative, approximately 12 percent of previously inventoried roadless area within grazing allotments, but containing altered character, would fall outside of roadless area designation (substantially altered). This potentially would allow for existing road density increases in some areas within the foreseeable future, depending on project level planning. This alternative (as compared with Alternative 1) provides for limited development and use of temporary roads in the implementation of certain activities, notably, fuels management, and some forest vegetation management within the CPZ.

Under this alternative, approximately 735,500 acres would be included in the upper tier within allotment boundaries. The upper tier acres are more limiting, allowing no road construction or tree cutting for fuel treatments. These additional prohibitions on tree cutting could lead to decreases in the amount and availability of understory range vegetation, increases in small woody material leading to livestock movement issues and increase potential for fuel-loading scenarios.

Alternative 3

Existing IRAs plus 409, 500 additional acres would be managed in conjunction with existing and future forest plan direction. Increases in activities over Alternative 1 and 2 are projected. Tree cutting, sale, or removal along with road construction would be allowed unless specifically prohibited. By maintaining current Forest plan direction, restrictions or limitations on future road construction or reconstruction, tree cutting activities, and leasable minerals development within roadless areas, the potential for impacts on rangeland vegetation would continue on it currently does. There would still be some potential for disturbance from activities which do not require road construction as well as a potential for introduction or spread of invasive or non-native plants.

This alternative would incur the highest potential for impacts to rangeland vegetation. This is because this alternative potentially allows for the most additional road construction or reconstruction, tree cutting, fuels management, and discretionary mineral activities in roadless areas. However, any project level activities would be consistent with forest plan management area prescriptions within the roadless areas, an analyzed in site-specific NEPA.

The overall affect could be substantially more disturbance to rangeland vegetation in the short term, some of which (e.g., increased diversity and cover, and changes in species composition) could be considered to be beneficial if it results in increased native herbaceous or shrubby cover, changes in composition to increase diversity, or increased vegetative mosaic patterns across the landscape. On the other hand, some effects could be detrimental if they result in altered water, soil moisture, soil stability and productivity, and riparian/wetland relationships that ultimately impact native rangeland vegetation and plant communities.

Tree cutting activities tend to open forest canopies, which leads to increases in the abundance of forage vegetation for livestock (and grazing wildlife species). Therefore, while Alternative 3 would pose the highest potential for adverse impacts on livestock grazing management in roadless area allotments, there would be no substantial difference in risk to livestock operations under any of the alternatives

Alternative 4

This alternative has the same prohibitions and exceptions as Alternative 2. The difference is the 1.4 million additional upper tier acres where additional restrictions on tree cutting and road construction apply. Continuing to limit human activities in these upper tier roadless acres would help buffer and minimize man-made effects to livestock management, and roadless area characteristics. Conversely, the potential reduction in vegetation management activities for upper tier acres could have a negative effect on understory range vegetation and the increased risk of catastrophic fire loss to range improvements and vegetation.

Under this alternative, 1.7 million acres would be included in the upper tier within allotment boundaries. Consequently, a long term but relatively slow decrease in suitable habitat for rangeland vegetation would be expected due to increased conifer canopy closure and invasion of conifers into meadows and open grasslands compounded by a lower priority to treat these situations unless they are related to fuels management needs.

Cumulative Effects

Other public land use activities that occur in roadless areas, such as motorized and non-motorized recreation activities which have a similar potential for incidences of leaving gates open, cutting fences, harassing or killing livestock, and other effects previously described could contribute to cumulative negative effects on livestock management in the future. Trends in recreational use, along with trends in oil, gas, and coal activities, are expected to increase over the next 15 years, which would increase potential risks to livestock operations in the roadless areas. However, human activity in roadless areas likely would continue to be less frequent and less extensive compared to activities on more intensively managed lands outside roadless areas. Thus, overall, those other activities in roadless areas that are not expected to differ by alternative would not substantially affect ongoing or future livestock operations that are authorized in the roadless areas.

All Alternatives

Because of the low risk of measurable direct and indirect effects of the alternatives on permitted livestock operations, and the low magnitude and frequency of other activities in roadless areas likely to substantially alter permitted livestock operations, no significant cumulative effects would be anticipated under any of the alternatives.

Rangeland vegetation is especially susceptible to impacts from invasive plant species which in turn are often a result of ground disturbing impacts from other activities, such as road construction or maintenance, or vegetation management activities. Invasive species may also be introduced to an area through vehicle use, recreation activities, animals (wildlife and livestock) or by natural means (wind, water, etc.) (Hobbs, R. and Huenneke, L. 1992). See the discussion on invasive species for a more detailed description of the current situation and potential for effects.

In roadless areas, the potential for these impacts is often less than in managed forest lands. Similarly, in the upper tier portions of the roadless areas there would be expected to be only limited potential for forest vegetation management or fuels management activities due to more difficult access, steeper slopes and greater restrictions.

Therefore, alternatives that have the greatest past history, current activity, or reasonably foreseeable potential for activities, such as road construction and maintenance, forest vegetation management, oil, gas or other minerals management, and fuels management would have the greatest potential for cumulative effects (both positive and negative) on rangeland vegetation. Based on information from the Forests evaluations of each roadless area, Alternative 3 would have the greatest potential for cumulative effects to rangeland vegetation, while Alternative 4 would have the least potential. Some of these effects could be deemed as positive (e.g., increases in composition or cover of native herbaceous or shrubby species) while some are negative (e.g., altered soil water, temperature, stability relationships or altered stream/riparian morphology).

In general, the greater the extent of acres potentially open to activities (past, present or reasonably foreseeable future) such as road construction or other ground disturbing activities, the greater the potential for cumulative effects to herbaceous and shrubby rangeland vegetation. Some of these effects have the potential to be positive in nature. For example, the opening of a conifer canopy or removal of conifers from grassland parks or meadows can create conditions conducive to increased herbaceous species diversity (e.g., some native species which have not been known in the plant community can germinate and grow with a release of competition for sunlight, water, and nutrients).

Similarly, common native herbaceous and shrubby plants can increase in cover or density, experience changes in relative composition, increase in production, and change mosaic patterns across a landscape in response to reductions or alterations in canopy cover.

On the other hand, activities such as road construction, timber harvest, oil and gas development, and even fuels management can negatively impact rangeland vegetation. Often this occurs through alteration of water relationships (changes in surface or sub-surface flow regimes, solar heating and drying of soil water, increased evapo-transpiration, etc.), or in alteration of morphological relationships within wetlands and riparian areas.

Cumulatively, all potential positive and negative effects of management activities as described in each of the 4 alternatives combined with known amounts of dispersed recreation, would present no significant cumulative effects to the livestock management program or to the long-term sustainability of rangeland vegetation from any alternative.

Scenic Quality

Scenery with natural-appearing landscapes enhances people's lives and benefits society (Driver et al. 1991). It is a primary reason that people choose to recreate on NFS lands, and it contributes directly to real estate values in neighboring communities and residential areas. Scenic quality is based on two definable elements, landscape character and scenic integrity. Landscape character defines particular attributes, qualities, and traits of a landscape that give it an image that makes it identifiable or unique. Scenic integrity measures the state of naturalness or disturbance created by human activities or alteration. Roadless areas inherently have high scenic quality because of the lack of human-induced disturbance.

The scenic quality of a forest is not static; it changes over time. To varying degrees, roads, tree cutting, insect infestations, and wildland fires all affect the scenic integrity of a landscape. Managers may influence the effects of natural events to some extent by managing vegetation with silvicultural and fuels treatments. The positive effects on scenic quality resulting from reducing the effects of these events may be offset by the negative effects of road construction and vegetative treatments. Wildfire events, insect or disease infestations, avalanches, and other natural events are considered a part of a landscape's natural processes. Such events and resultant landscape changes (even if visually unappealing) are consistent with High or Very High levels of scenic integrity.

Affected Environment

Resource management activities in roadless areas strive to achieve long-term sustainable landscape character goals within the scenic integrity objectives identified in the land management planning process using the Scenery Management System (SMS) (USDA Forest Service 1995b) or with establishment of visual quality objectives using the Visual Management System (VMS) (USDA Forest Service 1974). These visual or scenic management objectives define allowable levels of change on specific land areas.

The VMS process applies to all management activities on National Forest System lands to set visual goals and assist in final management decisions. It provides the groundwork for visual assessments that evaluate the visual resources, character types/variety classes, and sensitivity levels based on public concerns, and ultimately assign Visual Quality Objectives (VQO). These VQO's establish degrees of acceptable alterations to the natural landscape found in various management units.

The current basis for describing scenic quality is the SMS, as described in Landscape Aesthetics (USDA Forest Service 1995b). This handbook defines a system for inventory and analysis of the aesthetic values of NFS lands and replaces the Visual Management System. The analysis evaluates how the prohibitions and exceptions for tree cutting, sale, or removal, road construction/reconstruction, and discretionary mineral activities would affect the ability to maintain or enhance the supply of high scenic quality.

The SMS identifies landscape character and scenic integrity as the basis for scenic quality. Landscape character is the overall visual impression of landscape attributes that provide a landscape with an identity and sense of place; it consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable and distinct. Similar to VQOs, Scenic Integrity Objectives (SIO) are the measure of the wholeness or completeness of the landscape, including the degree of visual deviation from the landscape character valued by constituents. Scenic integrity is a continuum ranging over five levels of integrity from Very High to Very Low. Unacceptably Low scenic integrity is not considered an objective. Table 3-50 shows a cross-walk of the SMS/SIOs and the VMS/VQOs.

Table 3-50. *Scenic Integrity Objectives and Visual Quality Objectives*

Scenic Quality (SMS)	*Visual Quality (VMS)*
Very High (Unaltered): refers to landscapes where the valued landscape character is intact with only minute, if any, deviations. The existing landscape character and sense of place is expressed at the highest level.	**Preservation:** this visual quality objective allows ecological changes only. Management activities, except for very low visual-impact recreation facilities, are prohibited.
High (Appears Unaltered): refers to landscapes where the valued landscape character appears intact.	**Retention:** this visual quality objective provides for management activities which are not visually evident.
Moderate (Slightly Altered): refers to landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.	**Partial Retention:** management activities remain visually subordinate to the characteristic landscape when managed.
Low (Moderately Altered): refers to landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape but they borrow valued attributes from the surrounding landscape.	**Modification:** management activities may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from the naturally established form, line, color or texture and must remain visually subordinate to the proposed composition.
Very Low (Heavily Altered): refers to landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape.	**Maximum Modification**: management activities of vegetative and landform alterations may dominate the characteristics landscape.
Unacceptably Low: where human activities of vegetative and landform alterations are excessive and totally dominate the natural or natural-appearing landscape character.	**Unacceptable Modification:** overall extent of management activities is excessive or poorly related to scale of landform and vegetative patterns in the characteristic landscape.

The original VMS process was considered a visual “snap shot in time” and established acceptable levels of management activities. In comparison, the current SMS process creates a visual inventory of acceptable levels of management activities and focuses on future desired visual conditions. With the advent of GIS technology, SMS coverage mapping is recorded forest-wide. Typically, the transition from the VMS process to the SMS process occurs whenever a forest goes through their forest plan

revision. Some national forests in Colorado have revised forest plans and have converted to the Scenery Management System. Other national forests are under the Visual Management System:

- **Scenery Management System (SMS)**: Arapaho-Roosevelt National Forests and Pawnee NGs, GMUG National Forests, Rio Grande National Forest, San Juan National Forest, White River National Forest
- **Visual Management System (VMS):** Pike-San Isabel National Forests, Routt National Forest, Manti-La Sal National Forest

Roadless areas generally do not carry evidence of management activities and currently have a high degree of scenic integrity. The scenic integrity of landscapes in these roadless areas is generally High to Very High or Retention to Preservation, which indicates a low level of landscape modification due to a lack of high intensity management activities in the past. However, some roadless areas have had extensive use, including from ski areas, cattle grazing, off-highway vehicles, timber sales, and mining. Therefore, the scenic integrity/objectives have been modified and the resulting scenic integrity is considered Moderate/Partial Retention to Low/Modification.

Environmental Consequences

There are minimal projected differences in LCZs for each of the alternative. This results in a minimal comparison difference between alternatives.

Any activity will need to meet the forest plan requirements for scenery. Scenic effects will result, based on proposed locations at the project level.

Alternative 1

The 2001 Roadless Rule is anticipated to maintain high levels of scenic integrity in the roadless areas. By maintaining the restrictions or limitations on future road construction or reconstruction and tree cutting activities within IRAs, the scenic quality would remain substantially unaltered by future management activities, consistent with High to Very High SIOs or Retention to Preservation VQOs.

The 2001 Roadless Rule allows road construction in limited situations. Most would be temporary roads associated with existing oil and gas or coal leases. It is anticipated that the amount of change from such new road construction would have a negligible change on the current High and Very High scenic integrity in most roadless areas. In those few areas where roads are constructed, the scenic integrity could change from High to Low or Moderate.

There are existing oil and gas leases within the IRAs, as well as existing coal leases. The disturbance in these areas, which includes both road construction and tree cutting while operations are ongoing, can be expected to have an impact on the scenic value. However, as areas are reclaimed and roads are removed, the scenic values would improve over time, commensurate with the revegetation.

The 2001 Roadless Rule allows limited tree cutting of generally small-diameter material for specific purposes within IRAs. The intensity of change associated with the acres projected to have tree cutting is not expected to create a measurable change in scenic integrity, though there could be minor localized effects. The magnitude or amount of area per project that potentially would be affected is also considered to be relatively minor, typically several hundred acres or less. Vegetation management would result in short-term changes in scenic quality. These projected activities would be spread out over very large acreages.

Based on the anticipated intensity and magnitude of change from potential vegetation management, it is anticipated that most current High and Very High scenic integrity within all IRAs would be retained.

Retaining the substantially altered areas and developed ski areas inside the roadless areas would allow portions of the roadless areas to continue to deviate from desired roadless area characteristics and values regarding scenic quality as defined by this alternative.

The acres within the analysis area that are not within the IRAs have been identified by the forests as having roadless area characteristics and are most likely have High/Retention and Very High/Preservation scenic integrity. Where tree cutting, sale, or removal and road construction is projected to occur, the SIO/VQOs could change on those acres from High/Retention to Moderate/Partial Retention.

Alternative 2

Under this alternative, limiting activities in CRAs helps minimize adverse modifications to existing scenic quality. Removing the substantially altered areas and developed ski areas from the CRAs and redefining the CRA boundaries to include areas with roadless area characteristics would increase values regarding scenic quality. In addition to the CRA boundaries, the proposed 1,024,000 upper tier acres could potentially change to High and Very High scenic integrity.

Annually, the miles of road construction projected within the CRAs and within the remainder of the analysis area are, for the most part, temporary roads, including those temporary roads associated with existing oil and gas development and existing and future coal leases within the North Fork coal mining area. All roads would be decommissioned following the specific permitted use. It is anticipated that the amount of change from such new road construction would have a negligible change on the current High and Very High scenic integrity in most roadless areas. In those few areas where roads are constructed, the scenic integrity could change from High to Low or Moderate.

There are existing oil and gas leases within the CRAs, as well as existing coal leases. Acres within the 19,100-acre North Fork coal mining area would be available for future coal leases, including temporary road construction (some acres are already under lease). The disturbance in these areas, which includes both road construction and tree cutting while operations are ongoing, can be expected to have an impact on the scenic value. However, as areas are reclaimed and roads are removed, the scenic values would increase over time, commensurate with the revegetation.

Limited tree cutting, sale, or removal is permissible in CRAs, primarily to reduce the wildfire hazard for at-risk communities or municipal water supply systems. Tree cutting within the CRAs, other than for the purpose of incidental, personal, or administrative uses, must maintain or improve one or more of the roadless area characteristics over the long-term.

Tree cutting outside the upper tier acres could modify scenic integrity at least in the short term, but is assumed to maintain at least a Moderate/Partial Retention level of scenic quality. In the long term, SIOs/VQOs associated with these tree cutting treatments would result in High/Retention to Very High/Preservation scenic levels. It is likely that tree cutting would be spread across multiple roadless areas across the State, thus reducing the potential change in any one CRA. Also, potential effects across CRAs would be moderated because of priority treatment of hazardous fuels would be

concentrated around communities that are not within the upper tier. These treatments would minimize impacts to communities by applying SIO and VQO guidelines from forest plans.

Based on the anticipated intensity and magnitude of change from potential vegetation management, it is anticipated that the most current High and Very High scenic integrity within all upper tier acres would be retained due to the limited activities allowed.

Removing the substantially altered areas and developed ski areas from the roadless areas would allow these areas to be managed according to forest plan direction regarding scenic quality, which may no longer reflect roadless area characteristics. However, the substantially altered acres were specifically removed because they currently do not reflect roadless area characteristics. The additional CRA acres added to the inventory are mostly High/Retention and Very High/Preservation scenic integrity and would be retained as such due to the limited activities allowed under Alternative 2 over the long term.

Alternative 3

This alternative would incur the highest risk of increased adverse impacts to existing scenic quality. This is because this alternative allows for the most additional road construction or reconstruction and tree cutting, sale, or removal activities in IRAs, as defined by individual forest plans. Based on the forest plan restrictions on activities within the areas analysis area, including within the IRAs, combined with topographic or economic constraints, new roads or tree cutting activities would be projected to occur on only a small percentage of the existing roadless area acreage.

Management prescriptions similar to wilderness/Primitive settings are likely to retain their High/Retention to Very High/Preservation SIOs/VQOs because limited activity is permitted to occur in these areas. Generally, natural processes dominate.

There are existing oil and gas leases within the analysis area, as well as existing coal leases. Under this alternative, future leasing can occur. The disturbance in these areas, which includes both road construction and tree cutting, while operations are ongoing, can be expected to have an impact on the scenic value. However, as areas are reclaimed and roads are removed, the scenic values would increase over time, commensurate with the revegetation.

Scenic quality could be reduced in areas where road construction/reconstruction occurs. In many of the roadless areas, it is likely that scenic quality would not be reduced as much because prescriptions generally encourage the use of temporary roads (short-term impact) and retention of more trees because of wildlife considerations. There could be some beneficial effects on scenic quality from silvicultural and fuels treatments that reduce the potential magnitude of natural events such as insect infestations and wildland fires. Also, potential effects would be moderated because of priority treatment of hazardous fuels around communities and by applying SIOs and VQOs guidelines from forest plans.

Alternative 4

The impacts of Alternative 4 will be similar to Alternative 2, but with the additional upper tier acres, more acres potentially could change from High to Very High scenic integrity.

Cumulative Effects

Past actions and events have shaped the current landscape. The current High/Retention to Very High/Preservation scenic qualities are a reflection of the low level of active management in these

areas. It is anticipated that current or planned actions and foreseeable future actions would generally retain the current High/Retention to Very High/Preservation scenic quality designations with most CRAs under any alternative.

Summary of Effects

Road construction and other ground disturbing activities within various roadless areas can affect scenic resources depending on the potential activity within the established Scenic Integrity Objectives. When compared to Alternative 3, Alternatives 1, 2, and 4 would have the potential for beneficial scenic integrity levels. Based on the inclusion of disturbed areas, Alternative 1 would be the least beneficial, followed by Alternative 2 and then Alternative 4 based on the increased amount of upper tier acres. When compared to Alternative 1, Alternative 3 would have a detrimental effect for scenic resources based on the allowed road construction and ground disturbing effects. Alternatives 2 and 4 would remain as beneficial effects, based on the upper tier acres and restrictive activities.

Recreation

Many definitions of recreation exist, each emphasizing a slightly different aspect of an enjoyable pursuit. The basic premise behind recreation is the pleasurable and constructive use of one's spare time. This sense of refreshment, relaxation, and the active pursuit of pleasure are realized by participating in recreational activities suited to individual preference.

This analysis reviews the possible changes to roadless areas available for dispersed recreation, developed recreation, and recreation special uses. The disclosed environmental consequences are based on factors such as trends in recreation use; the prohibitions and permissions for tree cutting and road construction and reconstruction; and the availability of future roadless areas in Colorado to meet growing future demands.

Generally, the recreation characteristics of most roadless areas are either in a Primitive setting, a Semi-Primitive Non-Motorized (SPNM) setting, or a Semi-Primitive Motorized (SPM) setting. A Primitive setting describes an area with little developed infrastructure that allows non-motorized uses, but can also allow mechanized uses. A SPNM setting describes an area with minimal developed infrastructure that allows non-motorized and mechanized use. A SPM setting describes an area with minimal developed infrastructure that allows for non-motorized, motorized, and mechanized uses. More developed recreational settings, including roads, trail heads, campgrounds, boat launches, and picnic areas, would be found outside of roadless areas, but would allow access to trails into roadless areas.

Dispersed Recreation

Dispersed recreation is generally associated with activities that do not require constructed facilities, except for trails. Non-motorized activities (such as hiking, biking, and backcountry skiing) and motorized activities (such as snowmobiling and off-highway vehicle (OHV) trails use) best represent dispersed recreation. Thus, dispersed recreation is generally associated with the Primitive, SPNM, and SPM recreation settings. Roadless areas in Colorado provide opportunities for non-motorized, motorized, and mechanized dispersed recreation activities, as well as fishing and big-game hunting opportunities.

Affected Environment

These roadless areas provide settings for dispersed recreational activities that are prohibited in designated wilderness areas and not readily available in developed or modified settings with system roads. For example, wilderness areas prohibit, with few exceptions, mechanized and motorized uses, such as OHVs, mountain bikes, and snowmobiles. Within roadless boundaries, these activities are permitted on designated trails, including current and new trail construction. Wheelchair or handicapped access is allowed within wilderness areas, but is expected to be very challenging. Depending on the travel management direction for an individual roadless area, many trails within roadless areas are open to OHV use for those who are not able to access remote areas without motorized assistance.

Six of the top 10 activities pursued on NFS lands within the Rocky Mountain Region (walking for pleasure, family gathering, view/photograph natural scenery, sightseeing, and view/photograph other wildlife) are generally associated with dispersed recreation (Cordell and Betz, 2006). The demand for Primitive, SPNM, and SPM classes and dispersed recreation opportunities is increasing (Cordell et al. 1999a and 1999b).

Environmental Consequences

Restrictions or limitations on future road construction or reconstruction and tree cutting activities within roadless areas would maintain existing opportunities for dispersed recreation in a semi-primitive setting that would be substantially unaltered by future management activities.

Effects Common to All Alternatives

In November 2005, the Forest Service published a new travel management rule governing motor vehicle use on national forests and grasslands (36 CFR 212.B). Under the final rule, each national forest or ranger district will designate those roads, trails and areas open to motor vehicle use by class of vehicle and, if appropriate, by time of year.

Both the 2001 Roadless Rule and Colorado Roadless Rule address road construction, but do not address travel management. Management direction related to travel-planning actions would be regulated by other existing regulatory and analytical processes, such as travel management planning and individual forest plans. Travel management is made under separate travel planning processes and is ongoing for all Colorado national forests.

Travel management decisions made outside of this rulemaking process will have an impact on the types of motorized and non-motorized use and level of use available within roadless areas under any alternative.

Alternative 1

The 2001 Roadless Rule prohibits road construction and reconstruction in IRAs, except under very limited exceptions. The limited road construction and reconstruction exceptions could change the dispersed recreation opportunities within a given area. The level of disturbance would not measurably change the dispersed recreation opportunities in any given area.

There are currently about 1,260 miles of road within the boundary of the IRAs. Existing road density in roadless areas may gradually be reduced over time, as more miles of road likely would be decommissioned or obliterated than constructed. Many unauthorized roads would be eliminated or

naturally disappear. The associated effects would increase the semi-primitive setting and recreation opportunities from fewer roads in the long-run.

The 2001 Roadless Rule prohibits tree cutting, sale, or removal, with a few exceptions. The level of projected activity would not measurably alter roadless area characteristics currently identified, especially over the long-term.

IRAs would continue to provide habitat for wildlife and fish; therefore, hunting and fishing opportunities would continue. Retaining the substantially altered areas and developed ski areas inside the roadless areas would allow portions of the roadless areas to continue to depart from desired roadless area characteristics and values regarding semi-primitive settings. Visitors would expect IRAs to be substantially unroaded and undeveloped. Thus, those portions of the IRAs would continue to conflict with visitor expectations.

Alternative 2

Under Alternative 2, tree cutting, sale, or removal and road construction and reconstruction are prohibited with specific exceptions. Most roads projected in this alternative are temporary and associated with fuel treatments within the CPZ, for existing oil and gas leases, and within the North Fork Coal mining area for coal removal. The miles of road construction projected to occur on the substantially altered acres is mainly occurring in SPM areas, with lesser amounts in SPNM and Primitive settings in roadless areas.

This level of road construction and reconstruction could change dispersed recreation opportunity settings in some areas from a SPM to a more roaded type opportunity; however, because the roads are decommissioned and obliterated after use, the change in the type of recreation opportunity would be temporary.

Tree cutting is projected to occur within the CRAs and on the substantially altered acres that are not within the CRAs. Depending on whether the tree cutting occurs as thinning or as removal of dead material, the projected tree cutting over 15 years may change the natural appearance of some areas for a period of time until the area regenerates. Most of this tree cutting would be done for hazardous fuels management, and would be done within 0.5 mile to 1.5 miles from at-risk communities in more developed recreation settings. Based on this level of tree cutting, a small percentage of the CRAs would be affected over 15 years. Dispersed recreation opportunities would not change as a result of such tree cutting, but the feeling of remoteness may change in some locations for a period of time.

None of these activities would take place in the 1,024,000 upper tier acres where roads and tree cutting for fuel treatments is prohibited. So, dispersed recreation in those upper tier acres would not likely see any changes due to exceptions.

Hunting and fishing opportunities likely would not change in areas where tree cutting and associated road construction occurs because of the dispersed nature of these activities. Some species are likely to thrive in the openings created by the tree cuttings before the recovery of vegetative conditions. The use of temporary roads would limit the impact to wildlife and fish habitat because the roads would be decommissioned as soon as the use is completed. In addition, any areas which are in the upper tier would see additional restrictions in activities under Alternative 2.

Alternative 3

This alternative would incur the highest risk of change or adverse impacts to the existing semi-primitive recreation setting and opportunities. This is because this alternative allows for the most additional road construction or reconstruction, tree cutting, and discretionary fluid and solid mineral activities in roadless areas. However, based on forest plan restrictions on activities within the IRAs, together with topographic or economic constraints, new roads or tree cutting activities would be projected to occur on only a small percentage of the existing roadless area acreage.

Under existing forest plans, road construction and reconstruction, tree cutting, and oil, gas, and coal activities are generally not permitted on areas with management prescriptions of Primitive, SPNM and SPM. Some tree cutting could occur in the more developed and roaded recreation settings, but likely would not be done to a degree that would change the existing roadless area characteristics.

The level of projected road construction and reconstruction could change dispersed recreation opportunity settings in some areas from a SPM to a more roaded setting; however, if roads are decommissioned after use then the change would be more temporary in nature.

Depending on the nature of the forest plan prescription, tree cutting may change the natural appearance of some areas for a period of time until the area regenerates. The type of cutting would depend whether the fuels treatment need is to thin overstocked stands or to remove dead material (see Scenery section). Based on this level of cutting, a small percentage of the roadless areas would be affected over 15 years. Dispersed recreation opportunities would not change as a result of tree cutting, but the sense of remoteness may change for a period of time.

Alternative 4

Impacts to Alternative 4 will be similar to Alternative 2. With the additional upper tier acres the dispersed recreational opportunities likely would see fewer changes over time due to the limited activities.

Cumulative Effects

Currently, roadless areas are seen as important places where dispersed motorized and mechanized uses may sometimes occur. As populations increase in Colorado, there likely would be more unauthorized motorized use in roadless areas, and more pressure for authorized land use activities in roadless areas. Nonetheless, the roadless areas would be expected to generally retain roadless area characteristics, and visitors would find places in roadless areas to seek quiet and solitude.

Decisions made through travel planning could affect the amount of area available for motorized and non-motorized travel and indirectly affect dispersed recreation settings and opportunities in roadless areas. If road construction is constrained in roadless areas under one of the alternatives, additional pressures to build roads would be placed on NFS lands outside roadless areas.

No other past, ongoing or foreseeable future activities in or around the roadless areas would combine with effects of any of the alternatives to result in a significant cumulative effects.

Summary of Effects

Road construction and other ground disturbing activities within various roadless areas can affect dispersed recreation settings and opportunities depending on the potential activity within the established ROS classifications. When compared to Alternative 3, Alternatives 1, 2, and 4 would have the potential for additional SPM, SPNM and Primitive recreational opportunities. Based on the

inclusion of disturbed areas, Alternative 1 would be the least restrictive, followed by Alternative 2 and then Alternative 4 based on the increased amount of upper tier acres. When compared to Alternative 1, Alternative 3 would have an effect of ROS classifications potentially shifting to SPM and RN recreational opportunities based on the allowed road construction and ground disturbing effects. Alternatives 2 and 4 would have the potential for additional SPNM and Primitive recreational opportunities, based on the upper tier acres and restrictive activities.

Developed Recreation

Developed recreation sites are those with constructed facilities, such as campgrounds; picnic or day-use sites; trailheads and scenic overlooks with parking areas; interpretive sites; ski areas; and visitor centers. Developed recreation sites typically provide semi-primitive motorized, roaded natural, rural, and urban Recreation Opportunity Spectrum class opportunities and settings.

While some visitors prefer dispersed recreation opportunities and settings that are farther away from the sights and sounds of people and development, others prefer settings that offer more developed amenities, such as picnic tables, trash receptacles, roads, parking lots, boat ramps, and other built features.

Affected Environment

There are about 1,820 developed recreation sites on NFS lands in Colorado (Region-2 INFRA-Recreation Facilities database, April 2008). Most of these sites are along roads that provide motorized access to the public. None of the roadless areas in Colorado contain developed recreation sites, except for portions of developed ski areas. However, access roads, campgrounds, and trailheads along the outer boundaries of many of the roadless areas provide public services and entry points into the roadless areas. .

Environmental Consequences

The effects on developed recreation opportunities in roadless areas do not substantially differ among the alternatives being evaluated in this document. Thus, the effects are described for all four alternatives at once.

Effects Common to All Alternatives

Developed sites could be built adjacent to roadless areas in order to facilitate specific demands for recreation activities within the area. However, aside from trail construction (motorized and non-motorized), developed recreation sites would generally not be constructed within roadless areas under Alternatives 1, 2, or 4. Under these alternatives, developed recreation sites could be developed in the analysis area acreage that is not within the roadless area boundaries for those alternatives, depending on forest plan direction. Under Alternative 3 there potentially would be additional opportunities for development of recreational sites or facilities within IRAs in accordance with forest plan direction.

Roads projected to be constructed in a roadless area for the foreseeable uses identified for each alternative would not be expected to remain open for public vehicle travel (see Analysis Framework). Therefore, there would be no measurable increase in motorized road access for recreation opportunities within roadless areas under any alternative.

Cumulative Effects

Generally, there are no direct and very limited indirect effects to developed recreation associated with the four alternatives. With no direct or indirect effects, there would be no cumulative effects to developed recreation.

Developed Ski Areas

Developed ski areas are authorized under the Ski Area Permit Act of 1986, or other statute, which have constructed facilities on NFS lands. This analysis evaluates effects of the alternatives on developed ski area recreation.

Affected Environment

Many ski resorts have authorizations to conduct activities on NFS lands in Colorado. Nationally, there are 134 ski areas operating on national forests and receive 30 million or more skier visits per year (National Ski Areas Association, 2009). Colorado has the highest number of ski areas under permit on national forests (22 areas listed in Table 3-51) and the highest number of annual skier visits on national forests of any state, exceeding 12.5 million. Skiers spend approximately $2.6 billion annually in the State, which is 33 percent of annual tourist dollars spent.

Table 3-51. *Colorado ski areas on National Forest System lands*

	Ski area	National Forest
1	Arapahoe Basin	White River
2	Aspen Highlands	White River
3	Aspen Mountain	White River
4	Beaver Creek	White River
5	Breckenridge	White River
6	Buttermilk	White River
7	Copper Mountain	White River
8	Crested Butte	Grand Mesa, Uncompahgre, and Gunnison
9	Durango Mountain Resort	San Juan National Forest
10	Eldora	Arapaho-Roosevelt
11	Keystone	White River
12	Loveland	Arapaho-Roosevelt
13	Monarch	Pike- San Isabel
14	Powderhorn	Grand Mesa, Uncompahgre, and Gunnison
15	Ski Cooper	White River; and Pike-San Isabel
16	Ski Sunlight	White River
17	Snowmass	White River
18	Steamboat	Routt
19	Telluride	Grand Mesa, Uncompahgre, and Gunnison
20	Vail	White River
21	Winter Park	Arapaho-Roosevelt
22	Wolf Creek	Rio Grande

Ski areas not listed are not within National Forest System lands, or not operational.

During the 2005–2006 ski season, the number of skier visits in the United States hit an all-time record of 58.8 million visits, up 3.3 percent from the previous season, and up 2 percent from the previous

record set in 2002–2003 (RRC Associates 2006). With population growth in many of the key western ski states, the rising ski area visitor trend will likely continue.

The settings, experience, and activities associated with developed ski areas are not always compatible with roadless area characteristics. Forest Service lands adjacent to developed ski areas typically fall into the semi-primitive non-motorized, or semi-primitive motorized land management categories. Summer use around ski resorts is also growing and can also impact roadless characteristics.

Further consideration of ski area development and roadless areas are described under Alternatives 1, 2, and 4 in the Environmental Consequences section. In addition, Appendix F contains maps showing the ski areas that occur in roadless areas.

Environmental Consequences

For any project to be authorized within a ski area under any alternative, it must be consistent with the existing forest plan direction, have an approved Master Development Plan, and site-specific NEPA analysis.

Alternative 1

By maintaining the restrictions on future road construction or reconstruction and tree cutting, sale, or removal, activities within IRAs limit opportunities for ski area development, and consequently, expansion of some ski areas would be limited. In other ski areas, this alternative would have no effect on developed ski area recreation in the 15-year planning time frame.

Currently, 6,550 NFS acres are within IRAs and would be under a ski area permit before the final date of this rule. In these areas, road construction and tree-cutting activities are allowed to continue according to master ski area plans.

Ski areas on NFS lands in Colorado that are not listed here do not contain roadless acres within their permit boundary, or are not currently operating.

For Loveland Ski Area and Durango Mountain Resort, the forest plan allocation for the ski area is larger than the existing permit area. Under Alternative 1, no road construction or reconstruction would occur outside the existing permit boundary established before the date of this rule; including those areas that have been allocated under forest plans. It is important to note that ski area development can occur without road construction. Over-the-snow construction of lift towers can be accomplished in some locations; similarly, tree-cutting, sale, or removal can be completed over snow to clear ski trails and runs without the constructing roads. Therefore, it is possible that ski area expansion into IRAs under Alternative 1 could occur without road construction in areas that are not currently under permit.

Alternative 2

Under Alternative 2, ski areas that are permitted or allocated by forest plans are not included within CRAs boundaries. Therefore, road construction or reconstruction and tree-cutting, sale, or removal in those ski areas (outside CRAs) would be allowed as prescribed in the forest plans, ski area master plans, and project-level NEPA documents. The ski resorts and their associated roadless acres are displayed in Table 3-52. Individual maps comparing permit and allocation boundaries with IRA and CRA boundaries are also available in Appendix F of this document.

Similar to Alternative 1, ski area development could occur without road construction. It would be permissible to cut trees incidental to implementing a permitted, ski-area management activity, not

otherwise prohibited in a CRA. Such ski area expansions without road construction could take place in upper tier acres, as well as in regular CRA acres.

Table 3-52. *Ski Area Acreage in the IRAs but Not Included in CRAs*

National Forest Ski Area(s) [1]	CRA(s)	Ski Area Permitted Acres [2]	Additional Ski Area Allocation Acres [3]	Total Ski Area Acres Excluded from CRAs
Arapaho-RooseveltNational Forests				
Loveland	Bard Creek, Mount Sniktau	1,370	1,620	2,990
Winter Park	Vasquez Adjacent Area	30	0	30
Grand Mesa, Uncompahgre, and Gunnison National Forests				
Crested Butte	Gothic	900	0	900
Pike-San Isabel National Forests				
Ski Cooper	Mad Creek DB & DB1	560	0	560
Routt National Forest				
Steamboat Springs	Long Park	180	0	180
San Juan National Forest (Draft Revised forest plan)				
Durango Mountain Resort	San Miguel	0	90[4]	90
White River National Forest				
Arapahoe Basin	Porcupine Peak	1,050	0	1,050
Aspen Mt	McFarlane	50	0	50
Beaver Creek	Meadow Mountain A, B	510	0	510
Breckenridge	Tenmile	150	0	150
Buttermilk	Burnt Mountain	50	0	50
Copper Mountain	Ptarmigan Hill	720	0	720
Snowmass	Burnt Mountain	80	0	80
Vail	Game Creek	900	0	900
TOTAL		**6,550**	**1,710**	**8,260**

Acres rounded to nearest 10 acres. Totals might not add due to rounding.

[1]Not all ski areas on NFS lands in Colorado are listed here because they either do not contain roadless acres within their permit or allocation boundary or are not currently operating.

[2]Ski area permit acres within IRAs where permit acres authorized before the effective date of Colorado Rule.

[3]Acres allocated in forest plans to ski area management that adjoin permitted ski areas but are outside the current permit boundary.

[4] Expansion of Durango Mountain Resort is included within the draft revised forest plan for San Juan National Forest, draft preferred alternative. There are 90 IRA acres that would be excluded from the CRA acres.

The ski areas listed in Table 3-52 could have some increase in development of ski area facilities under Alternative 2, because of the number of ski areas outside CRAs where road construction and tree-cutting, sale, and removal would be governed by forest plan direction. As areas allocated under a forest plan are not included within the CRA boundaries, so there is potential for further development and expansion, compared to Alternative 1, of an additional 1,710 acres.

Alternative 2 would have a positive impact on the developed ski area recreation resource by removing some limitations to constructing ski area facilities. The authorization of roads in developed ski areas would facilitate the implementation of required ski area vegetation management plans to improve forest health, remove hazard trees, and manage fuel hazards associated with the current mountain pine beetle epidemic affecting lodgepole pine within developed ski areas. This potential increase in road construction and tree removal is not certain.

If road construction and tree removal are authorized in these developed ski areas and a decision is made to expand the permit boundary at Durango Mountain Resort and Loveland Ski Area, there likely would be a change of the ROS from semi-primitive non-motorized to semi-primitive motorized or roaded natural within those areas. Such a project would require a subsequent NEPA environmental analysis.

Alternative 3
The 8,300 acres within existing permitted ski area boundaries and those areas allocated in forest plans to ski area management would be managed the same in this alternative as in Alternatives 2 and 4 because they have been excluded from CRAs. Future development of these areas would require additional NEPA environmental analysis.

This alternative would allow additional ski area expansion or development requiring road construction in the analysis area. This would not be allowed under Alternatives 1, 2, and 4 if the proposed development is within the alternatives' roadless areas.

Alternative 4
The effects for Alternative 4 are the same as described under Alternative 2 because ski areas under permit have been excluded from the roadless inventory. Additional upper tier acres in Alternative 4 do not affect ski areas.

Wilderness

The Wilderness Act of 1964 (P.L. 88-577) established the National Wilderness Preservation System, composed of federally owned areas designated by Congress. Congress has the sole authority to designate wilderness. A wilderness is recognized as an area "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Wilderness areas generally appear to be affected by the forces of nature; have opportunities for primitive and unconfined recreation; are of sufficient size (typically greater than 5,000 acres) to be managed as wilderness; and contain other ecological, geological, scientific, educational, scenic, or historical values. Wilderness areas are managed to protect natural conditions and primeval character. Commercial enterprise, motor vehicles, motorized equipment and mechanical transport are prohibited. The Wilderness Act does allow for what may be minimally necessary for administration of the area, including measures required in emergencies involving the health and safety of people in the area.

The primary stewardship mandate of the 1964 Wilderness Act is to preserve wilderness character. The Statement of Policy, section 2(a), in the Act states that wilderness areas, "shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for the future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character."

The Forest Service takes actions to protect wilderness character in accordance with Wilderness Policy manual directives (FSM 2320). Effects from federal activities on wilderness character are considered to ensure natural conditions prevail in wilderness, to the extent possible.

As part of the forest planning process potential wilderness areas are identified (FSH 1909.12, chapter 70) using a three-step process:

- identifying lands that satisfy the definition of wilderness found in section 2 of the 1964 Wilderness Act
- evaluating lands as to their wilderness potential
- reviewing and approving wilderness recommendations.

Generally, roadless areas serve as the pool for potential wilderness areas.

This analysis evaluates the effects from the prohibitions on designated wilderness, recommended wilderness, and legislative designated areas.

Affected Environment

Across the United States, there are approximately 110 million acres designated as wilderness within 757 areas, of which 439 are administered by the Forest Service. There are a total of 36 Forest Service designated wilderness areas in Colorado comprising 3,200,000 acres (Table 3-53).

Wilderness character is often used to describe a wilderness area. The statutory language in the Act identifies four qualities of wilderness: "untrammeled," "natural," undeveloped," and "solitude or a primitive and unconfined type of recreation" (Landres et al., 2008).

As defined in Landres et al. (2008), untrammeled means wilderness is essentially unhindered and free from modern human control or manipulation. Natural means that wilderness ecological systems are substantially free from the effects of modern civilization. Undeveloped means that wilderness is essentially without permanent improvements or modern human occupation.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation means wilderness provides outstanding opportunities for people to experience solitude or primitive and unconfined recreation, including the values of inspiration and physical and mental challenge. These attributes are used to measure the potential consequences of the prohibitions of each alternative on the wilderness resource. However, the Wilderness Act does not constrain projects proposed adjacent to wilderness boundaries because of the mere presence of wilderness. The effects from projects adjacent to wilderness areas should not be the sole reason for deferring or declining a project proposal.

Table 3-53 lists the existing wilderness areas in Colorado, as well as their size and the year they were established. Several of the wilderness areas have been enlarged by subsequent wilderness legislation. Information regarding the year individual legislation establishing the wilderness areas follows the table.

Table 3-53. *Existing Wilderness Areas in Colorado*

Wilderness	Acres	Year Created
Buffalo Peaks	43,000	1993
Byers Peak	8,000	1993
Cache La Poudre	9,000	1980
Collegiate Peaks	167,000	1980
Comanche Peak	67,000	1980
Eagles Nest	133,000	1976
Flat Tops	235,000	1975
Fossil Ridge	33,000	1993
Greenhorn Mountain	22,000	1993
Holy Cross	123,000	1980
Hunter-Fryingpan	82, 000	1978
Indian Peaks	78,000	1978
James Peak	14,000	2002
La Garita	129,000	1964
Lizard Head	42,000	1980
Lost Creek	120,000	1980
Maroon Bells-Snowmass	181,000	1964
Mount Evans	75,000	1980
Mount Massive	28,000	1980
Mount Sneffels	17,000	1980
Mount Zirkel	160,000	1964
Neota	10,000	1980
Never Summer	21,000	1980
Platte River	743	1984
Powderhorn	14,000	1993
Ptarmigan Peak	13,000	1993
Raggeds	65,000	1980
Rawah	73,000	1964
Sangre de Cristo	227,000	1993
Sarvis Creek	45,000	1993
South San Juan National Forest	159,000	1980
Spanish Peaks	19,000	2000
Uncompahgre	100,000	1980
Vasquez Pea	13,000	1993
Weminuche	489,000	1975
West Elk	176,000	1964
TOTAL	***3,200,000***	

Acres are rounded to nearest 1,000. Totals might not add due to rounding.

Five Colorado wildernesses were established with the signing of the Wilderness Act of 1964; La Garita, Maroon Bells-Snowmass, Mt. Zirkel, Rawah and West Elk Wildernesses. Since 1964, several subsequent stand-alone Wilderness Acts and two State-wide Wilderness Acts have been enacted. In 1980, the Colorado Wilderness Act established 15 new wilderness areas (P.L. 96-560) and the 1993 Colorado Wilderness Act enlarged many of the existing wildernesses and added 12 new wilderness areas (P.L. 103-77). In 2009, the Omnibus Public Lands Act was signed into law, which enlarged the Indian Peaks Wilderness by 1,000 acres.

Environmental Consequences

None of the alternatives would directly affect existing wilderness because the management direction would not apply to designated wilderness areas. Therefore, there would be no effects on the untrammeled, natural, undeveloped, or primitive and unconfined recreation opportunities within a wilderness area. However, activities permitted in roadless areas contiguous or adjacent to designated wilderness could affect opportunities for solitude and could affect the scenery as viewed from a

wilderness area. The degree of effect would depend on the frequency, duration, extent, and type of activity that occurs.

Effects Common to All Alternatives

All the alternatives, to some degree, could affect solitude and scenic values, and the ability for roadless areas to be recommended for wilderness designation in the future. Roadless areas are the reservoir of undeveloped lands from which future wilderness designations are considered. Each roadless area is evaluated during the forest planning process to determine if it provides wilderness characteristics and whether or not it should be recommended for wilderness. Areas not recommended for wilderness could still be considered for wilderness by Congress. Impacts on the area's inherent wilderness character, its undeveloped nature, its naturalness, its natural ecosystem forces, and the opportunity to provided primitive and unconfined recreation would detract from future consideration of the area as wilderness.

Alternative 1

In general, the 2001 Roadless Rule prohibits tree cutting and road construction in IRAs unless under specified exceptions more than Alternative 3 would allow. The prohibitions in Alternative 1 reduce the potential risk of impacts to adjacent wilderness areas. Where tree cutting or road construction is permitted in Alternative 1, there may be minimal effects on wilderness depending on the scenic value of view-shed, distance from the wilderness boundary, and natural drainage. Such activities could impact future recommendations for wilderness areas.

Those unroaded acres not included as IRAs would continue to be managed according to their respective forest plan direction. In some cases, that would be consistent with protecting wilderness character, but in others, activities including tree cutting and road construction may be allowed.

Alternative 2

In general, Alternative 2 prohibits tree cutting and road construction, with certain exceptions, which reduces the risk of impacts to adjacent wilderness areas. Within the upper tier acres, this alternative is more congruent with wilderness than Alternative 1 and allows for more untrammeled conditions to prevail. Where tree cutting or road construction is permitted under exceptions near or adjacent to existing wilderness, there could be effects on wilderness, depending on the scenic value of view-shed, distance from wilderness boundary, and natural drainage. Such activities, especially those within a CPZ and those associated with coal activity, could impact future recommendations for wilderness designation. Activities within the CPZ could impact areas adjacent to wilderness areas, affecting scenery and noise of those traveling within the wilderness. Alternative 2 might reduce controversy and result in more stability by recognizing those roadless areas with important roadless area characteristics and thereby providing an important niche for motorized and mechanical (mountain bike) use.

In addition, the acres in upper tier Alternative 2 would be more consistent with existing wilderness designation than Alternative 1. Wilderness character would be protected in Alternative 2 upper tier lands, and thereby, provide a potential pool of unmodified landscapes for future consideration as wilderness.

Alternative 3

In general, Alternative 3 allows more tree cutting and road construction than Alternatives 1, 2, or 4, reducing potential wilderness eligibility on the impacted acres. Compared to the other alternatives, Alternative 3 would result in the highest risk of adverse impacts on wilderness from ground-disturbing activities such as tree cutting and road construction.

Overall, it is expected that activities authorized under Alternative 3 would pose the highest risk to reducing the wilderness character to lands adjacent to wilderness. Alternative 3 would provide the greatest potential soil disturbance and modification to roadless areas, compared to the other three alternatives. By allowing for more treatments for hazardous fuels purposes, this alternative would also reduce the chance of roadless areas being considered for future wilderness recommendation.

Colorado roadless areas are managed under a variety of management prescriptions in existing forest plans. Because many roadless areas are adjacent to wilderness areas, some tracts of land would remain essentially unroaded and undeveloped. Roadless areas are at times managed as a bank for future resource development or special designation.

Alternative 4

Alternative 4 would preserve potential wilderness eligibility more than Alternatives 1, 2, and 3 due to the additional number of upper tier acres. This alternative is most congruent with existing wilderness

Cumulative Effects

With increasing population and demand for Wilderness use, as well other types of recreational uses on NFS lands, roadless areas will continue to offer an important relief valve to Wilderness areas and the solitude experience. Recreational users who are seeking a remote, but non-wilderness type of opportunity (mountain biking, motorcycling, ATV use, etc.) or who want to enjoy a day trip only, can venture into the roadless areas, leaving the wilderness users more opportunity within Wilderness. As roadless areas are moved from their roadless status into Wilderness or another designation, the ability to provide recreational opportunities for the variety of users becomes more limited. Table 3-54 highlights the differences between the types of activities and uses that can occur in Wilderness and activities and uses that are allowed by alternative in roadless areas.

***Table 3-54**. Comparison of Wilderness, 2001 Roadless Rule, and Colorado Roadless Area Prohibitions and Exceptions*

Activity	*Wilderness Act, and FS Directives*	*Alternative 1*	*Alternatives 2 and 4*	*Alternative 3*
Tree cutting	No commercial harvesting. Allows for incidental or administrative uses, wildfire, insect, or disease control in emergency situations and "habitat manipulation" to protect T&E species or to correct conditions created by human influence. No chainsaws except with Regional Forester's approval.	Commercial harvesting only within substantially altered acres. Chainsaw allowed in IRAs. Allows limited tree cutting, sale, or removal within IRAs to (1) maintain or improve TEPS, (2) maintain or restore ecosystem composition, (3) incidental activities, (4) administrative or personal uses.	No commercial harvesting. Chainsaw allowed in CRAs. Tree cutting within the upper tier acres limited to incidental activities or administrative or personal use only. Tree cutting within non-upper tier CRA acres within the CPZ to reduce hazardous fuels, or beyond the CPZ for municipal water supply system, also to maintain or improve TEPS, to maintain or restore ecosystem composition, for incidental activities, and administrative, or personal uses.	Commercial harvesting allowed according to forest plan direction. Chainsaws allowed.
Motor Vehicle/ Mechanical Travel	Prohibited. Exceptions for pre-existing grazing (as approved in annual permits), motorboat, aircraft uses; access to private inholdings pursuant to historic access; pre-existing patented mining leases; or if minimum necessary for uses pursuant to historic use before designation as wilderness. Prohibits bikes and OHVs.	Alternatives 1, 2, 3, and 4 do not address motor vehicle or mechanical transport use. Allowed as specified in forest plan and travel management decisions.		
Motorized Equipment	Prohibited, except with Regional Forester determination in special cases, or Forest Supervisor approval in emergency situations.	Alternatives 1, 2, and 4 do not address motorized equipment. Allowed as specified in forest plan and travel management decisions.		Allowed as specified in forest plan and travel management decisions.
Road Construction	Prohibited.	Allows road construction and reconstruction for (1) public health and safety, (2) CERCLA,	No new roads except for existing and public health and safety in upper tier acres.	Allowed as specified in forest plan and travel management decisions.

Activity	Wilderness Act, and FS Directives	Alternative 1	Alternatives 2 and 4	Alternative 3
		(3) existing rights, (4) road-related damage, (5) certain federal highway projects, (6) road traffic safety, and (7) reasonable access to leasable minerals in existing leased areas.	Within non-upper tier CRA acres, road construction is limited to (1) existing rights, (2) road-related resource damage, (3) road safety, (4) water conveyance for existing water rights, (5) public health safety, (6) hazardous fuel treatments within the CPZ, (7) maintain or restore ecosystem characteristics within the CPZ, (8) for existing oil/gas leases, or (9) for coal leases within the North Fork coal mining area.	
Oil, Gas & Coal	Allowed for existing patented mining leases, pre—December 31, 1983. Prohibits road construction.	Prohibits road construction for future leases.	Prohibits road construction for future oil/gas leases on non-upper tier CRA acres. Adds NSOs to future leases within the upper tier CRA acres. Allows temporary roads within the North Fork coal mining area for future leases.	Allowed as specified in forest plan and travel management decisions.
Water Conveyances	Existing water rights generally not affected. New conveyances must be approved by President. Pre-existing conveyances and related facilities may be maintained and restored if for public need or by valid existing right. Yes, motorized access for water conveyances if pre-existing use or minimum necessary.	Prohibits road construction for future water conveyances.	Allows road and LCZ construction for water conveyance construction, reconstruction, or maintenance w/ pre-existing water court decree if deemed minimum necessary and not affecting cutthroat trout over the long term.	Allowed as specified in forest plan and travel management decisions.
Grazing	Allowed for pre-existing grazing rights permitted before designation.	Alternatives 1, 2, and 4 do not address grazing specifically.		Allowed as specified in forest plan and travel management decisions.

Activity	*Wilderness Act, and FS Directives*	*Alternative 1*	*Alternatives 2 and 4*	*Alternative 3*
	Allows maintenance under Grazing Guidelines related to facilities which may need occasional motorized equipment pursuant to approved annual grazing permit. No road construction.			

Recommended Wilderness Areas

Recommended wilderness areas are lands identified as having undeveloped character and wilderness potential through forest planning. During forest planning, the current undeveloped lands within a forest are assessed using the three-step process to determine if they should be recommended to Congress for the inclusion in the National Wilderness Preservation System.

Affected Environment

Recommended wilderness areas are managed to maintain wilderness character and values until Congress acts on the Agency recommendation or a different Agency recommendation is made. Roadless areas that are recommended for wilderness have management prescriptions that protect the wilderness character of the area, but these areas are not managed as wilderness.

Table 3-55 identifies the currently recommended wilderness areas in Colorado by existing forest plan direction. Several of the older forest plans have no recommended wilderness acres because Congressional actions have added those areas to the Colorado wilderness system. In the future, when these forest plans are revised, additional recommended wilderness acres will likely be identified.

Table 3-55. *Acres of Recommended Wilderness by National Forest*

National Forest	Acres Recommended	Year of Current Forest Plan
Arapaho/Roosevelt National Forest		1997
Comanche Peak Adjacent Area Unit D	1,000	
Comanche Peak Adjacent Area Unit F	1,000	
Comanche Peak Adjacent Area Unit G	3,000	
Mount Evans Adjacent Area Unit A	500	
GMUG	No acres recommended	1983
Manti-La Sal	No acres recommended in Colorado	
Pike-San Isabel	No acres recommended	1984
Rio Grande	No acres recommended	1996
Routt	No acres recommended	1998
San Juan	No acres recommended	1983
White River		2002
Assignation Ridge	12,000	
Eagles Nest - addition	1,000	
Flattops-addition	2,000	
Holy Cross-addition	8,000	
Hunter Fryingpan-addition	4,000	
Ptarmigan Peak-addition	3,000	
Raggeds-addition	2,000	
Red Table	50,000	
TOTAL	***87,500***	

Acres are rounded to the nearest thousand acres.

Environmental Consequences

Alternative 1

Under the exceptions permitted by the 2001 Roadless Rule, road construction and reconstruction and tree cutting could occur in areas recommended for wilderness through specific project planning or the forest planning process. However, this is unlikely to happen as existing plans generally exclude tree cutting and road construction activities in recommended wilderness; unless a site-specific amendment was completed. Alternative 1 would not directly affect any of the recommendations made in forest plans for recommended wilderness areas.

Alternative 2

Roadless areas are managed under a variety of management prescriptions in existing forest plans. Some of the upper tier acres in Alternative 2 are recommended for wilderness in forest plans or draft

forest plans. This would establish a uniform approach to managing areas already identified as being recommended for wilderness. Any changes to that direction would require a rule-making effort.

Alternative 3

Under the provisions in the forest plans, about 87,500 acres are recommended for wilderness (Table 3-56). Areas recommended for wilderness would be managed to protect and preserve existing wilderness character; therefore, road construction and reconstruction, tree cutting, or discretionary mineral activities are prohibited. Recommendations for wilderness designation would be reviewed during the next round of forest planning, typically every 10 to 15 years.

Alternative 4

Roadless areas are managed under a variety of management prescriptions in existing forest plans. Implementation of Alternative 4 with 2.6 million acres in the upper tier would establish a uniform approach to managing over half the CRA acres. Any changes to that direction would require a rule-making effort.

Cumulative Effects

During future forest planning, roadless lands would be available for consideration as wilderness. Because of the limited expected development activities across all alternatives in the next 15 years, a majority of the roadless areas should continue to exhibit wilderness characteristics into the future.

Other Designated Areas

The other designated areas that are discussed in this EIS fall into these categories:

- Congressionally Designated Protection Areas
- Congressionally Designated Wild & Scenic Rivers
- Congressionally Designated Trail, Continental Divide National Scenic Trail
- Administratively Designated Areas

Congressionally Designated Protection Areas

In addition to existing wilderness and forest plan recommended wilderness, six Congressionally Designated Protection Areas, hereafter referred to as “protection areas” have been established on three forests in Colorado by the 1980 and 1993 Colorado Wilderness Acts and the James Peak wilderness and Protection Area Act of 2002 (P.L. 107-216).

Affected Environment

Congressionally designated areas have legislative language clarifying specific management direction as far as road construction and tree cutting. Legislative management direction takes precedence over management direction in a regulatory rule or in a forest plan. Because of that, all of the CDPAs that were in the original 2001 Roadless Rule’s IRAs have been removed from analysis as roadless under all alternatives in the EIS. The six CDPA areas were removed from the 2001 Roadless Rule IRAs analyzed in Alternative 1 and were removed the CRAs analyzed in Alternatives 2 and 4.

***Table* 3-56.** *Congressionally Designated Protection Areas in Colorado*

National Forest	*Congressionally Designated Protection Areas*	*Date and Public Law*	*Total FS Acres/Acres Removed From IRA*	*Road construction and Tree Cutting Direction in Public Law*
Arapaho-Roosevelt	Bowen Gulch Protection Area	1993, Public Law 103-77	10,700/10,700	Prohibits timber harvesting (sec 6(e)), new road construction (sec 6(d)). Allows motorized travel on established routes during periods of adequate snow cover (sec. 6(f)). Mechanized travel shall be permitted (sec. 6(f)).
Arapaho-Roosevelt	James Peak Protection Area	2002, Public Law 107-216	10,400/1,000	Allows for timber harvesting for fuel treatment, control of fire, insect and disease control projects, and protection of public health and safety (sec. 3 (E)). Road construction allowed to replace existing roads, landowner rights, and temporary roads for management (sec. 3 (D)). No net gain in mileage of roads or trails open for mechanized and non-motorized public use (sec. 3 (C) (I)).
GMUG	Fossil Ridge Recreation Management Area	1993, Public Law 103-77	43,500/36,900	Prohibits timber harvesting (sec 5(d)), and new road construction (sec 5(f)). Allows motorized travel on established routes (sec. 5(g)).
GMUG	Tabeguache Area	1993, Public Law 103-77	9,000/9000	Prohibits timber harvesting and road construction. Managed to maintain presently existing wilderness character and potential inclusion in the National wilderness Preservation System (sec. 9(3)). Mechanized or motorized travel not permitted (sec. 9 (4)).
GMUG	Roubideau Area	1993, Public Law 103-77	18,700/18,700	Prohibits timber harvesting and road construction. Managed to maintain presently existing wilderness character and potential inclusion in the National wilderness Preservation System (sec. 9(3)). Mechanized or motorized travel not permitted (sec. 9 (4)).
San Juan	Piedra Area	1993, Public Law 103-77	61,000/61,000	Prohibits timber harvesting and road construction. Managed to maintain presently existing wilderness character and potential inclusion in the National wilderness Preservation System (sec. 9(3)). Mechanized or motorized travel not permitted (sec. 9 (4)). Mechanized or motorized travel not permitted except on Trail 535 if adequate snow cover (sec. 9(4)).

Environmental Consequences: All Alternatives

Similar to the Congressionally designated wilderness areas, these protection areas are not included in roadless areas being analyzed in this EIS. All alternatives would manage these areas according to their individual legislative direction.

Congressionally Designated Wild & Scenic Rivers

The Wild and Scenic River designation protects 61 miles of river under Forest Service administration in the following classifications: 16 miles of Wild classification and 45 miles as Recreation classification. No road construction or tree-cutting are allowed in the wild corridor. In the recreation section of the wild and scenic river corridor, some roads and other activities could occur, as long as the outstandingly remarkable values remain protected.

Affected Environment

Colorado has only one Congressionally designated river, the Cache la Poudre River on the Arapaho-Roosevelt National Forest west of Ft. Collins, Colorado. The river was designated by Congress as a Study River in 1975 and recommended for wild and scenic designation in 1986 (P.L. 99-590).

Environmental Consequences: All Alternatives

None of the alternatives would directly affect the stretch of the wild and scenic river corridor classified as wild, because the statute designating the river is more restrictive than any of the alternatives. Because the law does not allow activities that would degrade those values for which the river corridor was designated, and the law's restrictions take precedence over regulations and forest plan direction, none of the alternatives would directly affect the wild and scenic values in this corridor.

However, as described for wilderness and other Congressionally designated areas, activities allowed to occur on surrounding roadless area acres could indirectly affect the values associated with the wild river designation. Alternative 1, 2, and 4 would have the least potential to affect wild river values in that river corridor; and Alternative 3 would have the highest potential to affect those values.

Congressionally Designated Trail, Continental Divide National Scenic Trail

Congress enacted the National Trails System Act (P.L. 90-543) on October 2, 1978, which established a nationwide trail system and designated the Appalachian Trail and Pacific Crest Trail. The act describes national scenic trails "will be extended trails so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass."

Affected Environment

Congress amended the National Trails System Act with Public Law 95-625, on November 10, 1978, to establish and designate the Continental Divide National Scenic Trail (CDNST), which traverses approximately 800 miles through Colorado along the Continental Divide. The Comprehensive Plan for the CDNST, amended on September 28, 2009, describes that the nature and purposes are to provide for high-quality scenic, primitive hiking and horseback riding opportunities and to conserve natural, historic, and cultural resources along the CDNST corridor. Under forest plan direction, the trail is managed to provide for primarily primitive and semi-primitive non-motorized recreation opportunities and settings, and a scenic integrity level of high to very high. The direction would be

followed under any of the four alternatives. Specific CDNST information is found at www.online at http://www.fs.fed.us/cdt.

Environmental Consequences: All Alternatives

None of the alternatives would directly affect the scenic values for which the CDNST was designated because management direction contained in the statutes associated with this designated trail overrides any existing forest plan direction or rule.

Potential indirect impacts on the high-to-very-high scenic values along this trail corridor could vary by alternative depending on the amount of road construction or tree cutting within view of the CDNST. Among the alternatives, Alternative 1 might have the least potential to affect those scenic and other values along the CDNST from adjacent land management activities with the lowest projected levels of road construction and tree cutting activities. Projected activities in Alternatives 2 and 4 likely would be focused within the CPZs and not likely to affect the CDNST. The upper tier acres of Alternatives 2 and 4 would limit future activities more than the prohibitions of Alternative 1 in the IRA acres. Alternative 3 has the highest potential to affect scenic and other values because of the highest level of projected activities within the IRA/CRA acres.

Administratively Designated Areas

Research Natural Areas (RNAs)

The RNAs in Colorado form a long-term network of ecological reserves designated for non-manipulative research, education, and the maintenance of biodiversity. The RNAs were selected to preserve a spectrum of relatively pristine areas that represent a wide range of natural variability within natural ecosystems and environments and may have special or unique characteristics of scientific importance. The desired condition for RNAs is to maintain natural conditions by allowing ecological processes to prevail with minimal human intervention.

Affected Environment

There are RNAs within roadless areas on seven of the eight national forests in Colorado; there are none on the small portion of the Manti-La Sal National Forest that occurs in the Colorado.

Table 3-57 lists the RNAs on each national forest fully or partially within a roadless area, along with the roadless area name.

***Table 3-57**. Research Natural Areas Within Roadless Areas*

National Forest	Research Natural Area	IRA	CRA
Arapaho-Roosevelt	Boston Peak Fen	Green Ridge West	Green Ridge West
	Mt. Goliath	Mt. Evans Adjacent Area	Mt. Evans Adjacent Area
	Lone Pine	North Lone Pine	North Lone Pine
	North St. Vrain	North St. Vrain RNA, North St. Vrain	North St. Vrain
GMUG	Gothic	Gothic Mountain	Gothic
Pike-San Isabel	Hurricane Canyon	East Pikes Peak	Pikes Peak East
Rio Grande	Finger Mesa	Pole Mountain/Finger Mesa	Pole Mountain/Finger Mesa
	Mill Creek	Crestone	Crestone
Routt	Kettle Lakes	Kettle Lakes	Kettle Lakes
San Juan	Williams Creek	Williams Creek White Fir Natural Area	Graham Park
White River	Main Elk Creek	Elk Creek B	Elk Creek B
	Assignation Ridge	Assignation Ridge	Assignation Ridge
	Hoosier	Hoosier Ridge	Hoosier Ridge
	Battlement Mesa	Housetop Mountain	Housetop Mountain

Management direction for specific RNAs differs among the various national forests. Timber harvest is not allowed, but in some RNAs manipulation of the vegetation for is allowed. New road construction in RNAs is either prohibited or restricted. There are no oil, gas, or coal leases within the RNAs, and no mining sites or other land uses that are subject to reserved or outstanding rights. Table 3-58 summarizes the management direction in each forest plan concerning tree cutting, road construction/reconstruction in RNAs.

***Table 3-58**. Research Natural Area Forest Plan Direction*

National Forest	***Tree cutting***	***Road Construction/Reconstruction and Road Use***
Arapaho-Roosevelt	Timber harvest is not allowed; vegetation manipulation may be used to maintain the unique features for which the RNA was established.	New road construction prohibited; prohibit motorized and mechanized use except when it provides necessary access for scientific, administrative or educational purposes
GMUG	Prohibit logging activity; prohibit direct habitat manipulation; do not reduce fire hazard; take no action against endemic insects or diseases	Generally, physical improvements, such as roads are not permitted
Pike-San Isabel	Prohibit direct habitat manipulation; do not reduce fire hazard; take no action against endemic insects or diseases	Generally, physical improvements, such as roads are not permitted
Rio Grande	Timber harvest prohibited; habitat	Roads restricted; prohibit motorized and

National Forest	Tree cutting	Road Construction/Reconstruction and Road Use
	manipulation only for TES species or where necessary for natural conditions	mechanized use except when necessary for research or educational access
Routt	Prohibit logging and wood gathering activities	New road construction prohibited; prohibit motorized use except when necessary for research or educational purposes
San Juan	Logging activity prohibited; take no action against insects, disease, or reducing fire hazard	Generally, physical improvements, such as roads are not permitted; semi-primitive non-motorized recreation is available
White River	Timber harvesting prohibited; under some circumstances, deliberate manipulation may be used to maintain the ecosystem or the unique features for which the RNA was established, or to reestablish natural ecological processes.	Roads restricted; prohibit motorized and mechanized use except when it provides necessary access for scientific, administrative, emergency, or educational purposes.

There is no projected road construction or tree cutting activities under any of the alternatives in the next 15 years in any of the RNAs.

Environmental Consequences

Alternative 1
Fourteen RNAs are partially or fully within IRAs. The 2001 Roadless Rule prohibitions on tree cutting and road construction continue the goal of the RNA program, maintaining a long-term network of ecological reserves designated for non-manipulative research, education, and the maintenance of biodiversity. As in the forest plans, natural conditions would be maintained by allowing ecological processes to prevail with minimal human intervention. The effect of this alternative is no different from Alternative 3. This alternative maintains the network of ecological reserves found in the RNAs.

Alternative 2
For those RNAs that are within the non-upper tier acres of the CRAs, the provisions of the proposed Colorado Roadless Rule for tree cutting and road construction continue the goal of the RNA program as in Alternatives 1 and 3.

The following RNAs are partially or fully within the upper tier acres of Alternative 2: Battlement Mesa, Boston Peak Fen, Finger Mesa, Gothic, Hoosier, Hurricane Canyon, Kettle Lakes, Lone Pine, Main Elk Creek, Mill Creek, Mt. Goliath, North St. Vrain, and Williams Creek. Within these RNAs under the proposed Colorado Roadless Rule, no human intervention is allowed. No vegetation manipulation would be allowed to maintain the unique features for which the RNA was established.

In the future, any projects proposed in the RNAs listed above could be implemented only within the non-upper tier portions of the CRAs. To the degree the non-upper tier acres allow projects to go forward, the network of ecological reserves would be maintained under this alternative.

Alternative 3

The direction in forest plans for RNAs are to maintain a long-term network of ecological reserves designated for non-manipulative research, education, and the maintenance of biodiversity. In all cases, direction on both road construction and tree cutting in the forest plans maintain natural conditions by allowing ecological processes to prevail with minimal human intervention. This alternative maintains the network of ecological reserves found in the RNAs.

Alternative 4

The following RNAs are partially or fully within upper tier acres of Alternative 4: Boston Peak Fen, Mt. Goliath, Finger Mesa, Mill Creek, Kettle Lakes, Williams Creek, Main Elk Creek, Hoosier, and Battlement Mesa. Within these RNAs under the proposed Colorado Roadless Rule, no human intervention is allowed. No vegetation manipulation to maintain the unique features for which the RNA was established would be allowed.

In the future, any projects proposed in the RNAs listed above could only be implemented within the non-upper tier portions of the CRAs. To the degree the non-upper tier acres allow projects to go forward, the network of ecological reserves would be maintained under this alternative.

Special Interest Areas

Special Interest Areas (SIAs) are identified in the forest plans for each national forest. SIAs are designated for their unique or outstanding botanical, geological, historical, paleontological, cultural, scenic, recreational, zoological (species or habitat diversity), or other significant values. The SIAs may be managed as interpretive sites for public recreation or education and vary in size.

The desired condition in SIAs is to maintain or restore the natural or near-natural conditions and protect the significant values for which the SIA was established. Losses of vegetation in SIAs as a result of insect-disease outbreaks or wildland fires are generally accepted. If activities are allowed in SIAs, they usually maintain or restore the natural conditions and protect threatened, endangered, or sensitive species habitat and the values of the SIA. Generally, roads and facilities may be constructed in SIAs to enhance the values for which the SIA was designated, for interpretive or educational purposes, or to correct resource damage.

Affected Environment

There are 23 SIAs within all or portions of roadless areas on six of the eight national forests in Colorado; they do not occur in roadless areas on the Manti-La Sal or the Pike-San Isabel. Table 3-59 lists the SIAs on the six national forests where they occur in all or portions of a roadless area.

***Table 3-59**. Special Interest Areas Within Roadless Areas*

National Forest	*Special Interest Area*	*IRA*	*CRA*
Arapaho-Roosevelt	James Peak	James Peak	James Peak
	Homestead Meadows	Lion Gulch	Lion Gulch
	Grays Peak	Mt. Sniktau	Mt. Sniktau
	Niwot Ridge	Indian Peaks Adjacent Areas	Indian Peaks Adjacent Areas
	Arapaho National Recreation Area	Indian Peaks Adjacent Areas	Indian Peaks Adjacent Areas
GMUG	Ophir Needles	Ophir Needles	Not in a CRA
	Slumgullion Slide	Cannibal Plateau	Cannibal Plateau
	Alpine Tunnel	Romley	Mirror Lake
Rio Grande	Bachelor Loop	Wason Park	Wason Park
	Blowout Pass	Wightman Fork/Upper Burro	Wightman Fork/Upper Burro
	Devil's Hole	Alamosa River	Alamosa River
	John Charles Fremont	Deep Creek/Boot Mountain	Deep Creek/Boot Mountain
	Wagon Wheel Gap Watershed Experiment Station	Snowshoe Mountain	Snowshoe Mountain
Routt	California Park	Sugarloaf North and South, Nipple Peak North and South, and Shield Mountain	Sugarloaf North and South, Nipple Peak North and South and Shield Mountain
	Black Mountain	Sugarloaf South	Sugarloaf South
	Little Snake	Elkhorn	Elkhorn
	Windy Ridge	Barber Basin	Barber Basin
	Teller City	Never Summer South	Never Summer South
San Juan	Falls Creek Archaeological Area	Not in IRA	Hermosa
White River	Main Elk Creek	Elk Creek B	Elk Creek B
	Porcupine	Tenderfoot Mountain	Tenderfoot Mountain
	Independence Pass	North Independent B	North Independent B
	Colorado Midland Railroad	Wildcat Mountain C	Wildcat Mountain C

Management direction for specific SIAs differs among the various national forests. Timber harvest is not allowed, but in some SIAs manipulation of the vegetation for the purposes of the SIA is allowed. New road construction in SIAs is either prohibited or restricted. There are no oil, gas, or coal leases within the SIAs, and no mining sites or other land uses that are subject to reserved or outstanding rights. There is no projected road construction or tree cutting activities under any of the alternatives in the next 15 years in any of the SIAs. Table 3-60 summarizes the management direction for road construction and tree cutting in SIAs for the forest plans with SIAs in roadless areas.

***Table 3-60**. Forest Plan Direction for Special Interest Areas*

National Forest	Tree Cutting	Road Construction or Reconstruction
Arapaho-Roosevelt	Tree cutting restricted; maintain or restore the natural or near-natural conditions and protect TEPS habitat and the values for which the SIA was established; insect and disease losses are generally accepted	Roads restricted; new facilities may be constructed to enhance the values for which the SIA was designated, for interpretive or educational purposes or to correct resource damage; most SIAs are non-motorized
GMUG	Tree cutting prohibited; prohibit any direct habitat manipulation	Roads restricted
Rio Grande	Timber harvest is prohibited; allow vegetation manipulation only to maintain or enhance the areas' unique values	Roads restricted; Recreation Opportunity Spectrum class is semi-primitive motorized; developed facilities must meet management objectives
Routt	Timber harvest not scheduled and does not contribute toward allowable sale; use only those vegetation management practices necessary to meet specific resource objectives of maintaining or restoring the values for which the SIA was established	Construct new roads only when consistent with SIA values, such as interpretation or education, or to meet other resource objectives such as oil and gas leasing
San Juan	Tree cutting restricted; allow tree removal only for such purposes as public safety, improvement of aesthetics, insect and disease control, ruins research and maintenance, ruins reconstruction, or wildlife habitat improvement	Roads restricted; develop transportation system only to enhance cultural resource interpretation or maintenance opportunities
White River 2.1 Management Area	Tree cutting restricted; allow vegetation management practices necessary to meet specific resource objectives of maintaining the values for which the individual area was proposed or established	Roads restricted; regulate motorized and mechanized travel where necessary to protect the values for which the individual area was proposed or established
White River 3.1 Management Area	Tree cutting restricted; allow vegetation manipulation when necessary to reduce fuel loads, maintain or restore natural conditions, or enhance other values for which the individual area was proposed or established	Roads restricted; construct new roads only when necessary for interpretive or educational purposes or to correct resource damage from existing roads

Alternative 1

Twenty-three SIAs are partially or fully within IRAs. Generally, the 2001 Roadless Rule prohibitions on tree cutting and road construction are in harmony with protecting the significant values for which the SIA was established. The 2001 Roadless Rule prohibits road construction for access to conduct vegetation manipulation or for interpretive or educational purposes. Tree cutting to maintain or restore the characteristics of ecosystem composition and structure, tree cutting for threatened, endangered, proposed or sensitive species habitat improvement or incidental tree cutting is allowed. Alternative 1 would allow for the basic maintenance the SIAs.

Alternative 2

Twenty-two SIAs are partially or fully within CRAs. Generally the provisions of the Colorado Roadless Rule for tree cutting and road construction are in harmony with protecting the significant values for which the SIA was established.

The forest plan restricts road construction and tree cutting to narrowly defined reasons, all related to the enhancement or support for the purpose of the individual SIA. The provisions of the Colorado roadless rule would allow vegetation manipulation for maintaining or restoring the characteristics of ecosystem composition, structure or processes or for threatened, endangered, proposed or sensitive species habitat improvement, which could enhance and support the desired conditions of the SIA. Any tree cutting would have to meet both the provisions of the Colorado Roadless Rule as well as the provisions in the forest plan. Road construction for public access would not be allowed.

The Niwot Ridge SIA and the Arapaho National Recreation Area SIA are partially within upper tier acres in this alternative. No road construction or tree cutting, except that which is incidental or administrative would be allowed within these acres. In the case that vegetation manipulation was desired to enhance the SIA, it would not be allowed on these upper tier acres. Alternative 2 would maintain the SIAs within the non-upper tier acres.

Alternative 3

The SIAs are designated in the forest plans, and the desired conditions, as well as any associated standards and guidelines, are to maintain or restore the natural or near-natural conditions and protect the significant values for which the SIA was established. There is restricted road construction and tree cutting. Vegetation manipulation and road construction are allowed only to further the purposes of the SIA, such as restoring natural conditions or to allow public access for interpretive or educational purposes. It is rare that these activities are conducted within SIAs.

Alternative 4

Twenty-two SIAs are partially or fully within CRAs. Generally the provisions of the Colorado Roadless Rule for tree cutting and road construction are in harmony with protecting the significant values for which the SIA was established.

The forest plans restrict road construction and tree cutting to narrowly defined reasons all related to the enhancement or support for the purpose of the individual SIA. The provisions of the Colorado Roadless Rule would allow vegetation manipulation for maintaining or restoring the characteristics of ecosystem composition, structure or processes or for threatened, endangered, proposed or sensitive species habitat improvement, which could enhance and support the desired conditions of the SIA. Any tree cutting would have to meet both the provisions of the Colorado Roadless Rule as well as the provisions in the forest plan. Road construction for public access would not be allowed.

There are four SIAs totally within upper tier acres in this alternative: Blowout Pass, Devil's Hole, Wagon Wheel Gap Watershed Experiment Station, and Porcupine. Eleven SIAs are partially within upper tier acres: James Peak, Homestead Meadows, Niwot Ridge, Arapaho National Recreation Area, John Charles Fremont, California Peak, Black Mountain, Little Snake, Windy Ridge, Falls Creek Archaeological Area, and Main Elk Creek. No road construction or tree cutting except that which is incidental or administrative would be allowed within these acres. In the case that vegetation manipulation was desired to enhance the SIA, it would not be allowed on these upper tier acres.

Alternative 4 would maintain the SIAs within the non-upper tier acres, and depending on circumstances, might not provide proper maintenance within the upper tier acres.

Roadless Area Characteristics

As discussed and described in Chapter 1, there are nine roadless area characteristics identified and defined in the 2001 Roadless Rule and referred to in the proposed Rule. Roadless area characteristics are resources or features that are often present in or characterize roadless areas[16]:

- High quality or undisturbed soil, water, and air
- Sources of public drinking water
- Diversity of plant and animal communities
- Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land
- Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation
- Reference landscapes
- Natural appearing landscapes with high scenic quality
- Traditional cultural properties and sacred sites
- Other locally identified unique characteristics

Roadless area characteristics are discussed in detail throughout specific resource sections in this document. One of the nine roadless area characteristics, reference landscapes, describes the ability for roadless areas to be used as a benchmark for measuring changes in areas with similar ecological characteristics. Reference landscapes contribute to the body of knowledge about the effects of forest management activities over long periods of time and on large landscapes, providing comparison areas for evaluation and monitoring.

Affected Environment

When considering the nine roadless area characteristics, each individual roadless area is unique. The Colorado roadless areas are described in the roadless profiles found on the website (www.roadless.fs.fed.us). These profiles describe each roadless area and the roadless area characteristics within each CRA. Five tables in Appendix A (Tables A-4a through A-4e) and each CRA profile contain a cross-walk between the IRAs and the CRAs in order to display the overlap and differences between the CRA and IRA boundaries and roadless area characteristics.

Environmental Consequences

In an increasingly developed and fragmented landscape, large intact tracts of land become increasingly important for the resources and features described in the roadless area characteristics. Disturbance events, such as high-severity wildfire, can compromise some of the characteristics.

Effects Common to All Alternatives

Certain management activities, such as road construction, have the greatest likelihood fragmenting roadless areas. Other management activities, such as tree cutting and the use of linear construction

[16] *These features or resources can also be present in areas of the national forests that are not designated as roadless.*

zones, or energy development may also compromise roadless area characteristics. However, all potential projects under all alternatives would be subject to multiple forest plan goals, objectives, standards and guidelines that directly or indirectly protect soil, water, air, diverse plant and animal communities, habitat for threatened, endangered, proposed or sensitive species, recreation opportunities, reference landscapes, scenic integrity, traditional cultural properties, sacred sites, and other unique characteristics.

Alternative 1

The substantially altered acres within the IRAs (459,100 acres) comprising approximately eleven percent of the total IRA acres, have lost some of their roadless area characteristics. Tree cutting would continue to occur on these acres under this alternative. Future tree cutting, sale, or removal and road construction or LCZs would have limited impact beyond the substantially altered areas. It is anticipated that less than one percent of additional acreage would be impacted by this alternative within the next 15 years, including those lands under an existing oil, gas or coal lease.

Most of the IRA acres that currently exhibit high quality roadless area characteristics would retain those into the future. On the limited areas where future tree cutting may occur, the action must maintain or improve one or more of the roadless area if it is not in a substantially altered condition. Activities located in areas that have been substantially altered do not have to maintain or improve roadless area roadless area characteristics.

By allowing fewer management activities, particularly those involved with reducing wildfire hazard around at-risk communities, this alternative has the lowest potential to reduce the effect of high severity wildfires or limit the severity of some insects or disease spread. This could impact some of the roadless area characteristics such as public drinking water or high quality water, soil and air resources. It does provide substantial roadless protection for areas beyond the substantially altered areas, with some exceptions. All projects would be subject to site-specific environmental review under NEPA analysis. .

Alternative 2

Due to the limited projected tree cutting, sale, or removal and road construction or LCZs less than two percent of the 4,185,600 acres within the CRAs would be impacted by this alternative within the next 15 years, including those lands under an existing oil, gas or coal lease. Most of the CRA acres that currently exhibit high quality roadless area characteristics would retain those into the future. Approximately four percent of the substantially altered acres (459,100 acres) have projected tree cutting in the next 15 years and likely would continue to have reduced roadless area characteristics, depending on land management plan direction.

Future activities within CRAs could have potential effects on the undeveloped and natural qualities of roadless area characteristics; however these acres are expected to be limited in any specific area and temporary roads are required to be decommissioned after use including those for oil, gas, and coal leases. Short-term roadless area characteristics could be negatively impacted but through restoration activities and time, roadless area characteristics would be maintained or improved over the long-term within the CRAs. Future activities are unlikely to affect natural ecosystem forces or opportunities for primitive and unconfined recreation.

This alternative allows tree cutting to reduce the risk of wildfire hazard around at-risk communities and municipal water supply systems, except in the upper tier acres. By allowing management activities, this alternative has the potential to reduce the effect of high severity wildfires. This could lessen impacts to some roadless area characteristics, such as public drinking water or high quality water, soil and air resources, in the event of a wildfire. Temporary roads associated with fuel treatments and other exceptions could impact connectivity and fragmentation. Upper tier areas would exhibit additional restrictions that would protect roadless characteristics in most cases. All projects would be subject to site-specific environmental review under NEPA analysis. .

Alternative 3

Some existing forest plan management prescriptions limit tree cutting, sale, or removal and road construction or reconstruction. There is no specific forest plan language limiting the use of LCZs or the placement of oil and gas pipelines, electrical power lines or telecommunication lines within the roadless areas.

In considering the entire analysis area for all alternatives (4,653,100 acres), approximately 10 percent are substantially altered by past management activities. These acres are within the IRAs but have been removed from the CRAs. Future management activity in these areas could affect some roadless area characteristics.

By allowing a wider range of management activities, this alternative has the potential to reduce the effect of high severity wildfires or limit the severity of some insects or disease spread to a greater extent than the other alternatives. However, these activities could also lead to landscape fragmentation. All projects would be subject to site-specific environmental review under NEPA analysis.

Alternative 4

The effects would be similar to Alternative 2, but because there are more upper tier acres with less activity, more acres within the CRAs are likely to retain their existing roadless area characteristics over time. Most of the CRA acres that currently exhibit high quality roadless area characteristics would retain those into the future. A small portion of substantially altered acres would continue to have reduced roadless area characteristics, depending on land management plan direction.

Future activities within CRAs could have potential effects on the undeveloped and natural qualities of roadless area characteristics; however, such acreage is expected to be limited in any specific area and the temporary roads are required to be decommissioned after use including those for oil, gas, and coal leases. Short-term roadless area characteristics could be negatively impacted but through restoration activities and time, roadless area characteristics would be maintained or improved over the long-term within the CRAs. Such activities are unlikely to affect natural ecosystem forces or opportunities for primitive and unconfined recreation.

As with Alternative 2, this alternative allows tree cutting to reduce the risk of wildfire hazard around at-risk communities and municipal water supply systems, except in the upper tier acres. By allowing management activities, this alternative has the potential to reduce the effect of high severity wildfires or limit the severity of some insects or disease spread. This could lessen impacts to some roadless area characteristics, such as public drinking water or high quality water, soil and air resources, in the event of a wildfire.

Cultural Resources

Cultural resources, also known as heritage resources, refer to areas, sites, buildings, art, architecture, memorials, and objects that have scientific, historic, or cultural value. They link people to their cultural history, provide insight into how people lived in the past, and reveal past and ongoing relationships between people and the natural world. Many of the Nation's cultural resources are located on public lands, with NFS lands containing more than 330,000 known sites nationwide.

Traditional cultural properties and sacred sites are also considered cultural resources and could exist within roadless areas in Colorado. Sacred sites are places that are determined sacred by virtue of their established religious significance to or ceremonial use. Past consultations with Tribes and rural communities in Colorado indicate that certain tribes and ethnic groups have some specific traditional use areas within the roadless areas. Members of the various Ute Tribes are known to use some roadless areas in Colorado for traditional plant gathering and hunting. Because of cultural sensitivities and the desires of traditional tribal practitioners, exact areas for these types of activities often are not publicly disclosed. Evaluating the existence and significance of traditional cultural properties and sacred sites requires consultation with tribal members who possess traditional knowledge of these areas. Traditional cultural properties and sacred sites have not yet been extensively inventoried on NFS lands, especially in roadless areas. .

Inventories and evaluations of effects of land management activities on cultural resources are completed during analysis of the proposed site-specific activities; measures are designed to avoid or minimize harm to those resources. If human remains are discovered before or during project implementation on NFS lands, the Forest Service consults with culturally affiliated tribes and takes appropriate actions, in accordance with the Native American Graves Protection and Repatriation Act. Federal agencies are to accommodate access to and ceremonial use of Native American sacred sites by Native American religious practitioners, and are to avoid adversely affecting the physical integrity of such sacred sites when practicable.

Affected Environment

Of the more than 30,000 cultural resource sites on NFS lands in Colorado, more than 17,600 (approximately 59 percent) are either considered significant and eligible for inclusion, or listed on the National Register of Historic Places (NRHP), or their significance is unknown and they are managed as though eligible for inclusion on the NRHP. Of the 30,000 sites identified on NFS lands in Colorado, more than 1,400 are currently known to exist within IRAs and more than 1,200 are currently known to exist within CRAs. Sites include historic, prehistoric, and traditional cultural properties. Additional cultural resources likely exist within roadless areas, but have yet to be discovered or documented (data obtained from the USDA Forest Service Region-2 INFRA-heritage database 2008).

There are two resident tribes in Colorado, both retaining some of their traditional land base as reservations via a series of treaties, agreements, and laws. The Ute Mountain Ute and Southern Ute Tribes (consisting originally of the Weeminuche, Capote, Tabeguache, and Mouaches Bands)—each a "domestic sovereign" nation—have reserved some specific off-reservation hunting rights in Colorado and retain inherent aboriginal rights throughout their traditional territory. Many other tribes located outside Colorado maintain tribal interests, including aboriginal and ceded territories, and retain inherent aboriginal rights within the State.

Environmental Consequences

Effects Common to All Alternatives

All alternatives require compliance with existing laws and regulations; therefore, before any management actions take place. The standard process for considering effects would be conducted as required by the implementing regulations for the National Historic Preservation Act. In most cases, a cultural resource inventory would be conducted and impacts would be avoided or mitigated. Tribal consultation is an integral part of the planning process for management actions; as well as consultations with the State Historic Preservation Officer and other interested parties.

Forest Service land management practices have the potential to affect buried or surface remains of archaeological sites, historic sites, and sites of traditional or religious importance to tribes. Whenever roads or other facilities are constructed, there may be a variety of associated impacts on cultural resources that affect the integrity of those sites. The risk of adverse impacts from activities in roadless areas would be relatively low in all alternatives based on projections of activity levels.

Fires can damage historic and prehistoric buildings and structures, culturally modified trees, artifacts, features, and other surface remains. By removing vegetation, fires expose sites and make them more vulnerable to erosion damage and vandalism. Recreation activities, ongoing permitted or authorized activities can impact cultural resources. These activities do not vary by alternative.

Impacts on tribal governments and tribal practices from the Colorado roadless rulemaking process are not expected because of consultation requirements with individual tribes. The Forest Service has been consulting with Colorado-affiliated tribes regarding this proposed rulemaking action and analysis process.

Alternative 1

Implement the 2001 Roadless Rule would likely result in less risk of direct adverse effects on cultural resources from ground-disturbing activities. Adverse impacts associated with road construction would be minimized on historic landscapes, potential sacred sites, and traditional cultural properties. Some impacts would be seen with all alternatives associated with existing oil/gas and coal leases. With the minimal amount of human development or land use activities, there would be little affect to traditional uses by tribes or rural communities, such as traditional gathering of plants, hunting, fishing, or spiritual practices that may occur in IRAs. There would be a slightly greater risk of experiencing negative impacts to cultural resources from wildland fires with less tree cutting projected for community protection, which pose a risk of adverse effects on cultural resources.

With all alternatives, site-specific projects would be analyzed in accordance to NEPA and other laws and required consultation that protect cultural resources. Activities allowed will be conducted as required by the implementing regulations for the National Historic Preservation Act; impacts would be avoided or mitigated, consultation would be done with Tribes, as well as consultation with the State Historic Preservation Officer and other interested parties.

Alternative 2

Alternative 2 prohibits road construction, tree cutting, and the use of linear construction zones, with some exceptions. It also designates upper tier acres, providing additional restrictions. The effects and adverse impacts on historic landscapes, potential sacred sites, and traditional cultural properties,

traditional uses by tribes or rural communities, such as traditional gathering of plants, hunting, fishing, or spiritual practices are minimal.

By allowing more treatments for hazardous fuels and forest health purposes, this alternative would also reduce the chance of the CRAs experiencing large, stand-replacing wildfires, which can cause adverse effects to cultural resources, as described for Alternative 1.

There could be small, localized impacts from a number of ongoing activities, although the magnitude of human activities in CRAs would continue to be less than on other NFS lands and would be analyzed in more detail during site-specific NEPA analysis.

Compared to Alternative 1, Alternative 2 could result in a slightly higher risk of adverse impacts on cultural resources from ground-disturbing activities, mostly focused within the CPZ area, or associated with the North Fork coal mining area. However, if cultural resources are located within the upper tier, it would provide additional protections. Compared to Alternative 3, Alternative 2 likely would result in less risk of adverse impacts.

Alternative 3

Compared to the other alternatives, Alternative 3 would result in the highest risk of adverse impacts on cultural resources from ground-disturbing activities. There would be more potential for damage or loss of cultural resources. Alternative 3 would continue to provide for satisfactory maintenance of the current condition of cultural resources in the roadless areas. Alternative 3 would provide the greatest opportunity to increase heritage tourism and interpretation, compared to the other three alternatives. By allowing for more treatments for hazardous fuels purposes, this alternative would also reduce the chance of roadless areas experiencing high-severity wildland fires, which can cause adverse effects on cultural resources.

Alternative 4

This alternative provides the same prohibitions and exceptions as Alternative 2**.** The difference is the addition of 1.6 million acres of upper tier acres. This will further limit the potential cultural impacts within CRAs of alternative4.

Cumulative Effects

Given the increasing vulnerability of cultural resources located on private lands, cultural resources on public lands are becoming progressively more popular as resources to visit and protect. Potentially, there could be an increase in hazardous fuels treatments due to the bark beetle epidemic in Colorado. However, fuel reduction activities are designed to minimize the threats and associated impacts of wildfire, which could be detrimental to some cultural resources. Other ground-disturbing activities, such as energy development, also threaten cultural resources.

In general, more restrictive management would result in less direct impacts associated with ground-disturbing activities. However, prohibiting roads would limit the opportunity to develop tourism infrastructure for cultural resources. Limiting fuel reduction activities might also put certain cultural resources at risk from wildfire. Any future project, under all alternatives, would be subject to site-specific evaluation under analysis for NEPA and state consultation.

Lands: Special Use Authorizations

The Forest Service issues special use authorizations (SUAs) for third party owned facilities located on NFS lands. These SUAs include temporary permits, permits, term permits, leases and easements. All of these uses require some type of access to the facility for the original construction and the continued operation and maintenance. These facilities might need some incidental tree removal periodically for continued safe operation, or under certain emergency conditions. There are also SUAs issued for access to private and other ownerships. Access to private land and other ownership can be motorized or non-motorized, depending on the situation. Recreation-related permits are discussed separately in the recreation section of the EIS..

Affected Environment

There are approximately 140 different types of lands uses that can be authorized on NFS lands. In Colorado, there are approximately 3,900 lands SUAs issued to individuals, business entities, State and local governments and other federal agencies. Uses include, but are not limited to, roads, reservoirs, weather stations, snotel sites [17], communication sites, railroads, service buildings of all types, electric transmission and distribution lines, telecommunication facilities (copper phone and fiber optic lines), oil and gas pipelines, ditches and other water conveyance structures, including Federal Energy Regulatory Commission (FERC) hydropower projects. The authorized uses provide a variety of products to individuals and the general public throughout the United States, and can and do impact NFS lands.

As private land is developed adjacent to and on inholdings within NFS land, demand for authorizations for uses has grown. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) requires the agency to provide for access to inholdings based on the reasonable use and enjoyment of the property. Additional proposed SUAs adjacent to private land may include: water systems, wells, fences and access roads to support and enhance the activity on private lands.

Proponents for any SUA are required to submit a proposal, with an explanation of the purpose and need for the project or facility; a justification for the need for use of NFS lands; the public need for and benefit from the facility; and the appropriateness of the use for that particular management area, based on the forest plan, or other planning documents. The Forest Service accepts only proposals for facilities where the proponent has satisfied the criteria that they are not able to accomplish the use on non-NFS lands (FSH 2709.11, chapter 10, 12.32a: Appropriate use of NFS lands; 36 CFR 251.54(e)(5) (i) and (ii)). It is important to note that just because someone applies for a special use authorization for use and occupancy of NFS lands, the Forest Service is not obligated under most circumstances, to grant the use. During the proposal/application process, the agency determines its legal obligations to grant authorization, and then acts accordingly. If the agency accepts an application that triggers NEPA analysis, the responsible official can still select the No Action alternative, and deny the use based on the analysis. .

[17] *Automated system of snowpack and related climate sensors*

Environmental Consequences

Effects Common to All Alternatives

It is important to note that all discussions about future use and occupancy of IRAs and CRAs by third parties under authorization are purely speculative. Proposals for third party use and occupancy on NFS all come from outside the agency. The agency recognizes the increased oil and gas leasing activity, and so anticipates need for future transportation of product. The agency recognizes current increased growth in the rural west in and around the National Forests, and anticipates proposals for additional access and facilities for those developed lands.

Going hand in hand with that expansion, is the need for more municipal water. The agency sees many communities expanding their municipal watershed areas, and including more NFS lands in their municipal watershed. This could result in less access for traditional lands use authorizations, and infringe more on roadless areas.

The agency recognizes current trends for exploration of renewable energy sources, and anticipates proposals for siting of those facilities on NFS lands. Siting of renewable facilities on NFS lands necessitates connection to the national power grid with existing or additional new electric power lines. But trends and anticipation do not necessarily equate to action on the part of individuals or companies. Many entities would prefer to avoid locating facilities on National Forests, and certainly outside of IRAs or CRAs, but for some facilities, that is nearly impossible. Linear facilities in particular, often have no other options. Existing holders of any SUA are limited by the current location of the facility, depending on what it is. For existing holders of water conveyance system SUAs, expansion of those facilities to meet a growing need necessitates continued work with the agency, and work on the facility as it is currently located—no matter if it is in a roadless area or not. Projections for additional road construction and tree cutting for future SUAs are speculative. Due to the speculative nature of the projections for the reasons outlined above, differences among alternatives are discussed qualitatively, based on restrictions and exceptions under the different alternatives.

No alternative revokes, suspends or modifies any permit or other legal instrument authorizing the occupancy and use of NFS lands that has been issued before the effective date of the rule. Third party owned facilities that are authorized by SUA all require some type of access; however, it is not necessarily road access. Existing SUAs that authorize roaded access will continue to authorize roaded access and allow construction or reconstruction of roads under all alternatives. Authorized access roads are constructed to minimum standards, based on site-specific NEPA analysis and resource conditions. .

Future authorization of any land use under an SUA varies by alternative. In most cases, roaded access for all facilities could be allowed for health, safety and emergency reasons that without intervention could cause the imminent loss of life or property in both upper tier and non-upper tier acres.

This section of the EIS analyzes the following lands SUA facilities: oil and gas pipelines from sources located outside of roadless areas, electric power lines and telecommunications facilities, water conveyance structures, and a fourth category of all other land uses (including renewable energy facilities such as wind and solar). Oil and gas pipelines are assumed to be co-located with roads for existing leases within roadless areas and are analyzed in the oil and gas section of this EIS.

Forest plan direction that discourages or restricts the location of certain SUA facilities is followed in all alternatives and does not vary by alternative.

Oil and Gas Pipelines from Sources Located Outside of Roadless Areas

There are existing oil and gas leases within and on lands adjacent to IRAs and CRAs. Pipelines are a necessary component of infrastructure for production and transportation of oil and gas products and fulfillment of lease rights. Construction or reconstruction of pipelines for existing leases within roadless areas varies slightly by alternative and are assumed to be co-located with roads.

Agency policy reflects Bureau of Land Management (BLM) policy that recognizes authorized oil and gas pipeline construction does not require a road-- the area of disturbance for the installation of the pipeline is considered a LCZ. This analysis follows that policy and all pipelines located within roadless areas to transport product from sources outside of roadless areas are constructed or reconstructed using LCZs as dictated by pipeline direction in each of the four alternatives.

Alternative 1

There is no rule language limiting the use of LCZs and no rule language limiting the location of future oil and gas pipelines in IRAs from sources outside of IRAs. Within the limits of forest plan direction, oil and gas pipelines can be constructed in IRAs from oil and gas leases located outside of IRAs using LCZs.

There is no restriction on future oil and gas pipelines under this alternative to be constructed or reconstructed with LCZs.

Alternative 2

Construction of an oil and gas pipeline from a source or sources located exclusively outside of a CRA is prohibited after the effective date of the rule unless they connect to infrastructure within a CRA and the Regional Forester determines such a connection would cause substantially less environmental damage. Once it is determined that the pipeline would be located in a CRA, an LCZ can be used for its construction with a determination by the Regional Forester. The upper tier acres follow this same direction.

If it is determined that the pipeline would not be located within a CRA, the decision may necessitate longer routes, and larger pipelines to increase capacity for the future. This could have an economic effect on the proponent and all other agencies involved because of limited siting locations.

Alternative 3

This alternative is the same as Alternative 1 where LCZs are not limited.

Alternative 4

This alternative is the same as Alternative 2, with additional upper tier acres.

Electrical Power Lines and Telecommunication Lines

Electrical power lines and telecommunication lines currently are located in IRAs and CRAs. The agency will continue to receive proposals for additional electric transmission and distribution lines and telecommunication lines as energy sources are identified and developed, as private land adjacent to or within roadless areas is developed, and as new back-up transmission facilities are needed by the public and industry. New energy sources (renewables) would need to be connected to the electrical grid, both for construction purposes and then transportation of product to market. Most of these lines

are routed to take the path of least resistance—cross-country, through saddles, along existing disturbance if possible. These lines can be constructed with LCZs, but sometimes need some type of motorized access for operation and maintenance.

Alternative 1
There is no rule language limiting the location of future electrical power lines and telecommunication lines in IRAs or limiting the use of LCZs for their construction, reconstruction or maintenance. If uses are authorized in IRAs in the future, there is no provision for road construction for the construction, operation or maintenance of electrical power lines or telecommunication lines. Within the limits of forest plan direction, electrical power lines and telecommunication lines could be constructed in IRAs using LCZs.

If roaded access would be necessary, the siting route would be required to be located outside IRAs. Relocation outside an IRA could result in increased construction and operation and maintenance costs for the proponent, and possibly for the Forest Service also. Higher costs would ultimately be borne by the utility customers. Relocation outside an IRA could also cause greater environmental impacts if the route is significantly longer than it would have been if routed through the IRA.

Alternative 2
LCZs for electrical power lines and telecommunication lines would only be authorized within CRAs if a Responsible Official determines there is no opportunity for the project to be implemented outside of a CRA without causing substantially greater environmental damage. Once it is determined that the location would be within a CRA, the Regional Forester must determine that a LCZ can be used for the construction, reconstruction, and maintenance of existing or future authorized electrical power lines or telecommunication lines. The upper tier acres follow this same direction.

If roaded access would be necessary, the siting route would be required to be located outside CRAs. Relocation outside a CRA could result in increased construction, operation and maintenance costs for the proponent. Higher costs would ultimately be borne by the utility customers. Relocation outside a CRA could also cause greater environmental impacts if the route is significantly longer than it would have been if routed through the CRA.

Alternative 3
Other than where forest plan direction discourages or restricts the location of certain SUA facilities or restricts road construction, electrical power lines and telecommunication lines can be constructed through IRAs. Roaded access or LCZs can be used, depending on Management Area direction. This could benefit the proponent and the consumer by placing the electrical power line or telecommunication line in the most economically viable location for connection to the electrical grid. Placement of the facility would also be subject to site-specific NEPA analysis, to determine the most environmentally desirable location.

Alternative 4
This alternative would have the same effects as Alternative 2, with additional upper tier acres.

Water Conveyance Structures
As water needs increase throughout the country and drought cycles continue, holders are asking for authorization to expand and enlarge existing reservoirs and water conveyance structures. The agency also anticipates an increase in proposals for new reservoirs and the associated water conveyance

systems on NFS lands in Colorado, including roadless areas. There may also be applications for new FERC hydropower facilities. The location of water conveyance structures is only limited by forest plan direction and does not vary by alternative. What does change by alternative is how the water conveyance structures are constructed, reconstructed, operated, and maintained. Three of the alternatives allow for road construction for at least some of the future water conveyance structure SUAs. All of the alternatives allow for LCZs for at least some of the future water conveyance structure SUAs. .

Based on information from the State of Colorado Department of Natural Resources (DNR) and the State Engineer's Office, there are about 3,030 water rights currently located in CRAs. It is estimated there are 2,790 absolute water rights within CRAs, with about 840 of these associated with a reservoir, structure or lake. In addition, there are about 230 conditional water rights within CRAs, with about 50 of these associated with a reservoir, structure or lake.

In Alternative 2, there are about 2,330 absolute water rights in non-upper tier, of which 700 are associated with an existing structure or potential future site. About 460 absolute water rights occur in upper tier, of which 140 would be associated with an existing structure or potential future site. A total of 200 conditional water rights occur in non-upper tier, with 40 of these associated with an existing structure or potential future site. About 30 conditional water rights occur in upper tier, with about 10 of these associated with an existing structure or potential future site.

In Alternative 4, there are about 1,060 absolute water rights in non-upper tier, of which 270 are associated with an existing structure or potential future site. About 1,730 absolute water rights occur in upper tier, of which 560 would be associated with an existing structure or potential future site. A total of 90 conditional water rights occur in non-upper tier, with 15 of these associated with an existing structure or potential future site. About 140 conditional water rights occur in upper tier, with about 30 of these associated with an existing structure or potential future site.

All of these estimates include environmental water rights (instream flows, conservation pools). These estimates include authorized facilities. They also could include unauthorized facilities, and Forest Service owned and operated facilities and water rights. They could also include conditional water rights that have not been developed, and that have not gone through the Special Use authorization process with the Forest Service.

Alternative 1

If uses are authorized in IRAs in the future, there is no provision for road construction for the construction, operation or maintenance of water conveyance SUAs. Linear construction zones are not prohibited under this alternative so conceivably, some water conveyance structures could be constructed in an IRA under this alternative using an LCZ.

If roaded access would be necessary, future water conveyance structures could not be located in IRAs or adjacent to IRAs where roaded access would be needed within an IRA. Not allowing roaded access to future proposed uses within IRAs could cause public hardships or greater environmental damage to land outside of an IRA (i.e., higher customer rates, longer and more expensive construction of the facility, etc.).

Alternative 2

If water uses are authorized in CRAs in the future, the Regional Forester would be required to determine if road construction and LCZs are allowed. Water uses are limited to Forest Service

authorized water conveyance structures operated pursuant to a pre-existing water court decree [as of the effective date of the rule]. Before the effective date of the rule, if someone files for a water right through the State, the Forest Service still can oppose the water right application. The water right decree does not guarantee access across NFS. The water right holder would still need to apply for a SUA in order to gain authorized access to the water right to put it to beneficial uses. In the upper tier acres, only LCZs could be used.

If roaded or LCZ access would be necessary for future water conveyance structures that do not currently have a pre-existing water court decree, they could not be located in CRAs, or adjacent to CRAs where roaded access would be needed within a CRA. This could cause public hardships (i.e., higher customer rates, longer and more expensive construction of the facility, etc.) if the alternate location outside of CRAs proved to be more expensive to construct or had more environmental effects.

For currently authorized and future authorized water conveyance structures operated pursuant to a pre-existing water court decree in non-upper tier acres, roads and LCZs would be allowed. This may be beneficial to the proponents of these new facilities because it does not limit their most effective means of access for construction, operation and maintenance.

Alternative 3
Other than forest plan direction that discourages or restricts the location of certain SUA facilities or restricts road construction, water conveyance structures can be located in IRAs. This could benefit the proponent by placing the water conveyance structure in the most environmentally feasible and economically viable location.

Alternative 4
Alternative 4 has the same prohibits and exceptions as Alternative 2. There are an additional 1.4 million upper tier acres in this alternative than Alternative 2. Water conveyance structures in the upper tier acres can only use LCZs for their construction, reconstruction or maintenance.

All Other Land Uses

This category applies to all other proposed lands special uses, some of which were listed in the introduction and the affected environment sections of this report. This category also includes some renewable energy facilities.

As alternative energy sources are explored, proposals for wind energy testing and eventual build out, and solar facilities may become more prevalent on NFS lands. To date, proposals for wind, solar, and geothermal development have focused on NFS lands adjacent to private land that is already being developed on ridge tops and on the National Grasslands. Subject to forest plan direction, special use authorizations for wind and solar facilities could be allowed under all alternatives. But these facilities would be unlikely under Alternatives 1, 2 and 4. Alternative 3 is the only alternative that may allow roads for construction, operation and maintenance of other authorized land use facilities. Alternative 1 and 3 may allow for the use of LCZs for these other uses. Under the other alternatives, roads would not be allowed for other land use facilities, except for the listed exceptions for the listed uses. .

Alternative 1
If other lands special use facilities are authorized in IRAs in the future, there is no provision for road construction for the construction, operation or maintenance of SUAs. Linear construction zones are

allowed under this alternative. Some SUAs may be able to be constructed or periodically maintained using a LCZ as opposed to a road. If roaded access would be necessary, there could be economic issues for proposed uses that would normally have been located in or near IRAs, if their route would need to be located outside IRAs and that relocation increased construction and operation and maintenance costs. Not allowing roaded access to future proposed uses could cause public hardships or greater environmental damage (i.e., higher rates passed onto customers, longer and more expensive construction of the facility, etc.) if there were additional economic or environmental effects outside of an IRA. But, not allowing additional land uses in IRAs might preserve some of the roadless area characteristics.

Alternative 2
Alternative 2 does not allow for roaded access or LCZs for any other future uses. This would necessitate siting all new facilities outside of CRAs if they would require motorized roaded or LCZ access for construction, operation and maintenance. This would limit options for siting, and could cause economic issues for the proponent by limiting options, and environmental concerns for the public and the agency. Not allowing additional land uses in CRAs may preserve some of the roadless area characteristics.

Continued avoidance of CRAs for certain authorized third party uses could necessitate siting in areas adjacent to the CRAs. Site-specific NEPA analysis for these uses would allow for mitigation for potentially conflicting adjacent uses.

Alternative 3
Forest plans may allow for all these uses, and the associated road construction or LCZs. Forest plans are normally silent on LCZs, and do not specifically prohibit them. If not allowed under the current forest plan management direction, the Plan may be amended if necessary, with site and project specific NEPA.

Alternative 4
The impacts for this alternative are the same as Alternative 2, with additional upper tier acres.

Cumulative Effects

Continued population growth, more need for municipal, agricultural and domestic water, applications for hydropower development, sale and development of inholdings, subdividing of long time historic ranch lands, push for domestic, renewable, and low-carbon energy sources and the need for connection of those sources to electrical grids, need to get products to market via pipelines, power lines, telecommunication lines and roads all may affect management of NFS, both within and adjacent to IRAs and CRAs.

Overall environmental cumulative effects of allowing roaded access to certain described uses, and prohibiting roaded access to other similar uses may simply limit siting options and environmentally preferable locations that exist within IRAs and CRAs. Economically, Alternatives 1, 2, and 4 limit options for proponents, which could make any future proposal more expensive to implement and operate. Socially, benefits and drawbacks exist, depending on social values. Another key factor to remember is that all of these uses, no matter where they are proposed or are currently located on National Forests, trigger some type of site-specific NEPA analysis for changes to existing uses or proposed new uses. Site-specific analysis identifies design criteria, Best Management Practices, and monitoring for construction, operation, and maintenance which is appropriate for that use and

location. Even where there are exceptions for certain uses for road construction, site-specific analysis may not authorize roaded access. NEPA analysis may provide for some other type of access, based on the situation and use. Exceptions for LCZs are also subject to site-specific analysis for the proposed new use, and would also consider the Colorado Roadless Rule criteria for allowance of the LCZ. Those measures and design criteria identified in the analysis are then all required through the SUA that authorizes the use and occupancy.

Abandoned Mines and Public Safety

Colorado's abandoned mine land inventory database shows a total of 21,880 abandoned mine features including holes, dumps, and associated facilities occurring on Colorado NFS lands with approximately 4,230 (19 percent) of these occurring within the analysis area (Colorado Division of Reclamation Mine and Safety 2008 and 2009 USFS-AMLI data). This can be further broken down to 1,690 holes ranging from small prospect pits to open shafts and adits, 940 waste and tailings dumps of varying sizes, and 1,600 structural features such as head frames and ore bins. More than one feature may exist at any one site, and therefore, these total features should not be confused with total sites.

Affected Environment

Within the IRAs there are 3,270 total features and within the CRAs are 2,890 total features. Overall, the IRAs in Alternatives 1 and 3 include 380 more abandoned mined land features than do Alternatives 2 and 4 due to the inclusion of the substantially altered acres. The Forest Service inventory of abandoned mines on NFS lands is an ongoing process where more sites may still be identified than are reclaimed, and therefore, the number of abandoned mine sites within roadless areas in Colorado may increase.

Abandoned mines, quarries, and other mineral sites that pose human health, environmental, or safety risks may require some type of reclamation or mitigation. If the sites exist and are releasing, or have the potential to release, a hazardous substance, they would require some type of response action under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (P.L. 96-510, Stat. 2767; 42 U.S.C. 9601, 9603, 9607, 9620) (CERCLA). This act addresses emergency response, site remediation and spill prevention. The Forest Service has authority for CERCLA enforcement on NFS lands under Executive Order 12580, sec. 2(j). An Engineering Evaluation/Cost Analysis (EE/CA) or remedial investigation/feasibility study (RI/FS) would include provisions for proposed road construction if needed for CERCLA response actions, consistent with the National Contingency Plan, 40 CFR Part 300.

Also, inventoried roadless areas might contain sites that require some type of reclamation to resolve violations of the Clean Water Act.

It is common for an abandoned mine to have a road in place from initial development of the mine. Some road reconstruction may be needed to improve access to the mine itself to accomplish reclamation goals. However, the road improvements are only temporary, as closing and reclaiming the mine roads is integral to achieving the overall reclamation goals of the abandoned mine land program.

Environmental Consequences

Effects Common to All Alternatives

All alternatives allow construction or reconstruction of roads needed to conduct a response action under CERCLA or to conduct a natural resource restoration action under CERCLA, Oil, and Hazardous Substance Liability: Sec. 311 of the Clean Water Act, or the Oil Pollution Act.

Therefore, under all alternatives, the Forest Service will continue to respond to CERCLA violations that are encountered at abandoned mines within roadless areas in Colorado. Construction or reconstruction of temporary roads for this activity would be permissible. The exact number of identified sites that may result in CERCLA violations is not known until site-specific assessments are completed.

It is expected that most non-CERCLA environmental issues at abandoned mines can be addressed by means that do not require road construction or reconstruction.

Social Values

The social implications of roadless area management in Colorado are of interest to local residents surrounding the roadless areas, users of roadless areas, and to people throughout the country who value or are interested in roadless area resources. Policy decisions that influence the management of roadless areas attempt to balance the wide variety of uses and values individuals hold for national forest resources. It is unlikely that any alternative selected in this process will answer the needs of all those interested in management of roadless areas in Colorado. Each alternative will be a compromise between the competing uses and values of roadless areas.

This analysis describes the potential impacts to different interests and values of roadless area resources by alternative. The analysis includes a description of the analysis area, demographics and trends within Colorado, and potential impacts by alternative on various forest interests and values.

Affected Environment

There are 64 counties in Colorado; the 41 listed below in Table 3-61 are those with roadless acres within county boundaries. Table 3-61 highlights the total NFS lands by county and the acres of IRAs and CRAs. Those counties without roadless acres or without NFS lands are not included in the analysis. There are 16 counties with 35 percent or more of the NFS lands within the county are roadless. In Moffat, Las Animas, and Mesa counties, over half the NFS lands in the county are within roadless areas. Several counties decline in roadless acres between IRAs and CRAs due to updated inventories of roadless areas. Dolores, Jefferson, Las Animas, Montezuma, Montrose, Ouray, Park, Pueblo and San Miguel all increased their roadless acres between IRAs and CRAs..

***Table 3-61**. Colorado Counties with IRAs and CRAs*

County	*NFS Lands*	*IRA acres, Alts. 1 and 3*	*% NFS acres w/in IRAs*	*CRA acres, Alts. 2 and 4*	*% NFS acres w/in CRAs*
Archuleta	430,000	125,500	29%	103,000	24%
Boulder	138,000	22,600	16%	22,600	16%
Chaffee	457,000	180,000	39%	179,300	39%
Clear Creek	175,000	62,800	36%	59,300	34%
Conejos	301,000	65,700	22%	64,000	21%
Costilla	1,000	-	-	500	50%
Custer	162,000	60,900	38%	57,800	36%
Delta	192,000	85,300	44%	75,400	39%
Dolores	335,000	69,700	21%	88,500	26%
Douglas	142,000	57,500	40%	55,700	39%
Eagle	596,000	231,000	39%	229,500	39%
El Paso	101,000	12,000	12%	13,200	13%
Fremont	100,000	43,200	43%	45,500	46%
Garfield	516,000	85,400	17%	85,500	17%
Grand	572,000	182,500	32%	186,400	33%
Gunnison	1,276,000	501,900	39%	370,200	29%
Hinsdale	559,000	133,100	24%	124,100	22%
Huerfano	141,000	47,200	33%	42,000	30%
Jackson	333,000	60,500	18%	58,900	18%
Jefferson	105,000	27,400	26%	28,800	27%
La Plata	404,000	191,700	47%	198,200	49%
Lake	162,000	53,900	33%	45,900	28%
Larimer	648,000	154,800	24%	153,600	24%
Las Animas	22,000	13,300	60%	14,900	68%
Mesa	548,000	288,200	53%	275,700	50%
Mineral	525,000	207,000	39%	202,000	38%
Moffat	42,000	28,200	67%	28,100	67%
Montezuma	257,000	40,900	16%	52,200	20%
Montrose	327,000	21,900	7%	33,500	10%
Ouray	132,000	11,600	9%	21,100	16%
Park	650,000	132,900	20%	142,700	22%
Pitkin	496,000	104,700	21%	104,400	21%
Pueblo	33,000	9,500	29%	11,600	35%
Rio Blanco	359,000	169,700	47%	169,600	47%
Rio Grande	280,000	87,600	31%	86,700	31%
Routt	583,000	222,100	38%	215,000	37%

County	NFS Lands	IRA acres, Alts. 1 and 3	% NFS acres w/in IRAs	CRA acres, Alts. 2 and 4	% NFS acres w/in CRAs
Saguache	932,000	304,900	33%	222,700	24%
San Juan	174,000	62,200	36%	68,800	40%
San Miguel	177,000	18,600	11%	20,200	11%
Summit	313,000	59,100	19%	57,100	18%
Teller	125,000	14,100	11%	15,300	12%
TOTAL	***13,885,000***	***4,249,000***	***31%***	***4,031,000***	***29%***

Totals might not add due to rounding Source: GIS roadless database

Demographics

Demographic information provides a general description of a community or region. It allows the decision maker and the public to understand trends and changes within an area and how those trends influence or are influenced by public land management. Demographics also identify potential social and economic impacts for specific groups that are defined by age, race, etc.

The characteristics of the population variables considered for this analysis include population and growth trends, age composition, racial diversity, and individuals below the poverty level. Where possible, explanations of trends that are not typical of the State are provided. Otherwise, trends are assumed to reflect some preference or response to natural, physical, or political framework, and would be expected to continue in the future.

Population

Population, the number of people living in an area, is important to consider in a social and economic analysis. The composition of the area's population can influence the ability of the area to absorb or adapt to changes as well as change the demands locals have for forest products and opportunities. It is important to consider any potential changes within the context of trends or changes that are occurring outside Forest management activities, for example the movement of retirees into Colorado, or changes in recreational activities.

Population and Growth Trends

In general, the population within Colorado has been increasing since 1900. Colorado saw rapid growth in the 1980s and early 1990s. More recently, the rate of growth has leveled off, but the population is still increasing as a whole. Figure 3-2 shows the population trend for Colorado from 1900 to 2010 and then projected through 2030.

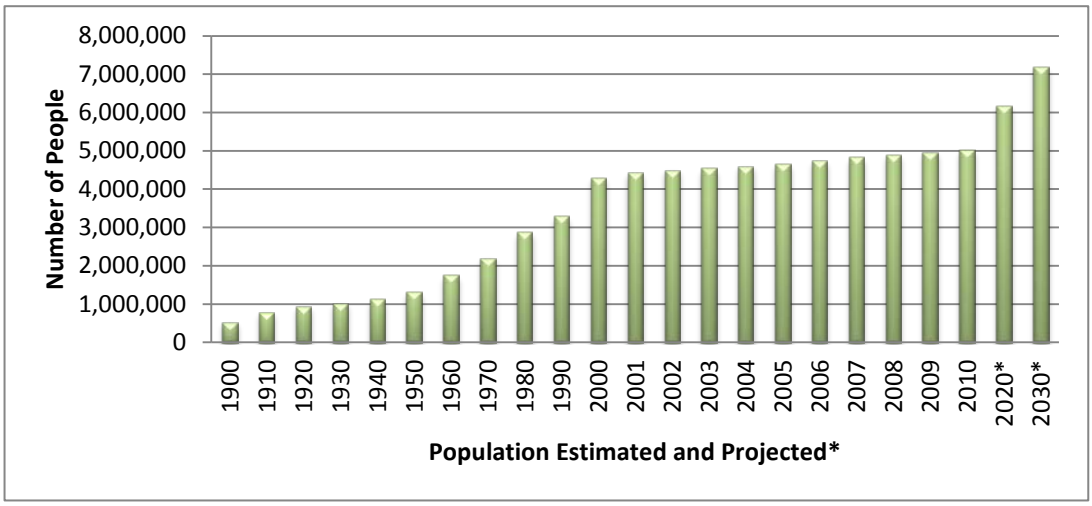

Figure 3-2. *Colorado Estimated Population from 1900 to 2010 and Projected for 2020-2030*[18]

Overall, Colorado's population increased about 2 percent between 2000 and 2005, from about 4,301,300 to 4,718,600, and is expected to continue growing at 2 percent until 2020 when growth slows slightly to 1.6 percent. Within the counties with roadless areas acres in them, Archuleta, Chaffee, Custer, Delta, Douglas, Eagle, Garfield, Grand, Lake, Mesa, Montrose, Park, San Miguel, and Summit counties are projected to have higher growth rates than the State average, but the trend is similar in that growth will continue and begin to decline between 2015 and 2020. Reasons for the growth in Colorado include the oil and gas boom on the western slope as well as the continued influx of retirees into the State (DOLA website, April 2008).

Age Composition

Figure 3-3 highlights the age distribution estimates for the State of Colorado for 1990 and 2010 and projections to 2030. As with the national trend of the aging baby boomers, Colorado expected a significant increase in the over 65 age category beginning in 2010; from 1990 to 2010 the 65 + category increased by about 212,100 and 122,400 since 2000. Colorado expects even more increasing in the future. The Colorado Demography Office is predicting that between 2000 and 2020, Colorado's population within the 55 to 64 age bracket will more than double (DOLA, 2007). This growth is greater than would be expected from Colorado's natural growth, indicating that retirees from outside Colorado will be moving to the state. With such an increase in the over 65 age category, Colorado counties will likely face many changes including personal income sources; different infrastructure needs to accommodate this population; and increasing demands for local services.

[18] ***Source:*** *State of Colorado, Division of Local Affairs - State Demography Office Website, 6/21/11*

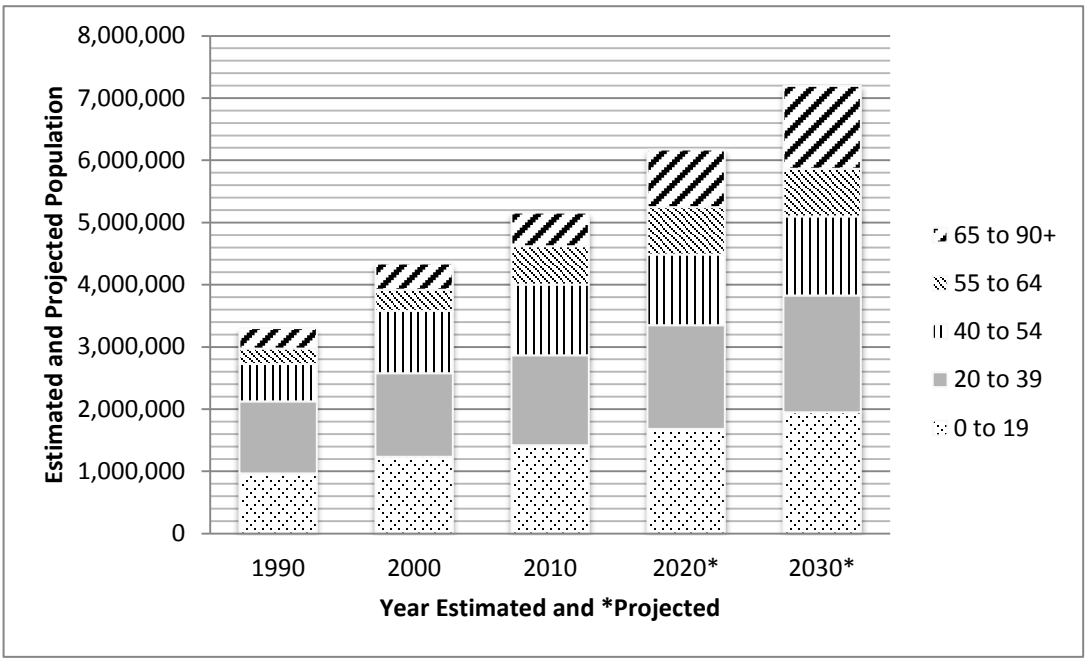

Figure 3-3. Colorado Population by Age, estimated for 1990 and 2010, projected for 2020-2030[19].

Racial Diversity

Racial diversity is displayed for the current population in Colorado, and projected through 2040 in Figure 3-4. Overall, Colorado has limited diversity, but the trend, as with the national trend, is toward more diverse populations in the future. The State average is not reflective of many individual counties in Colorado. Counties in the Southern San Luis Valley, as well as many counties on the western slope, have significantly higher Hispanic populations than the State average.

[19] *Source: State of Colorado, Division of Local Affairs - State Demography Office Website, 6/23/11*

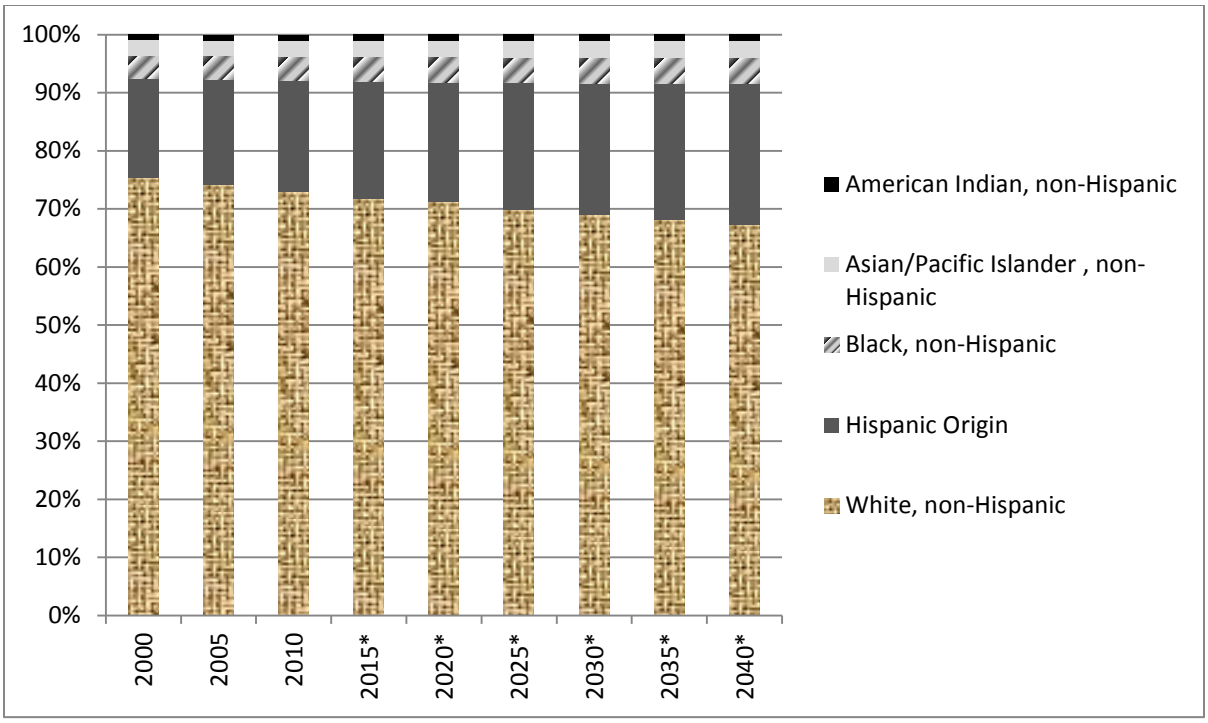

Figure 3-4. *Colorado population by ethnic group estimated for 2000: 2010 and projected 2015-2040[20].*

In some cases, demands for resource opportunities in roadless areas may change over time as the growth of different groups increases in communities around National Forests or within user groups on the Forests.

Appendix A includes spatial displays for ethnic group statistics by counties for a more detailed comparison.

Social Concerns

Social concerns are broad and complex enough that they do not constitute a single issue that can be easily measured and addressed. Generally, the values people hold toward forest resources is the measure used to assess if alternatives will have positive or negative impacts to various individuals or groups. There are many definitions of value, for this analysis it is assumed that we can understand forest values by understanding what is important to people. (Kroger, p. 156)

Forest values represent the importance and worth that people have assigned to Colorado roadless areas. Table 3-62 lists, in alphabetical order, major categories of forest values that individuals may hold for any forest resource or opportunity. People can hold multiple values for the same resource, or may hold separate values for specific places or experiences. The same place or roadless area will have different values to different people.

[20] *Source: State of Colorado, Division of Local Affairs - State Demography Office Website, 6/22/11*

Table 3-62. *Forest Values That People Might Hold*

Forest Value	Description Of Why People Hold This Value
Aesthetic	Value the forest because of the scenery, sights, sounds, smells, etc.
Biological Diversity	Value the forest because it provides a variety of fish, wildlife, plant life, etc.
Cultural	Value the forest because it is a place to practice, and pass down wisdom and knowledge and traditions
Economic	Value the forest because it provides timber, minerals, oil/gas/coal, and tourism opportunities (outfitter/guides)
Future	Value the forest because it allows future generations to experience the forest as it is now.
Historic	Value the forest because it has places and things of natural and human history that are important
Intrinsic	Value the forest in and of itself, just to know it exists, no use is needed to gain value
Learning	Value the forest because one can learn about the environment through scientific observation or experimentation
Life sustaining	Value the forest to produce, preserve, clean and renew air, soil and water
Recreation	Value the forest because it provides a place for outdoor recreation activities
Spiritual	Value the forest for sacred, religious, or spiritually special places, and for providing a feeling of reverence and respect for nature
Subsistence	Value the forest because it provides necessary food and supplies to sustain life for individuals
Therapeutic	Value the forest for physical and/or mental health

Source: *Brown and Reed 2000, page 243*

Conflicts occur when individuals or groups hold different forest values for same resource or place. It is difficult to measure these forest values, so specific information is limited, and yet it is these differences in values that create resource management conflicts. Resolving conflicts among forest values is a political problem and would not be corrected by simply counting or measuring the values better (Challenges, 1995, No 2). The debate about roadless area conservation reflects the broader question of how demands for the many values that national forests and grasslands provide should be met. Much of the public comment was rooted in the more fundamental issue of how NFS lands should be managed, and how to balance commodity and non-commodity values. This issue is discussed at length within the 2001 Roadless Rule FEIS and associated specialist report (http://roadless.fs.fed.us/documents2.shtml).

Colorado Roadless-Related Values/Interests

For this analysis, the values and interests included are based on the many responses to comments the public has provided during the 2001 Roadless Rule comment periods, the 2006 Colorado Task Force public hearings, and to the 2007 Colorado Rulemaking Notice of Intent comment period. This is not a random sample; people who chose to respond to any Forest Service comment period are self-selected, by focusing on those who commented, the analysis inevitably focuses on those people who hold strong forest values for roadless area resources.

This analysis centers on nine broad categories of roadless values/interests, based on the comments received. These categories, defined in Table 3-63, are used to display the differences among

alternatives. The categories are used to display differences between alternatives, and do not define specific individuals or groups.

Several assumptions underlie this analysis:

- People make choices or reflect their preferences based on what is important to them (Kleindorfer et al. 1993).
- Any individual may hold one or more of the values/interests in roadless areas described in this section. Consequently, the impacts of the alternatives on specific individuals could be a cumulative one, and mixed, depending on how many different values they hold. For example, a person might hold values similar to those of the preservation category when considering wildlife habitat, but might hold values similar to the non-motorized recreation category when considering access to recreational opportunities.
- Management actions within roadless areas that are inconsistent with people's forest values are perceived by them as threatening and undermining of their values.
- The ability of forest users to continue to engage in current or future use of roadless area lands, and to maintain the quality of their experience, is tied to the ecological health of the natural resources found there.
- Most uses occurring in roadless areas begin with developed infrastructure outside of the roadless area (road, trailhead, campground, boat ramp, etc.).

The nine value/interest categories used for this analysis are defined in alphabetical order in Table 3-63.

Table 3-63. *Forest Value/Interest Categories Used for Colorado Roadless Area Analysis*

Value/Interest Category	*Defined For Colorado Roadless Area Analysis*
Conservation	Values the balance of roadless area management between active management of resources for use and areas where natural processes dominate.
Industry Access	Values commercial activities in roadless areas such as timber, oil and gas development, mining, coal extraction, utilities, and other uses where appropriate. Value future access as needed to facilitate continued resource development and support of resource jobs and income.
Preservation	Values roadless areas for the natural processes and opportunities provided without additional management or infrastructure development. Much of the value is in knowing roadless areas exist and are protected from future development rather than values associated with actual use or visitation.
Recreational use: motorized	Value focuses on maintaining current motorized use of roadless areas for recreational opportunities, as well as, where appropriate, increasing backcountry motorized opportunities in the future, which may be trails/singletrack rather than roads.
Recreational use: non motorized	Values maintaining or expanding non motorized opportunities in roadless areas. There is some division in this category between those interested in mechanized use (mountain bikes) and those who would like to limit access to hiking and horses. Overall the desire is for quiet/non motorized experiences in roadless areas.
Roaded access	Values gaining access via roads to the forest, including roadless areas. For some, driven by need or disability, the desire for roaded access is due to the inability to get into the forest without the road system. For others, desire for additional roaded access is the preferred method of travel, the travel itself is the recreational experience.
Tourism (including ski	This category is another commercial interest, but capitalizing on the roadless areas as a natural amenity that attracts customers to the area for leisure activities. Scenery is of

Value/Interest Category	Defined For Colorado Roadless Area Analysis
resorts)	concern to this category, but the value of roading depends on the types of experiences the operation is providing.
wilderness	Values roadless areas as roadless so those areas can be included within the wilderness system in the future. This category focuses on future primitive and protected wilderness experiences and wilderness resources.
wildland urban interface	This category is specific to those activities in WUI or CWPP acres that overlap in roadless areas where vegetation treatments are desired to reduce hazards of wildfire. This category values reducing wildfire hazards to houses and communities no matter the location. This category does not focus on individuals living within the WUI.

Environmental Consequences

As highlighted in Chapter 1, there are several issues people commented on specifically to the Colorado Roadless Notice of Intent: roadless area characteristics and values, ecological integrity and biological resource values, soil and water quality, semi-primitive recreation related values, illegal uses, oil and gas development, coal development, road accessible recreation, and inconsistency with the 2001 Roadless Rule. These have been described in Chapter 1.

Generally, issues with a social aspect have several opposing views or values. Specific to Colorado, public comments indicate strong support from individuals and groups who view the highest value of Colorado roadless areas to be maintained through preservation/non-development, as well as strong support from individuals and groups who view a balanced management approach that allows some development and extractive uses to be the best use of the roadless areas. Each alternative then addresses these issues differently, creating different balance points between the conflicting values. The following section highlights these differences and, using the nine categories of values/interests defined above, indicates potential impacts based on differences between alternatives and the projected activities outlined in the analysis framework.

Alternative 1

Conservation

The 2001 Roadless Rule offers this category the least ability to actively manage forest resources now and in the future. While the limitation on road construction could prevent future resource damage, most active management, such as tree cutting for salvage in beetle-killed areas, would also be limited.

Industry Access

The potential economic impacts associated with this category are considered specifically in the economic section of this analysis. Generally, roaded access and the ability to remove trees is necessary for timber operations to be profitable. Similarly, energy resources and mineral activity requires some level of roaded access and infrastructure development to operate. Alternative 1 limits future extractive operations within IRAs, similar to Alternatives 2 and 4. But most IRA acres would remain closed to most future commercial activity. The unroaded acres added to Colorado inventory under Alternatives 2 and 4 may be developed under Alternative 1, depending on suitable conditions and resource availability, and forest plan direction. :

Preservation
This category favors the limited road construction and tree cutting allowed under Alternative 1. Limits on future activity maintain IRA acres that are not already substantially altered in their current condition, allowing for natural processes to take place. The substantially altered acres may continue to have some tree cutting and existing roaded access will continue, which will detract from roadless area characteristics. The lack of a prohibition on LCZs could result in some linear utilities that would detract for roadless area characteristics in specific locations, or for short periods of time. Similarly, any future management activities within the unroaded acres not included in the IRA inventory in Alternative 1 could limit the roadless area characteristics in those acres.

Recreational Use (Motorized)
The limited road construction that could be allowed in IRAs under Alternative 1 will not change the current level of roaded access for this category. Any new roads will be closed to general public for motorized access, so no additional motorized opportunities will be created through new road construction within IRAs. Overall, this category may be more concerned with forest travel management decisions as an opportunity to maintain or increase their overall motorized access. This category is also interested in keeping motorized trails open and adding additional trails within IRAs, providing users with a more primitive trail experiences as well as roaded opportunities. None of the alternatives limit motorized trail construction, but these decisions are part of individual forests' travel management decision, and not part of the roadless analysis.

Recreational Use (Non-Motorized)
The limited road construction that could be allowed in IRAs under Alternative 1 would be closed to public motorized use, but could be used by non motorized users. These additional opportunities are not likely to provide a roadless experience in the short-term. Overall, this alternative best maintains the non motorized status of IRAs, although motorized trail use would not be limited by this alternative, there would be restrictions on new road construction. Similar to the motorized category, the forest travel management plans will be of concern to the non-motorized category, and may have a greater impact on their current and future roadless opportunities depending on future travel management decisions.

Roaded Access
This alternative, similar to Alternatives 2 and 4, is restrictive for this category. Even though most roads likely to be constructed under any alternative would be closed for public motorized use, Alternatives 1, 2 and 4 limit the possibility for future NFS road construction within roadless areas. As with the Recreational Use categories, the travel management plans for the road system outside of roadless areas is likely to be of greater concern to the Roaded Access category to maintain their current level of roaded opportunities.

Tourism
Depending on the type of tourism opportunities offered, this category parallels the Recreational Use categories. Those tourism operations that focus on motorized opportunities would continue to operate under Alternative 1 on current roads and using existing access points and motorized trails. Alternative 1, 2 and 4 would not offer new roaded access for tourism operations, any new roads would be closed to general motorized use. Tourism operations that focus on non-motorized opportunities favor the additional limitations on road construction and tree cutting to preserve the type of experience they

offer. Specific to the ski industry, Alternative 1 may limit future expansions into IRA acres surrounding existing permit boundaries.

Tourism operations of all kinds in Colorado use the scenery on NFS lands to advertise and for a backdrop to their activities. All alternatives would continue to limit additional road construction and tree cutting in roadless areas which may maintain scenery. However, with recent beetle epidemics, much of the scenic quality of NFS lands will be altered inside and outside roadless, regardless of alternative.

Wilderness
None of the alternatives recommend wilderness or alter recommended wilderness. For Alternative 1, some road construction and tree cutting is projected within IRAs; however, the level of activity is less than the other alternatives. Alternative 1 allows use and maintenance of existing roads and some tree cutting within substantially altered acres, those areas would continue to be inconsistent with wilderness characteristics. Alternative 1 would not address the unroaded acres outside the IRAs that have been included within Alternative 2 and 4 inventories. LCZs and linear utilities that are not specifically prohibited by Alternative 1 may be inconsistent with wilderness character. None of the alternatives restrict motorized use within IRAs, so roadless areas will continue to be open to motorized trail use unless otherwise closed by forest travel management plans. Such motorized use detracts from the wilderness experience this category values within IRAs.

Wildland Urban Interface
Alternative 1 offers the least flexibility and access to address WUI concerns. Future fire, fuels, and forest health projects would be limited to those areas that can be accessed via existing road systems, or to tree cutting activities within substantially altered acres. For this category, the actual location of the IRA in relation to specific communities is also important, but not analyzed in detail in this section. The economic and the fire and fuels sections of this analysis address the potential community impacts in more detail.

Alternatives 2 and 4

Conservation
Alternatives 2 and 4 provide limited additional ability to actively manage forest resources as compared to Alternative 1, but not as much flexibility as Alternative 3. While the restrictions on new road construction could prevent future resource damage, active management would be limited to those areas in CPZs, and not in upper tier, for forest health and fire/fuels treatments where temporary roads and limited tree cutting could occur. Upper tier acres would be more restrictive than Alternative 1 due to the additional limits on tree cutting. Alternative 4 has more upper tier acres than Alternative 2, and many of those acre overlap with CPZs, so Alternative 4 will have less opportunity for active management compared to Alternative 2.

Industry Access
As with Alternative 1, most CRA acres would remain closed to future commercial activity under Alternatives 2 and 4. As discussed in the analysis framework, Alternatives 2 and 4 do allow for some additional temporary road construction and tree cutting within the CPZ, these activities may have a commercial element to them, but not as the primary purpose of the project. Energy activities would also be allowed to continue according to their lease stipulations as of the date of the Colorado Rule, so future activities would have to occur without new roads. One specific exception is the ability to

construct new temporary roads for coal activities within the North Fork coal mining areas, (see the energy resource and economic sections for details). Alternatives 2 and 4 also have specific limits on LCZs and installation of linear utilities through CRAS that are more limiting than both Alternatives 1 and 3.

Preservation

Alternative 4 circumstances for additional road construction and tree cutting would preserve similar acres of the CRAs in as primitive areas as Alternative 1, due to the increased level of upper tier, and reduced CPZ access. Alternative 2 is similar to Alternative 4, but has fewer upper tier acres, and none of the upper tier are within the existing CPZ. Most of the acres to be considered for disturbances, such as tree cutting for fuel treatments, are within the CPZ, around communities. Upper tier acres in Alternative 4, just like Alternative 2, limit tree cutting more than Alternative 1, so those acres will be at less risk for human disturbance than Alternative 1 and those CPZ acres that overlap with upper tier may remain untreated under Alternative 4. Removing the substantially altered acres from CRAs reduces the total acres included under Alternatives 2 and 4, although adding the unroaded acres into CRAs increases the restrictions of future road construction and tree cutting on those new acres. The restriction on additional LCZs for linear utilities would also prevent some activities in CRAs that may be allowed under Alternative 1, changing the roadless area characteristics.

Recreational Use (Motorized)

There would be little change for this category between Alternatives 1, 2 and 4: any additional roads would be closed to public motorized use, so there would be no increase in roaded opportunities.

Recreational Use (Non-Motorized)

The actual miles of roads open for public motorized use would not change between Alternatives 1, 2 and 4, but Alternatives 2 and 4 do allow additional circumstances for temporary road construction that may detract from the overall non motorized experience in those areas where activities are taking place.

Roaded Access

Alternatives 2 and 4 are not significantly different from Alternative 1 in providing additional roaded opportunities.

Tourism

As with the Recreational Use categories, there is not much difference between Alternatives 1, 2 and 4 in terms of additional roaded access. Specific to the ski industry, Alternatives 2 and 4 would allow limited expansions of ski areas not allowed in Alternative 1, but not as much flexibility as Alternative 3 allows (see ski area section for details). Alternative 4 may create some short-term declines in scenery within CPZ areas, although less than Alternative 2 due to the decrease in accessible CPZ acres, but over time, the temporary roads and tree cutting allowed within the CRA acres may provide for improved scenery as compared to the rest of the CRA acres and the outcome of the beetle epidemics.

Wilderness

The additional circumstances for road construction and tree cutting in Alternatives 2 and 4 do not offer similar overall protection of future wilderness as Alternative 1, but do offer similar protection to a majority of the CRA acres. Most of the activity associated with the exceptions in Alternatives 2 and 4 would be near communities in the CPZ, and Alternative 4 has fewer acres of CPZ available for

treatment compared to Alternative 2 due to the overlap of upper tier acres with the CPZ. Alternative 4 also has more upper tier acres than Alternative 2 where tree cutting is more limited than in Alternative 1. Alternatives 2 and 4 also limit the development of linear utilities within CRAs using LCZs, which are not addressed in Alternative 1. In addition, CRAs do not include the substantially altered acres which under Alternative 1 are not required to be returned to a roadless state, but wilderness interests are concerned that management of these acres under forest plan direction would open those acres for additional activities. Alternatives 2 and 4 add additional unroaded acres to the CRA inventory; these acres are not included under Alternative 1 or 3.

Wildland Urban Interface
Alternative 4 offers the limited flexibility and some locations to address WUI concerns due to the upper tier acres overlap with CPZs. Treatments will not be allowed in upper tier acres. All upper tier acres were removed from the existing CPZ in Alternative 2. Future fire/fuels/forest health projects in Alternative 2 are limited to those areas that have an approved CWPP, and within the CPZ area and that are not in upper tier. Alternatives 2 and 4 provide communities with additional opportunities to reduce wildfire hazards with temporary roads and tree cutting than Alternative 1, but not as much flexibility as Alternative 3.

Alternative 3

Conservation
Management of resources under provisions of the forest plans without the 2001 Roadless Rule provides the most management flexibility. Under Alternative 3, IRAs would be managed for a balance between use and protection, but if ecosystem conditions changed, actions could be taken to manage the impacted resources.

Industry Access
Alternative 3 offers industry the most flexibility to gain access to timber and energy/mineral resources within IRAs, according to forest plan direction. Future action in the North Fork area would be prohibited under Alternative 1, but under Alternative 3, the North Fork area and additional areas could be available for coal exploration and development. Access to these resources would be managed to protect forest ecosystems and resources pursuant to protective forest plan standards and guidelines.

Preservation
Depending on individual forest plan direction, Alternative 3 likely would have the greatest impact to the preservation of IRAs in their current condition over the long-term. Preservation of forest ecosystems and resources would occur pursuant to protective forest plan standards and guidelines.

Recreational Use (Motorized)
While most projected new roads would be closed to public motorized use, Alternative 3 would allow for new NFS roads in IRAs as directed by forest plan direction, travel management plans, and budgets. Outside of the possibility of new roads, Alternative 3 is similar to the other alternatives in terms of providing for motorized trail opportunities in IRAs.

Recreational Use (Non-Motorized)
Management under provisions of the forest plans without the 2001 Roadless Rule would protect non-motorized recreation under existing standards and guidelines. There would be minimal impacts to

these opportunities from Alternative 3. As stated in the motorized category, new roads could occur in IRAs under Alternative 3. Any new roads in IRAs would negatively impact non-motorized opportunities. However, these opportunities would be protected by existing protective forest plan standards and guidelines.

Roaded Access
Alternative 3 is not projected to allow additional NFS roads open for public use, but of the alternatives, this is the only one that has the potential to construct new NFS roads in IRAs.

Tourism
Alternative 3 projects the most additional road construction and tree cutting, which could impact scenery in the short term. However, since it allows for proactive management, fuels projects would be allowed on a broader scale, protecting scenery from wildfire. As with the other alternatives, most roads would be closed to public motorized use, depending on the tourism operation, there would be little change between alternatives. In terms of providing a roadless experience, Alternative 3 has minor potential to negative impact such experiences in specific locations. However, such experiences would be protected by existing standards, guidelines, goals, and objectives to protect roadless values. Specific to the ski industry, existing and future ski resorts that wanted to expand or build in IRAs, would need to be consistent with the forest plan, but would not be limited by specific roadless rule direction.

Wilderness
Those areas identified in forest plans as recommended wilderness will continue to be protected as wilderness under Alternative 3. This alternative does not authorize any road construction, tree cutting, or other active management activities. Such activities may potentially occur in the future and would be analyzed through appropriate environmental analysis process. They would also be subject to existing forest plan standards and guidelines to protect resources. Such future projects could potentially impact future areas from being recommended for wilderness due to projected road construction, tree cutting, and other management activities.

Wildland Urban Interface
Alternative 3 would offer the greatest protection to wildland urban interface conditions. It offers the most flexibility to address WUI concerns. Future fire/fuels/forest health projects would be scheduled as needed and as budgets allowed. They would be subject to existing protections afforded by forest plan standards and guidelines. Road construction would take place as allowed under the forest plans and as needed to access specific WUI locations.

Summary of Effects

Table 3-64 highlights each value/interest category and preferred alternative based on the responses to comments and potential impacts outline in the analysis framework. Some interests are more adaptable to differences between alternatives, and so more than one of the alternatives may be acceptable. Other interests are specific in their needs and values of roadless area resources, even small variations in potential impacts can result in undesired outcomes. The actually response of any group or individual to activities related to roadless area will depend on location, substitute sites, timing, mitigation measure, and other trends and events occurring outside Forest Service control.

Table 3-64. *Summary of Preference for Alternatives by Interest Category.*

Value/Interest Category	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 4*
Conservation		Preferred	Preferred	
Industry Access			Preferred	
Preservation	Preferred			Preferred
Recreational use: motorized		Preferred		
Recreational use non motorized	Preferred	Preferred		Preferred
Roaded access			Preferred	
Tourism	Nature/eco based, preferred	Motorized adventure-based and ski industry, preferred		
Wilderness	Preferred			Preferred
Wildland urban interface		Preferred	Preferred	

Cumulative Effects

Population growth, influx of retirees, changes in diversity, and other demographic trends are outside of the Forest Service control, but will dramatically impact the demands placed on national forest resources, both inside and outside of roadless areas.

Related to population growth is the conversion of existing open spaces/ranches into subdivisions and ranchettes, limiting the opportunity for private lands to supply some of resource demands and pushing additional needs onto public lands. Future development also increases the WUI, requiring more vegetation treatment to address concerns of wildland hazard.

Future changed in recreation activities and gear will change the way people use roadless areas and it is possible that conflict will not be limited to motorized, mechanized, and non motorized in the future, but additional exceptions and limits may be necessary depending on future activities and values.

Economic trends for energy and minerals are highlighted in the economic section. As these trends play out in Colorado, the values people hold for roadless areas will likely change as more types of people with different values are affected. It is unlikely there will be agreement in the future of how roadless areas should be managed. Under any alternative, the debate is likely to continue, but depending on which alternative is selected, the issues of debate would be different.

Economics

This section provides a description of current economic conditions in Colorado and the potential changes to those conditions given alternative roadless area management.

In the course of public involvement, two issues regarding the economic implications in Colorado were raised frequently and are analyzed in this section: energy development and community protection from wildfire. Other common resource management activities and outputs, including recreation use (tourism), water yield, and livestock grazing were also considered, but not at the same level of detail. Resource sections analyzing these fields in this document generally found that activities and outputs would vary little among the alternatives considered. With little change to these resources, no change in quantitative economic effects is expected or can be modeled in this analysis.

For the FEIS, timber production was revisited to assess whether harvest levels could be expected to vary by alternative. It was determined that no change among alternatives would be anticipated.

As a result of these considerations, energy development, and community protection from wildfire are the only issues that varied by alternative and could be analyzed quantitatively for this economic section. Some topics that could not be quantified and valued in monetary terms are discussed and analyzed qualitatively.

The economic consequences of implementing each alternative are categorized as either impact or efficiency effects. Impact effects, sometimes called distributional effects, include consequences to jobs and labor income in specified areas of the State. These effects also include consequences to Colorado State and local governments in the form of Federal payments and taxes. Procedures for estimating jobs and income were based on economic models of Colorado economies using an input/output economic model and local Colorado data sources. Methods for estimating fiscal consequences to Colorado State and local governments were based on fiscal models using current tax and Federal revenue sharing structures.

Efficiency effects analysis, referred to in this report as benefits and costs, considers both financial and economic benefits and costs of each alternative. Benefits and costs include discussions of market and non-market goods and services, including roadless area characteristics, options for future use of roadless areas, and ecosystem function. The benefit and cost discussion provided in this section is a summary of the larger treatment of benefits and costs provided in the Regulatory Impact Analysis (Miller 2011).

Affected Environment

All of the economic impacts presented in this report occur in Colorado.

Economic Contributions

The Colorado economy is diverse, ranging from urban centers along the Front Range (the urban development from the Denver metro area north to Fort Collins and south to Pueblo) to rural communities in the mountains and plains. Known world-wide for skiing and outdoor recreation, Colorado enjoys a strong tourism industry. It also benefits from substantial cable and satellite, defense, technology, and mining industries. Roadless area management, as described in this document, directly affects only one of these sectors –mining (natural gas and coal): but indirectly affects many others. Colorado also has a very modest forest products industry that might be affected. Table 3-65 displays the overall Colorado economy21 using metrics of production value, employment, and labor income. This gives context to the portion of the economy that could be affected by roadless area management.

Table 3-65. *Value of Production, Employment, & Labor Income in the Colorado Economy (2009)*

Industry	*2009* *Value of Production ($ millions)*	*Employment (jobs)*	*Labor Income ($ millions)*
Agriculture	5,065	39,480	900
Mining	12,521	27,650	2,591
Utilities	6,006	8,710	1,000
Construction	23,465	188,340	9,508
Manufacturing	59,090	133,960	9,873
Transportation & Warehousing	11,571	75,710	4,131
Trade	36,262	375,710	16,341
Finance, insurance, & real estate	111,111	292,900	20,759
Professional services	30,264	248,560	17,543
Administrative & waste services	19,186	192,730	9,713
Educational, health, & social services	27,918	311,020	14,960
Arts, entertainment, &	4,253	67,380	1,786

[21] *The data and models used in this analysis have been completed revised and updated from the RDEIS. See the economic specialist report for details.*

Industry	*2009 Value of Production ($ millions)*	*Employment (jobs)*	*Labor Income ($ millions)*
recreation			
Accommodation & food services	14,696	224,410	5,349
Other services	13,281	167,960	6,971
Government	37,614	446,660	28,575
Totals	***412,303***	***2,801,180***	***150,001***

Source: *MIG, Inc. 2011 & Colorado Department of Local Affairs, Division of Local Government, State Demography Office 2011.*

The following sections highlight those industries in Colorado most likely to be influenced by management of roadless areas.

Energy Minerals

Energy minerals provided to the U.S. economy from any source, including roadless areas in Colorado, has national as well as local implications. This section briefly describes the economic context within which natural gas and coal from Colorado roadless areas are provided to the nation.

Natural Gas

The demand for natural gas in the U.S. is projected to grow by 0.6 percent annually over the next 25 years (USDOE, Energy Information Administration 2011). Although, natural gas heats most American homes, it also generates about 20 percent of the nation's electricity. The increase in natural gas consumption for electricity generation results from both the construction of new gas-fired generating plants and higher capacity utilization at existing plants. Natural-gas-fired plants are expected to account for 60 percent of power generation capacity additions between 2010 and 2035. Reasons for the shift to natural gas include lower capital costs, higher fuel efficiency, shorter construction lead times, and lower emissions.

Colorado has eight percent of all dry natural gas reserves in the U.S.: the third largest reserves of onshore dry natural gas in the U.S. behind Texas and Wyoming (USDOE, Energy Information Administration 2010a). Two prominent areas of known and high potential unconventional natural gas on the western slope of Colorado are the Piceance and Paradox Basins. In 2009, Colorado wells produced 1.51 trillion cubic feet of natural gas, or six percent of U.S. production (DNR, Colorado Oil and Gas Conservation Commission 2010; USDOE, Energy Information Administration 2010b.).

Coal

Coal has been a vital energy source throughout the history of this county. In the last 30 years, coal production has shifted from traditional eastern states to abundant coalfields in the western United States. Starting in the 1970's, increasing restrictions on atmospheric emissions of sulfur dioxide at power plants often made western coal the most cost effective choice for meeting sulfur dioxide limits without the installation of expensive retrofits. Because western subbituminous coal is cleaner than coal found in the eastern US, the demand for coal from Colorado and Wyoming is expected to claim a larger share of the national coal market in years to come (USDOE, Energy Information Administration 2011).

Colorado ranks tenth nationally among coal-producing states (USDOE, Energy Information Administration 2010). Coal production in the state is dominated by mines in four counties: Routt, Moffat, Delta and Gunnison. Reserves under roadless areas are found only in Gunnison County. In the last decade, statewide production has grown from 20 to nearly 30 million tons in 2009. About 55 percent of statewide coal is shipped out of Colorado, most to midwestern and southern states. The remainder of state production stays in Colorado, supplying several coal-fired electric generation plants (DNR, Colorado Geological Survey 2010).

Economic Impact Analysis Areas

To estimate the potential economic impacts of the alternatives on the Colorado economy, economic models were developed using IMPLAN. IMPLAN is a proprietary input-output modeling system composed of both software and data (MIG, Inc. 2011). The system is regarded in academic, government, and private sectors as a reliable portrayal of regional economies and economic impacts. The models created for this analysis were customized to match employment data provided by the Colorado Department of Local Affairs, State Demography Office. Model production value, employment, and labor income was further customized to capture economic conditions and interactions in the oil, natural gas, and coal mining industries using a variety of sources. Production for the energy sectors within the mining industry was based on average prices for 2009 reported by the Colorado Oil & Gas Conservation Commission (oil), the Energy Information Administration (natural gas, coal), the Colorado Division of Reclamation, Mining, and Safety (coal), and the Colorado Mining Association (coal).

To provide a State-wide context for the analysis, all Colorado counties were grouped into four model areas. Table 3-66 summarizes the counties in each of these model areas. Figure 3-1 displays the county composition of each area.

Table 3-66. *Colorado Counties by Economic Impact Model Area*

Model Area	*Counties*
Energy Roadless[1]	Delta, Garfield, Mesa, Montrose, Rio Blanco
Rural Roadless[1]	Alamosa, Archuleta, Chaffee, Conejos, Costilla, Custer, Dolores, Eagle, Fremont, Grand, Gunnison, Hinsdale, Huerfano, Jackson, La Plata, Lake, Las Animas, Mineral, Moffat, Montezuma, Ouray, Park, Pitkin, Rio Grande, Routt, Saguache, San Juan, San Miguel, Summit, Teller
Front Range Metro[2]	Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, El Paso, Gilpin, Jefferson, Larimer, Pueblo, Weld
Eastern Plains	Baca, Bent, Cheyenne, Crowley, Elbert, Kiowa, Kit Carson, Lincoln, Logan, Morgan, Otero, Phillips, Prowers, Sedgwick, Washington, Yuma

1) Oil, gas, and coal production for Gunnison and Pitkin Counties has been moved into the Energy Roadless Counties model to better account for economic interactions.

2) Some counties contain roadless areas.

Natural gas and coal resources potentially affected by roadless area management are primarily located in five western slope counties (Energy Roadless): Delta, Garfield, Mesa, Montrose, and Rio Blanco. Natural gas and coal resources are found in numerous other locations around the State of Colorado, but these locations are either not affected by roadless management alternatives or isolated with somewhat small deposits.

Pitkin and Gunnison counties are exceptions to this characterization. Important natural gas and coal resources associated with roadless areas are located in the northwest corners of Pitkin and Gunnison Counties. Development of these resources likely would impact jobs and labor income in the Energy Roadless counties rather than in the counties where the deposits are located. For these reasons, the economic impacts for oil, gas and coal are modeled using the Energy Roadless counties, but to fully account for the production, employment, and labor income of all coal mining operations in Gunnison County, the Energy Roadless model has been adjusted to include mines located in Gunnison County.

The Rural Roadless counties all contain some CRA acres, including some CPZs. These counties would most likely have more indirect impacts of roadless area management in terms of tourism and recreation opportunities, and for treatments for fire/fuels and watershed health.

Some of the communities within the Front Range Metro counties interface directly with roadless area management issues, but the economies of the counties would not be greatly affected by indirect changes to roadless area management. The Eastern Plains counties do not overlap with roadless areas and would not necessarily be impacted at all by changes to the management in those areas. (See Figure 3-5.)

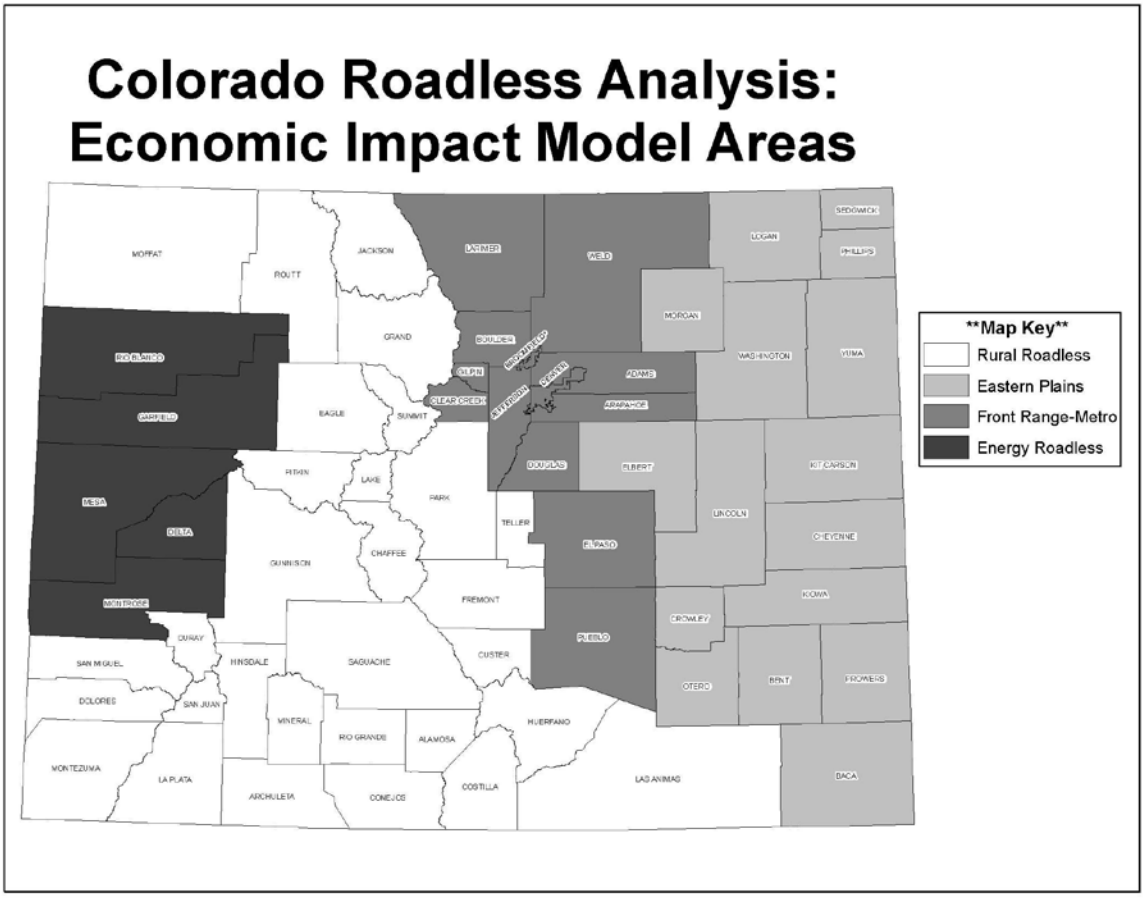

Figure 3-5. *Colorado Roadless Analysis: Economic Impact Model Areas*

The Energy Roadless model area includes a variety of communities, ranging from small towns, such as Somerset, to the economic center of western Colorado in Grand Junction. In prior years, this area

was primarily defined by retirees, tourism, and agriculture. With the recent energy boom, however, the area has developed into the center of energy development in western Colorado. Table 3-67 provides a picture of economic indicators by industrial sector.

Table 3-67. *Value of Production, Employment, and Labor Income in the Energy Roadless Model Area (2009)*

Industry	2009		
	Value of Production ($ millions)	Employment (jobs)	Labor Income ($ millions)
Agriculture	558	4,550	114
Mining	5,152	7,800	656
Utilities	472	790	78
Construction	1,974	15,400	817
Manufacturing	1,521	4,990	248
Transportation & Warehousing	673	4,920	257
Trade	1,684	21,330	803
Finance, insurance, & real estate	3,109	11,180	530
Professional services	705	7,500	371
Administrative & waste services	608	6,770	275
Educational, health, & social services	1,390	16,510	742
Arts, entertainment, & recreation	137	2,550	53
Accommodation & food services	704	11,330	250
Other services	600	8,990	330
Government	1,590	21,930	1,223
Totals	***20,877***	***146,540***	***6,747***

Source: MIG, Inc. 2011 & Colorado Department of Local Affairs, Division of Local Government, State Demography Office 2011.

To put the Energy Roadless model area in perspective, Table 3-68 summarizes the same economic variables for all model areas in Colorado. The Front Range Metro area dominates the Colorado economy in all respects with over 80 percent of production, jobs, and labor income. The Rural Roadless model area, with 30 counties, follows in economic importance. The Energy Roadless area, with only five counties, trails only slightly in the size of its economy and includes roadless areas in all counties. The Eastern Plains of Colorado complete the picture with about two percent of State-wide totals.

Table 3-68. *Comparison of the Energy Roadless model area with other roadless model areas (2009)*

Model Area	2009					
	Value of Production		Employment		Labor Income	
	$ millions	%	# jobs	%	$ millions	%
Energy Roadless	20,877	5%	146,540	5%	6,747	4%
Rural Roadless	31,836	8%	262,780	9%	10,953	7%
Front Range Metro	349,800	85%	2,319,700	83%	129,716	86%
Eastern Plains	9,790	2%	72,160	3%	2,585	2%
Colorado	***412,303***	***100%***	***2,801,180***	***100%***	***150,001***	***100%***

Source: MIG, Inc. 2011 & Colorado Department of Local Affairs, Division of Local Government, State Demography Office 2011.

Table 3-69 focuses on the mining industry in each model area of Colorado. The Energy Roadless area has greater production than any other part of the State. This is notable given the large oil and gas fields north of Denver that have been producing for many years. Employment in the Energy Roadless area ranks second to the Front Range Metro area, primarily because of Denver-based corporate headquarters for mining companies doing business in Colorado and other parts of the US. For the same reason, income in the Energy Roadless area trails the Front Range Metro area.

Table 3-69. *Comparison of the Mineral Industry in Roadless Areas (2009)*

Model Area	2009					
	Value of Production		Employment		Labor Income	
	$ millions	%	# jobs	%	$ millions	%
Energy Roadless	5,152	41%	7,800	28%	656	25%
Rural Roadless	2,986	24%	3,190	12%	287	11%
Front Range Metro	3,960	32%	15,640	57%	1,568	61%
Eastern Plains	424	3%	1,020	4%	80	3%
Colorado	***12,521***	***100%***	***27,650***	***100%***	***2,591***	***100%***

Source: *MIG Inc. 2011 & Colorado Department of Local Affairs, Division of Local Government, State Demography Office 2011.*

In a recent study of the Colorado oil and gas industry (McDonald et al. 2007), it was estimated that over two percent of State-wide employment and three percent of earnings were supported by oil and gas development and production. When compared with the travel industry, oil and gas provided 56 percent fewer jobs, but only 14 percent less income. As energy development continues in the State, especially on the western slope, these differences can be expected to narrow.

Coal Industry in the Energy Roadless Area

The coal industry in the North Fork Valley constitutes a sizeable share of the local economy. When considering the production and employment at the mines plus all other secondary effects, the industry generates over 1,900 jobs and $145 million in labor income.

State and Local Government Fiscal Health and Energy Minerals

Sizeable revenues accrue to state and local governments from the production of energy resources on Federal lands. These revenues are important contributions to the fiscal health of small and large governmental entities alike. Royalties of 12.5 percent are paid on production value from Federal oil and gas leases; royalties of 8 percent are paid on production value from Federal coal leases for underground mines. Half of these revenues are paid to the states where production originated. In Colorado, these revenues are allocated to a variety of state funds, including the State Public School Fund, and to local jurisdictions. In 2010, $117 million was paid to Colorado (DOLA, Division of Local Governments, Financial Assistance Programs, Energy/Mineral Impact Fund 2010). :

The State of Colorado levies a severance tax that applies to energy mineral production. These revenues are distributed among State funds and local jurisdictions similar to Federal Mineral Lease payments. Oil, gas, and coal accounted for $70 million: 99 percent of all severance tax collections in 2010 (DOLA, Division of Local Governments, Financial Assistance Programs, Energy/Mineral Impact Fund 2010).

Values at Risk of Wildfire

High-country communities in Colorado are rich in amenities and have always attracted new residents. In recent decades, however, the in-migration of full-time residents and proliferation of second homes with seasonal residents have reached new levels. Whether they come to stay seasonally or year-round, the economy of these towns has become highly dependent upon their presence and activities (Lloyd Levy Consulting 2004). As a result, these economies are characterized by strong lodging, food service, recreation, and real estate industries.

While the juxtaposition of public lands has been a strong factor in the growth of mountain communities, it also comes with liabilities. Many mountain communities are becoming particularly susceptible to natural disturbances, such as mountain pine beetle infestations and drought. When the threat becomes reality and wildfire hits these communities: where landscapes are a critical foundation for life and livelihood: the results can be devastating.

A vibrant community is healthy in both its public and private sectors. The values at risk can include such things as citizen health, reliable water and power supplies, infrastructure (both public and private), business activity, and general quality of life. Community infrastructure is the most visible and quantifiable value at risk. Homes, schools, retail shops, office buildings, libraries, hospitals, and police stations are just a few examples of infrastructure at risk of wildfire loss. Should these assets be lost, impacts would not be limited to the owners of affected properties. Property tax revenues, employment, income, health care, emergency services, and the general welfare of communities may all be affected.

Damage or loss of private homes to wildfire is one of the most common and visible effects of wildfires to communities. As such, homes provide a good indicator of more comprehensive community values at risk of wildfire. Table 3-70 displays the 2009 county assessor valuation of non-agricultural, single residence homes in Colorado counties containing IRAs or CRAs (DOLA, Division of Property Taxation 2010). In addition, the table also displays an estimate of home values within 500 meters (about 0.3 mile) of public forest land in each county (USDA Forest Service 2010). It also puts these values in context by comparing the estimated home value with total valuation in the county. This analysis provides a very conservative indication of vulnerability to the tax base in each county.

The infrastructure value of homes in this setting averages only 2.8 percent of total valuation across all counties with either IRAs or CRAs, but it exceeds 10 percent in Eagle, San Miguel, Summit, and Teller Counties. The higher the ratio, the greater the vulnerability of local government community services and other economic activities to losses by a potential wildfire. Table 3-70 does not imply that all properties are at risk equally. It should also be noted that the share of residential valuation to total valuation is not equivalent to the share of total property taxes paid by residential owners to local governments. Even with the caveats, Table 3-70 offers an indication of vulnerability among counties with IRA or CRA lands.

Table 3-70. *Estimated Non-agricultural Single-Family Residences and Valuation within 500 Meters of Forested Public Lands in Counties with Inventoried Roadless Areas (2009)*

	All Properties	Non-agricultural Single-Family Residences				Estimated Non-agricultural Single-Family Residences within 500 Meters of Forested Public Lands			
County	Total Valuation $ millions	Total Valuation $ millions	Improvement Valuation $ millions	Number	Average Improvement Valuation $	Share of Total Properties* %	Number of Properties	Estimated Improvement Valuation $ millions	Share of County Total Valuation %
Archuleta	824.6	152.7	108.1	6,020	17,962	17.6%	1,061	19.1	2.3%
Boulder	6,914.3	2,654.4	1,500.1	80,896	18,543	4.8%	3,905	72.4	1.0%
Chaffee	449.1	160.9	98.8	10,703	9,227	7.8%	831	7.7	1.7%
Clear Creek	563.4	102.6	79.0	4,494	17,577	68.6%	3,084	54.2	9.6%
Conejos	63.4	19.4	16.0	2,599	6,153	7.8%	202	1.2	2.0%
Costilla	132.0	5.4	4.5	931	4,832	0.2%	2	0.0	-
Custer	102.4	38.1	31.2	2,711	11,524	13.6%	370	4.3	4.2%
Delta	774.7	134.9	95.0	8,868	10,712	5.0%	446	4.8	0.6%
Dolores	103.1	9.2	5.8	772	7,458	9.3%	72	0.5	0.5%
Douglas	5,790.5	2,573.5	1,868.8	88,955	21,008	1.3%	1,199	25.2	0.4%
Eagle	3,917.7	1,452.2	929.8	14,467	64,268	44.3%	6,412	412.1	10.5%
El Paso	8,236.8	3,196.3	2,460.7	172,414	14,272	-	-	-	-
Fremont	478.5	168.8	126.4	14,819	8,529	2.9%	435	3.7	0.8%
Garfield	5,500.8	538.6	357.1	14,410	24,782	14.3%	2,066	51.2	0.9%
Gilpin	414.3	57.4	45.3	3,152	14,381	76.6%	2,416	34.7	8.4%
Grand	1,063.6	318.5	228.2	9,357	24,388	33.8%	3,164	77.2	7.3%
Gunnison	1,234.3	270.6	183.5	6,790	27,024	19.6%	1,333	36.0	2.9%
Hinsdale	309.2	27.9	18.4	1,135	16,231	71.2%	808	13.1	4.2%
Jefferson	9,224.5	3,834.3	2,574.2	173,268	14,857	2.1%	3,689	54.8	0.6%
La Plata	3,740.1	523.9	332.0	15,879	20,911	18.9%	2,997	62.7	1.7%

County	All Properties	Non-agricultural Single-Family Residences				Estimated Non-agricultural Single-Family Residences within 500 Meters of Forested Public Lands			
	Total Valuation $ millions	Total Valuation $ millions	Improvement Valuation $ millions	Number	Average Improvement Valuation $	Share of Total Properties* %	Number of Properties	Estimated Improvement Valuation $ millions	Share of County Total Valuation %
Lake	115.3	47.4	34.8	3,102	11,213	26.6%	824	9.2	8.0%
Larimer	5,439.9	1,918.6	1,459.2	100,811	14,475	5.2%	5,277	76.4	1.4%
Las Animas	897.2	49.1	42.1	9,261	4,541	-	4	0.0	-
Mesa	2,776.5	903.1	621.7	44,025	14,121	1.5%	648	9.1	0.3%
Mineral	42.5	15.3	12.1	1,188	10,174	33.7%	401	4.1	9.6%
Moffat	564.7	51.3	41.7	3,780	11,040	0.2%	7	0.1	-
Montezuma	698.3	107.2	74.7	6,951	10,749	3.9%	272	2.9	0.4%
Montrose	659.7	215.8	155.4	11,494	13,518	0.8%	94	1.3	0.2%
Ouray	234.5	75.8	48.0	2,243	21,417	33.5%	750	16.1	6.9%
Park	572.2	221.4	166.4	10,985	15,150	30.1%	3,311	50.2	8.8%
Pitkin	3,888.7	1,743.0	688.6	5,062	136,036	46.2%	2,339	318.2	8.2%
Pueblo	1,479.8	560.2	494.3	52,063	9,494	0.8%	419	4.0	0.3%
Rio Blanco	1,201.3	32.1	24.3	2,018	12,062	1.8%	37	0.4	-
Rio Grande	231.9	51.4	41.0	4,604	8,899	6.3%	289	2.6	1.1%
Routt	1,646.2	460.6	277.8	7,898	35,171	9.7%	766	26.9	1.6%
Saguache	66.5	14.5	11.9	-	-	-	-	-	-
San Juan	113.1	11.7	6.3	510	12,380	45.2%	230	2.9	2.5%
San Miguel	1,289.5	344.1	217.2	2,647	82,073	66.1%	1,749	143.6	11.1%
Summit	2,036.6	796.8	499.1	13,700	36,433	79.9%	10,945	398.8	19.6%
Teller	535.1	182.0	142.2	10,524	13,515	46.4%	4,884	66.0	12.3%
TOTAL	***74,326.8***	***24,041.5***	***16,121.9***	***925,506.0***	***827,101.7***	***7.3%***	***67,737.9***	***2,067.6***	***2.8%***

Sources: *Colorado Department of Local Affairs, Division of Property Taxation 2010 and U.S. Department of Agriculture [USDA], Forest Service 2010.*

Benefits and Costs

Unlike the previous section which dealt with regional economic impacts of jobs, income, taxes, payments, and assets, this section considers benefits and costs realized by all citizens in Colorado and across the nation.

Benefits and costs are divided into two parts: 1) those which are financial and captured in the fiscal records of the Forest Service and 2) those which are realized by any organization or individual. Financial considerations include revenues and costs from the perspective of the Forest Service or other government agencies. Other benefits and costs can be realized by users of roadless areas in national forests, including backpackers, hunters, viewers of wildlife, permitted outfitters and guides, ski areas, ranchers, timber processors, and water users. Other benefits and costs can also be realized by those who never set foot in Colorado roadless areas who desire the retention of wildland characteristics for their children.

In considering non-financial benefits and costs of roadless area management, both market and non-market goods and services can vary widely. Market goods or services are those for which one can observe transactions in the marketplace. Water rights, ski lift tickets, and the sale of cattle which graze on public lands are some examples of market values that are not captured in the financial records of government agencies. When road construction and vegetative treatments are not allowed, these values may be minimal or non-existent. With roads and treatment options, these uses of roadless areas have a greater opportunity to develop and market values are realized.

Goods and services not found in the marketplace are also affected by roadless area management. Non-market goods and services are those for which there are no observable transactions. The value of these benefits are often estimated by economists using “willingness to pay” concepts (Peterson et al. 1988). Examples of non-market benefits include dispersed recreation, viewing scenery and wildlife, solitude, health benefits, biological diversity, and ecosystem functions. Another group of benefits includes those who desire to retain options for the future use, either for themselves or for others. All of these pertain to roadless areas in Colorado, and can potentially be affected by road or vegetative treatment activities.

Environmental Consequences

All of the environmental consequences presented in this section occur in Colorado.

Economic Impacts

The economic impacts of each alternative are based on projections of energy mineral development and production over a 15-year period. See the individual resource sections for details and specific assumptions applied to the projections. Projected oil and gas development for Colorado roadless areas is specific to each basin and forest. Most projected activity relevant to Colorado roadless areas occurs on the GMUG (GMUG) and White River National Forests and in the Piceance Basin.

Oil and natural gas development and production on the San Juan National Forest in the San Juan Basin are projected to not vary by alternative in 1, 2, and 4. Acres within roadless areas boundaries change by alternative, but total oil and gas activity in the San Juan Basin is not expected to change by alternative (Abing 2011). Alternative 3 may see additional leases in the future, but within the timeframe for this analysis it is not likely, and therefore, would be the same as Alternatives 1, 2, and 4. For these reasons, consequences of alternative roadless management in southwestern Colorado are

not presented in this report as they are assumed to not change between alternatives over the timeframe considered.

While oil and gas extraction in roadless areas is characterized by changes in annual production, coal extraction in roadless areas is characterized by constant production over differing lengths of time. All recoverable coal reserves in roadless areas are assumed to be economically viable. These coal reserves are located in Gunnison County adjacent to the Elk Creek and West Elk mines. The analysis assumes that no more than three coal mines will continue to operate in the North Fork coal mining area.

Output, employment, and labor income effects in the five-county area from oil and gas and from coal production are shown in Table 3-71. Output, employment, and labor income impacts have been estimated for the Piceance Basin by applying both development and production activities to the Energy Roadless model.

All indicators are expressed on an average annual basis over a 15-year analysis period (2012-2026). Only those impacts associated with development and production from roadless areas are included.

Table 3-71 shows the direct, indirect, and induced effects for output (production value), employment, and labor income by alternative. Direct effects are realized by drilling and extraction companies from the sale of oil, natural gas, coal, and well drilling services. Indirect effects are realized by local companies that provide goods and services to the extraction and drilling industries. Induced effects result from local spending of employee income paid by the companies directly and indirectly affected by extraction and well drilling activities.

Alternative 3 has the largest total effects on output, employment, and labor income. Alternatives 2 and 4 have the next largest effects. Compared with Alternative 3, output would be lower by about 4 percent each year, employment would be lower by about 3 percent each year, and income would be lower by about 2 percent annually. Alternative 1 has the smallest effects. Compared with Alternative 3, average production, employment, and labor income would all be lower by 13 percent annually over the 15 year analysis period.

Coal would provide about three-fourths of mineral-related employment and labor income under all alternatives. Coal would also provide about 60 percent of the production value under all alternatives.

Economic impacts displayed in Table 3-71 are generally smaller than those presented in the RDEIS. These changes are the result of substantially different economic conditions and updated data sources. The recession year of 2009 saw considerable changes in the price of natural gas (down) and coal (up) compared with 2006. Price changes alone profoundly affected estimates of production value, especially for natural gas.

Revisions of worker productivity and compensation rates have reduced employment and income generally, but with notable consequences in natural gas extraction. A fully updated set of coal mine lives and development assumptions altered the direct effects of coal employment. New estimates of goods and services purchased locally by both businesses and households have substantially diminished indirect and induced effects across all mineral activity.

When the impacts of drilling, oil and gas extraction, and coal mining are summed, the net change from the RDEIS exhibits two patterns. For Alternatives 2, 3, and 4 total aggregate production values for coal, oil, and gas are reduced by 22 percent, employment by 15 percent, and labor income by 10

percent in the FEIS compared to the RDEIS. Updates to the coal scenario are largely responsible for a different pattern of net changes under 2001 Roadless Rule in the FEIS. Compared with the RDEIS, the 2001 Roadless Rule shows a total production value increase of 9 percent, employment increase by 33 percent and labor income increase by 45 percent for coal, oil, and gas in aggregate in the FEIS.

Table 3-72 shows the comparable direct, indirect, and induced effects for output (production value), employment, and labor income by alternative throughout Colorado. Direct effects are identical to those shown in Table 3-71. Indirect and induced effects include industry interactions throughout the state.

The relationships between alternatives and among the energy mineral activities are very similar to those described for Table 3-71. Total employment effects range from 400 to 450 jobs greater than those shown for only the five-county area. These effects are approximately 20 percent larger than those for only the five-county area when including the impact to the entire state. Labor income effects range from $25.5 million to $29.3 million greater in the state-wide model than just the five-county area. These effects are about 17 percent larger than those for the 5-county energy roadless model area.

***Table 3-71**. Average Annual Economic Impacts by Alternative for Energy Mineral Activity in the Energy Roadless Model Area, 2012-2026 (2009 dollars)*

Activity/Effects	Value of Production ($ millions)			Employment (jobs)			Labor Income ($ millions)		
	Alt 1	Alt 2 & 4	Alt 3	Alt 1	Alt 2 & 4	Alt 3	Alt 1	Alt 2 & 4	Alt 3
Oil & Gas Drilling									
Direct	107.0	107.0	121.0	164	164	185	12.6	12.6	14.2
Indirect	16.3	16.3	18.4	113	113	127	6.0	6.0	6.8
Induced	9.8	9.8	11.1	91	91	103	3.3	3.3	3.7
Totals	***133.1***	***133.1***	***150.4***	***367***	***367***	***415***	***21.9***	***21.9***	***24.7***
Oil & Gas Production									
Direct	126.3	126.3	139.5	46	46	51	5.5	5.5	6.1
Indirect	15.6	15.6	17.2	102	102	113	5.7	5.7	6.3
Induced	5.5	5.5	6.1	52	52	57	1.8	1.8	2.0
Totals	***147.5***	***147.5***	***162.8***	***200***	***200***	***221***	***13.1***	***13.1***	***14.4***
Coal Production									
Direct	312.9	362.3	362.3	752	871	871	78.4	90.8	90.8
Indirect	54.6	63.2	63.2	318	368	368	17.8	20.6	20.6
Induced	46.5	53.9	53.9	433	502	502	15.6	18.0	18.0
Totals	***414.1***	***479.3***	***479.3***	***1,504***	***1,741***	***1,741***	***111.8***	***129.4***	***129.4***
Total Energy Minerals									
Direct	546.3	595.6	622.7	962	1080	1106	96.5	108.9	111.1
Indirect	86.5	95.1	98.8	533	583	609	29.5	32.3	33.7
Induced	61.9	69.2	71.1	576	644	661	20.7	23.1	23.7
Totals	***694.6***	***759.9***	***792.6***	***2,071***	***2,308***	***2,376***	***146.7***	***164.3***	***168.5***

***Table 3-72**. Average Annual Economic Impacts by Alternative for Energy Mineral Activity in Colorado, 2012-2026 (2009 dollars)*

Activity/Effects	Value of Production ($ millions)			Employment (jobs)			Labor Income ($ millions)		
	Alt 1	**Alt 2 & 4**	**Alt 3**	**Alt 1**	**Alt 2 & 4**	**Alt 3**	**Alt 1**	**Alt 2 & 4**	**Alt 3**
Oil & Gas Drilling									
Direct	107.0	107.0	121.0	164	164	185	12.6	12.6	14.2
Indirect	18.1	18.1	20.5	123	123	139	6.7	6.7	7.6
Induced	11.5	11.5	13.1	102	102	115	3.8	3.8	4.3
Totals	***136.7***	***136.7***	***154.5***	***388***	***388***	***439***	***23.1***	***23.1***	***26.1***
Oil & Gas Production									
Direct	126.3	126.3	139.5	46	46	51	5.5	5.5	6.1
Indirect	29.0	29.0	32.1	157	157	173	10.0	10.0	11.1
Induced	9.3	9.3	10.3	79	79	87	3.1	3.1	3.4
Totals	***164.7***	***164.7***	***181.8***	***282***	***282***	***311***	***18.6***	***18.6***	***20.6***
Coal Production									
Direct	312.9	362.3	362.3	752	871	871	78.4	90.8	90.8
Indirect	92.0	106.5	106.5	501	580	580	31.4	36.4	36.4
Induced	62.3	72.2	72.2	543	628	628	20.7	23.9	23.9
Totals	***467.3***	***541.0***	***541.0***	***1,796***	***2,079***	***2,079***	***130.5***	***151.1***	***151.1***
Total Energy Minerals									
Direct	546.3	595.6	622.7	962	1080	1106	96.5	108.9	111.1
Indirect	139.1	153.6	159.0	781	860	893	48.1	53.1	55.0
Induced	83.2	93.1	95.5	723	809	830	27.6	30.9	31.7
Totals	***768.7***	***842.3***	***877.3***	***2,466***	***2,750***	***2,829***	***172.2***	***192.8***	***197.8***

An analysis of potential impacts to the cost of natural gas transmission pipelines was completed for the FEIS. Based on a recent natural gas pipeline project in western Colorado (USDI-Bureau of Land Management and USDA-Forest Service 2008), it was estimated that about ten additional miles of pipeline could potentially be built and operated under Alternatives 1, 2, and 4 compared with Alternative 3. This increase would represent 0.7 percent of existing transmission pipeline mileage in the five-county area and 0.1 percent of pipeline mileage in the state. It is assumed that the increase in pipeline mileage would increase the cost of operations proportionately. Based on average annual labor and input costs in the U.S., this increase represents less than 0.2 percent of total pipeline operating costs and less than 0.1 percent of total oil, gas, and pipeline industry costs in Colorado.

Tables 3-73 through 3-75 show the estimated average annual state and local government revenues derived from energy mineral activity in roadless areas. Federal mineral lease payments, property taxes, and severance taxes have been estimated using production and revenue relationships provided by the Colorado Department of Local Affairs, Division of Property Taxation and the Colorado Department of Revenue (Hannum 2011; Thayer 2011; Colorado Department of Local Affairs, Division of Property Taxation 2011; Colorado Department of Revenue 2011).

Estimates by county are based on contemporary well drilling and productivity patterns in the Piceance basin (Abing 2011). The timing and magnitude of actual revenues will be dependent upon factors such as market prices, tax laws, regulatory constraints, and availability of equipment and personnel. Tax receipts are based on production only.

Revenue effects from oil and gas range from $13.1 million in Alternatives 1, 2, and 4 to $14.5 million in Alternative 3. Revenue effects from coal range from $15.7 million in Alternatives 1 to $18.1 million in Alternatives 2, 3, and 4.

Generally, property tax revenues account for the largest share of local government revenues. Mesa County is projected to have the largest number of wells and natural gas production, and thus garners the largest share of local government revenues. Gunnison County contains the vast majority of coal reserves, and therefore is projected to garner the largest share of local government revenues. Other counties across Colorado share severance tax receipts and Federal mineral lease royalties through allocations directed by Colorado statute and executed by the Colorado Department of Local Affairs.

Historically, decisions on the management of NFS lands have affected forest revenues and subsequent payments to states and counties. In 2000, the Secure Rural Schools and Community Self-Determination Act (SRSCSA) gave counties the opportunity to elect payments that would not vary and be independent of National Forest System receipts. All counties in Colorado elected to receive the SRSCSA, except Douglas, Gilpin, Jefferson, and San Miguel. Only San Miguel could experience a change in forest payments resulting from energy mineral development activities in roadless areas. Only fees associated with Forest Service permits for oil, gas, and coal exploration and development would affect payments to San Miguel County. Federal mineral lease royalties are collected by the Department of Interior and not subject to Forest Service payments. Changes in the payment to the county are not expected to be sizeable under any alternative.

Table 3-73. *Alternative 1: Average Annual Federal Mineral Lease Production, Payments, and Related Tax Revenues from Roadless Areas, 2012-2026 (thousands of 2009 dollars)*

Description	Energy-Affected Counties						
	Delta	Garfield	Gunnison	Mesa	Pitkin	All Other Counties	State Total
Oil & Gas Production							
Value of oil & gas production	$3,338	$11,817	$41,562	$46,743	$22,863	$0	$126,324
State and Local Tax Receipts							
Property tax (production only)	$100	$311	$1,086	$1,009	$392	$0	$2,898
Severance tax							$2,526
Federal Mineral Lease Payments							
Retained by U.S.							$8,053
Paid to Colorado							$7,737
State Distribution of Severance Tax & Federal Royalties*							
Public schools							$3,869
State trust, water, & grant funds							$4,469
Direct distribution to counties/cities/towns	$109	$341	$98	$189	$0	$1,189	$1,926
Total of Payments and Taxes Received	***$209***	***$652***	***$1,183***	***$1,197***	***$392***	***$1,189***	***$13,161***
Coal Production							
Value of coal production	$47,723	$0	$264,312	$0	$0	$0	$312,035
State and Local Tax Receipts							

Description	*Energy-Affected Counties*						
	Delta	*Garfield*	*Gunnison*	*Mesa*	*Pitkin*	*All Other Counties*	*State Total*
Property tax (production only)	$150	$0	$1,003	$0	$0	$0	$1,153
Severance tax							$2,295
Federal Mineral Lease Payments							
Retained by U.S.							$12,731
Paid to Colorado							$12,232
State Distribution of Severance Tax & Federal Royalties*							
Public schools							$9,422
State trust, water, & grant funds							$10,635
Direct distribution to counties/cities/towns	$164	$500	$143	$266	$0	$1,717	$2,791
Total of Payments and Taxes Received	***$314***	***$500***	***$1,146***	***$266***	***$0***	***$1,717***	***$15,679***

Table 3-74. *Alternatives 2 and 4: Average Annual Federal Mineral Lease Production, Payments, and Related Tax Revenues from Roadless Areas, 2012-2026 (thousands of 2009 dollars)*

Description	Energy-Affected Counties						
	Delta	Garfield	Gunnison	Mesa	Pitkin	All Other Counties	State Total
Oil & Gas Production							
Value of oil & gas production	$3,338	$11,817	$41,562	$46,743	$22,863	$0	$126,324
State and Local Tax Receipts							
Property tax (production only)	$100	$311	$1,086	$1,009	$392	$0	$2,898
Severance tax							$2,526
Federal Mineral Lease Payments							
Retained by U.S.							$8,053
Paid to Colorado							$7,737
State Distribution of Severance Tax & Federal Royalties*							
Public schools							$3,869
State trust, water, & grant funds							$4,469
Direct distribution to counties/cities/towns	$109	$341	$98	$189	$0	$1,189	$1,926
Total of Payments and Taxes Received	$209	$652	$1,183	$1,197	$392	$1,189	$13,161
Coal Production							
Value of coal production	$47,723	$0	$312,035	$0	$0	$0	$359,758
State and Local Tax Receipts							

Description	*Energy-Affected Counties*						
	Delta	*Garfield*	*Gunnison*	*Mesa*	*Pitkin*	*All Other Counties*	*State Total*
Property tax (production only)	$150	$0	$1,184	$0	$0	$0	$1,334
Severance tax							$2,646
Federal Mineral Lease Payments							
Retained by U.S.							$14,678
Paid to Colorado							$14,103
State Distribution of Severance Tax & Federal Royalties*							
Public schools							$7,051
State trust, water, & grant funds							$6,480
Direct distribution to counties/cities/towns	$190	$577	$164	$307	$0	$1,976	$3,217
Total of Payments and Taxes Received	$340	$577	$1,348	$307	$0	$1,976	$18,082

Table 3-75. *Alternative 3: Average Annual Federal Mineral Lease Production, Payments, and Related Tax Revenues from Roadless Areas, 2012-2026 (thousands of 2009 dollars)*

Description	Energy-Affected Counties						State Total
	Delta	Garfield	Gunnison	Mesa	Pitkin	All Other Counties	
Oil & Gas Production							
Value of oil & gas production	$3,855	$13,345	$43,671	$52,792	$25,812	$0	$139,475
State and Local Tax Receipts							
Property tax (production only)	$116	$351	$1,141	$1,139	$442	$0	$3,190
Severance tax							$2,789
Federal Mineral Lease Payments							
Retained by U.S.							$8,892
Paid to Colorado							$8,543
State Distribution of Severance Tax & Federal Royalties*							
Public schools							$4,271
State trust, water, & grant funds							$4,934
Direct distribution to counties/cities/towns	$120	$377	$108	$208	$0	$1,314	$2,127
Total of Payments and Taxes Received	$236	$728	$1,249	$1,348	$442	$1,314	$14,522
Coal Production							
Value of coal production	$47,723	$0	$312,035	$0	$0	$0	$359,758
State and Local Tax							

Description	*Energy-Affected Counties*						*State Total*
	Delta	*Garfield*	*Gunnison*	*Mesa*	*Pitkin*	*All Other Counties*	
Receipts							
Property tax (production only)	$150	$0	$1,184	$0	$0	$0	$1,334
Severance tax							$2,646
Federal Mineral Lease Payments							
Retained by U.S.							$14,678
Paid to Colorado							$14,103
State Distribution of Severance Tax & Federal Royalties*							
Public schools							$7,051
State trust, water, & grant funds							$6,480
Direct distribution to counties/cities/towns	$190	$577	$164	$307	$0	$1,976	$3,217
Total of Payments and Taxes Received	$340	$577	$1,348	$307	$0	$1,976	$18,082

Counties with Federal lands also receive Payments in Lieu of Taxes, (PILT) by the Department of Interior to help offset the loss of property tax revenues caused by Federal ownership. Using a system of formulas, payments are based on county population and acreage in Federal ownership less Federal payments from land use in the prior year. Federal mineral lease payments are included in prior year deductions. A minimum payment is established so that every qualifying county receives some PILT, regardless of prior year payments. Federal mineral lease payments estimated for all alternatives could reduce PILT by equal amounts. However, PILT payments are subject to Congressional appropriation, and have not been fully funded in recent years. Consequently, any reduction in PILT for Colorado counties is likely to be smaller than the increase in Federal mineral lease payments. For those counties already receiving the minimum PILT payment, no change would occur under any alternative.

The development and production of energy minerals in roadless areas may impose additional demands on services provided by local governments. Higher levels of traffic, greater demands for social services, and increased loads on utility infrastructure are examples of additional costs that may be incurred by local governments in the Piceance Basin. While these costs are common for communities near energy development, the specific timing, magnitude, and location of energy development cannot be estimated at this level of analysis. Such impacts on local governments are typically addressed at the project level when site-specific development is proposed. Because energy markets can be volatile, energy development can begin and end quickly, posing significant challenges to local governments in serving residents and visitors alike.

Summary of Economic Impact Effects

Provisions for energy mineral development in Alternatives 2, 3, and 4 are likely to result in increases of average annual production, employment, and labor income over the next 15-years for the Energy Roadless model area (Delta, Garfield, Gunnison, Mesa, Montrose, and Pitkin counties). Total jobs under Alternative 1 is estimated at 2,100, while for Alternatives 2 and 4 it rises to 2,300 and for Alternative 3 it is estimated at nearly 2,400 jobs. The estimated effects of Alternative 1 are generally 85 percent of Alternative 3 for output, employment and labor income. Effects under Alternatives 2 and 4 are about 95 percent of those in Alternative 3.

A pattern similar to economic effects emerges for average annual state and local government revenues. Compared with $32.6 million for oil, gas, and coal in Alternative 3, Federal mineral lease payments and tax revenues are estimated to be $31.2 million for Alternatives 2 and 4, and $28.8 million for Alternative 1. Gunnison and Mesa Counties are expected to yield the largest revenues under all alternatives. Other Federal payments to state and local governments, such as those from the National Forest Fund and PILT, are expected to either not change or be more than offset by revenues from Federal mineral lease payments.

Values at Risk from Wildfire

Some roadless areas pose a higher wildfire hazard to communities than others. In addition, each alternative poses different management restrictions that may influence the ability to treat hazardous fuels within roadless areas. The combination of these factors can influence potential vulnerabilities of wildfire losses to at-risk communities located nearby.

To assess the effects of a Colorado Roadless Rule on wildfire threats to communities, the CPZ has been defined within a limited definition of the WUI. This analysis area considers at-risk communities

within 0.5 and 1.5 miles of any roadless area. Communities within this area are strongly influenced by roadless area management.

National forest field personnel in Colorado projected the likelihood of mechanical fuel treatments in each roadless area under each alternative. The purpose of these treatments would be to reduce the risk of losses from wildfire in nearby at-risk communities. The likelihood ranged from "none" to "low" to "high". Table 3-76 shows the CPZ land area by county that could potentially be treated under each alternative. Some potential is defined as the combination of both "low" and "high" likelihoods. High potential is defined as only the "high" likelihood projected by forest personnel. Potential does not mean that these acres will be treated. Actual treatment depends on funding, overall fuel treatment priorities both in and outside of roadless areas, and other factors. However, Table 3-76 provides a cursory indication of options and likelihoods for reducing wildfire risks to at-risk communities by county.

A potential for fuel treatments in either IRAs or CRAs in the CPZ exists in 24 counties. Across these counties, the greatest acreages of potential treatment occur under Alternatives 2 and 3. The counties with the greatest acreage of high potential treatment include La Plata, Larimer, and Park. Those with moderate acreage of high potential include Archuleta, Custer, Chaffee, and Douglas. These seven counties have a minimum of 0.4 percent to 8.8 percent of their total valuation in homes located in the wildland urban interface. While all counties with high potential acres could benefit from reduced wildfire risks, these seven counties could benefit substantially.

Under Alternative 1, sixteen counties have potential for fuel treatments in the CPZ. The counties with the greatest acreage of high potential treatment are La Plata and Larimer. Under Alternative 4, twenty-two counties have potential for treatments in the CPZ. The counties with the greatest acreage of high potential treatment are Larimer, La Plata, Douglas, and Park.

Table 3-77 provides a comparison of potential treatment acres under each alternative with Alternative 3. This table shows more clearly that there are few differences between Alternatives 2 and 3. It also shows clearly a reduction in potential treatment acres under Alternatives 1 and 4. Thirteen counties would have a lower potential of treatment under Alternative 1, while 18 counties would have a lower potential of treatment under Alternative 4. Park County has a sizeable tax dependence on properties in the urban interface and would also have a substantial reduction in potential treatment acres under Alternative 1. No county is likely to have an increase in acreage under Alternative 1. Montezuma and Dolores Counties could have an increase in acreage under Alternative 4, but with lower potential for treatment. As with Alternative 1, Park County has both a high tax dependence on properties in the urban interface and faces the large reduction of acres with potential for treatment.

Table 3-78 provides a comparison of potential treatment acres under Alternatives 2 and 4 with Alternative 1. This table shows clearly that there are more potential treatment acres under Alternative 2, but fewer under Alternative 4. There are substantially more acres with some potential than high potential under Alternative 2, especially in Park, Custer, Eagle, and Pitkin Counties. Park and Custer Counties have the greatest number of high potential acres. Grand County has fewer acres with treatment potential under Alternative 2 compared with Alternative 1. Under Alternative 4, eight counties may have fewer potential treatment acres compared with Alternative 1, most notably La Plata and Archuleta Counties. Thirteen counties have greater potential treatment acres, especially Park and Pitkin Counties. Eagle, Park, and Pitkin Counties all have high tax dependence on properties in the urban interface and may also have higher potential treatment acres compared with Alternative 1. Grand County also has high tax dependence, but would have fewer acres of potential treatment.

Table 3-79, Table 3-80, and Table 3-81 provide another context for understanding potential treatment acres. These tables display the share of CPZ acres with treatment potential in IRAs and CRAs compared with all NFS acres that intersect the CPZ by county. A high percentage means that IRAs and CRAs could play an important role in overall reduction of community vulnerabilities due to wildfire. A low percentage means that treatments in IRAs or CRAs may not be critical for this purpose. Table 3-79 shows that fuel treatments under Alternatives 2 and 3 in IRAs or CRAs may be especially important for La Plata, Custer, Pueblo, Huerfano, and Fremont Counties. Acres with a high likelihood of treatment range from about 15 percent to 30 percent of all NFS acres in the CPZ in these counties. Custer County has the highest relative vulnerability to losses in the wildland urban interface among these five counties. For most other counties, high potential acres are a relatively small share of all NFS acres in the CPZ. Under Alternative 1, La Plata and Archuleta Counties show a high share of all NFS acres. Under Alternative 4, high potential treatment acres are a small share of all NFS acres in the CPZ for most counties.

Table 3-80 shows the difference in shares of CPZ acres when comparing each alternative with Alternative 3. This table clearly shows that typically there are very small differences between Alternative 2 and 3 when considering the share of all NFS acres available for fuel treatment in the CPZ. Alternatives 1 and 4, on the other hand, have clear reductions compared with Alternative 3 in the proportion of NFS acres available for fuel treatment in the CPZ. IRAs and CRAs under these alternatives would have a substantially reduced role on NFS lands in attempts to protect communities from wildfire losses.

Table 3-81 shows the difference in shares of CPZ acres when comparing Alternatives 2 and 4 with Alternative 1. This table clearly shows that Alternative 2 has a net increase in potential treatment acres as a share of all NFS acres in the CPZ. This is especially true for Pueblo, Custer, Fremont, and Huerfano Counties. Alternative 4 is a mix of larger and smaller shares of CPZ acres with potential treatment compared with Alternative 1. La Plata County would have the largest reduction in the share of CPZ acres, while Fremont and Custer Counties would have the largest increase. Overall, a slightly smaller share of CPZ acres would have potential for treatment under Alternative 4 resulting in a very modest reduction in the role of IRAs and CRAs to protect communities from wildfire losses compared with Alternative 1.

Table 3-76. *Potential Fuel Treatment[1] Acres in the Community Protection Zone within 0.5 and 1.5 Miles of At-Risk Communities, Totals by County, Acres*

County	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]	
	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles
	-acres,															
Archuleta	2,785	18,743	2,785	18,743	2,785	18,743	2,785	18,743	2,785	18,743	2,785	18,743	1,493	5,708	1,493	5,708
Boulder	-	5,089	-	3,908	-	5,089	-	3,908	-	5,089	-	3,908	-	5,089	-	3,908
Chaffee	941	3,944	941	3,944	3,700	11,891	3,700	11,891	3,700	11,891	3,700	11,891	410	5,725	410	1,649
Clear Creek	3,049	13,886	-	-	3,049	13,886	-	-	3,049	13,886	-	-	3,049	13,886	-	-
Custer	-	-	-	-	4,301	12,997	4,301	12,997	4,301	12,997	4,301	12,997	2,123	6,540	-	175
Dolores	853	1,911	-	-	853	1,911	-	-	853	1,911	-	-	1,347	1,908	-	-
Douglas	2,449	10,165	2,449	10,165	2,506	11,794	2,506	11,794	2,506	11,794	2,506	11,794	2,506	11,794	2,506	11,794
Eagle	-	-	-	-	13,278	25,332	2,195	5,027	13,278	25,332	-	-	3,528	-	-	-
El Paso	-	-	-	-	-	883	-	883	-	883	-	883	-	883	-	883
Fremont	-	-	-	-	1,092	3,640	1,092	3,640	1,092	3,640	1,092	3,640	1,083	3,593	-	-
Garfield	-	-	-	-	542	2,141	-	-	542	2,141	-	-	-	-	-	-
Grand	2,580	13,975	150	2,820	2,430	11,960	-	805	2,580	13,975	150	2,820	2,430	11,714	-	559
Gunnison	78	1,185	78	1,185	933	2,551	78	1,185	933	2,551	78	1,185	78	1,185	78	1,185
Huerfano	-	-	-	-	1,693	6,550	1,693	6,550	1,693	6,550	1,693	6,550	136	2,560	136	2,560
Jefferson	467	4,425	467	4,425	467	4,425	467	4,425	467	4,425	467	4,425	467	4,425	467	4,425
La Plata	17,633	69,556	16,736	66,727	17,633	69,556	16,736	66,727	17,633	69,556	16,736	66,727	8,323	20,708	8,323	20,708
Lake	256	273	256	273	256	273	256	273	256	273	256	273	256	273	256	273
Larimer	22,492	61,712	14,278	35,539	22,492	61,712	14,278	35,539	22,492	61,712	14,278	35,539	21,016	58,846	14,275	35,534
Mineral	-	471	-	471	-	471	-	471	-	471	-	471	-	-	-	-
Montezuma	3,982	22,857	-	-	3,982	22,857	-	-	3,982	22,857	-	-	5,670	22,813	-	-

County	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]	
	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles
	-acres-															
Park	1,070	5,829	1,070	5,829	8,239	29,683	8,239	29,683	8,239	29,683	8,239	29,683	8,206	25,560	4,239	9,886
Pitkin	-	-	-	-	11,318	36,279	-	-	9,912	33,922	-	-	901	17,618	-	-
Pueblo	-	-	-	-	2,907	9,436	1,605	5,644	2,907	9,436	2,907	9,436	-	269	-	269
Summit	166	1,361	-	-	2,158	8,969	166	1,361	2,158	8,969	166	1,361	1,130	3,079	-	-
Total	***58,801***	***235,382***	***39,210***	***154,029***	***103,707***	***363,593***	***58,492***	***215,902***	***102,451***	***363,251***	***56,447***	***212,890***	***64,152***	***223,907***	***32,183***	***99,247***

Totals might not add due to rounding.

1) Potential means there is some likelihood of tree cutting for the purpose of fuel treatment.

2) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "low" or "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

3) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

Table 3-77. *Potential Fuel Treatment[1] Acres in the Community Protection Zone within 0.5 and 1.5 Miles of At-Risk Communities Compared with Alternative 3, Totals by County*

County	Alternative 1 vs. Alternative 3				Alternative 2 vs. Alternative 3				Alternative 4 vs. Alternative 3			
	Some Potential for Treatment2		***High Potential for Treatment3***		***Some Potential for Treatment2***		***High Potential for Treatment3***		***Some Potential for Treatment2***		***High Potential for Treatment3***	
	Within 0.5 miles	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***
	-acres-											
Archuleta	-	-	-	-	-	-	-	-	-1,291	-13,035	-1,291	-13,035
Chaffee	-2,760	-7,947	-2,760	-7,947	-	-	-	-	-3,290	-6,166	-3,290	-10,242
Custer	-4,301	-12,997	-4,301	-12,997	-	-	-	-	-2,179	-6,457	-4,301	-12,822
Dolores	-	-	-	-	-	-	-	-	494	-3	-	-
Douglas	-57	-1,629	-57	-1,629	-	-	-	-	-	-	-	-

County	*Alternative 1 vs. Alternative 3*				*Alternative 2 vs. Alternative 3*				*Alternative 4 vs. Alternative 3*			
	Some Potential for Treatment2		***High Potential for Treatment3***		***Some Potential for Treatment2***		***High Potential for Treatment3***		***Some Potential for Treatment2***		***High Potential for Treatment3***	
	Within 0.5 miles	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***
	acres											
Eagle	-13,278	-25,332	-	-	-	-	2,195	5,027	-9,750	-25,332	-	-
El Paso	-	-883	-	-883	-	-	-	-	-	-	-	-
Fremont	-1,092	-3,640	-1,092	-3,640	-	-	-	-	-9	-47	-1,092	-3,640
Garfield	-542	-2,141	-	-	-	-	-	-	-542	-2,141	-	-
Grand	-	-	-	-	-150	-2,015	-150	-2,015	-150	-2,261	-150	-2,261
Gunnison	-854	-1,366	-	-	-	-	-	-	-854	-1,366	-	-
Huerfano	-1,693	-6,550	-1,693	-6,550	-	-	-	-	-1,557	-3,990	-1,557	-3,990
La Plata	-	-	-	-	-	-	-	-	-9,309	-48,848	-8,412	-46,019
Larimer	-	-	-	-	-	-	-	-	-1,475	-2,866	-2	-5
Mineral	-	-	-	-	-	-	-	-	-	-471	-	-471
Montezuma	-	-	-	-	-	-	-	-	1,688	-43	-	-
Park	-7,169	-23,853	-7,169	-23,853	-	-	-	-	-33	-4,123	-4,000	-19,797
Pitkin	-9,912	-33,922	-	-	1,406	2,357	-	-	-9,011	-16,304	-	-
Pueblo	-2,907	-9,436	-2,907	-9,436	-	-	-1,302	-3,792	-2,907	-9,167	-2,907	-9,167
Summit	-1,992	-7,607	-166	-1,361	-	-	-	-	-1,028	-5,890	-166	-1,361
Total	***-46,557***	***-137,303***	***-20,145***	***-68,296***	***1,256***	***342***	***743***	***-780***	***-41,203***	***-148,510***	***-27,168***	***-122,810***

Totals might not add due to rounding

1) Potential means there is some likelihood of tree cutting for the purpose of fuel treatment.

2) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "low" or "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

3) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

Table 3-78. *Potential Fuel Treatment[1] Acres in the Community Protection Zone within 0.5 and 1.5 Miles of At-Risk Communities Compared with Alternative 3, Totals by County*

County	Alternative 2 vs. Alternative 1				Alternative 4 vs. Alternative 1			
	Some Potential for Treatment[2]		High Potential for Treatment[3]		Some Potential for Treatment[2]		High Potential for Treatment[3]	
	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles
	~~acres~~~							
Archuleta	-	-	-	-	-1,291	-13,035	-1,291	-13,035
Chaffee	2,760	7,947	2,760	7,947	-530	1,781	-530	-2,295
Custer	4,301	12,997	4,301	12,997	2,123	6,540	-	175
Dolores	-	-	-	-	494	-3	-	-
Douglas	57	1,629	57	1,629	57	1,629	57	1,629
Eagle	13,278	25,332	2,195	5,027	3,528	-	-	-
El Paso	-	883	-	883	-	883	-	883
Fremont	1,092	3,640	1,092	3,640	1,083	3,593	-	-
Garfield	542	2,141	-	-	-	-	-	-
Grand	-150	-2,015	-150	-2,015	-150	-2,261	-150	-2,261
Gunnison	854	1,366	-	-	-	-	-	-
Huerfano	1,693	6,550	1,693	6,550	136	2,560	136	2,560
La Plata	-	-	-	-	-9,309	-48,848	-8,412	-46,019
Larimer	-	-	-	-	-1,475	-2,866	-2	-5
Mineral	-	-	-	-	0	-471	-	-471
Montezuma	-	-	-	-	1,688	-43	-	-
Park	7,169	23,853	7,169	23,853	7,136	19,730	3,168	4,057
Pitkin	11,318	36,279	-	-	901	17,618	-	-
Pueblo	2,907	9,436	1,605	5,644	-	269	269	269
Summit	1,992	7,607	166	1,361	964	1,717	-	-
Total	47,813	137,645	20,888	67,516	5,355	-11,207	-6,755	-54,513

Totals might not add due to rounding

1) Potential means there is some likelihood of tree cutting for the purpose of fuel treatment.

2) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "low" or "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

3 Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

***Table 3-79**. Share of Total NFS Lands in the Community Protection Zone where Potential[1] Exists for Fuel Treatment by County*

County	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3	
	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles
Archuleta	5.5%	12.3%	5.5%	12.3%	5.5%	12.3%	5.5%	12.3%	5.5%	12.3%	5.5%	12.3%	2.9%	3.7%	2.9%	3.7%
Boulder	-	3.4%	-	2.6%	-	3.4%	-	2.6%	-	3.4%	-	2.6%	-	3.4%	-	2.6%
Chaffee	1.7%	2.1%	1.7%	2.1%	6.8%	6.4%	6.8%	6.4%	6.8%	6.4%	6.8%	6.4%	0.8%	3.1%	0.8%	0.9%
Clear Creek	7.1%	13.9%	-	-	7.1%	13.9%	-	-	7.1%	13.9%	-	-	7.1%	13.9%	-	-
Custer	-	-	-	-	28.1%	23.7%	28.1%	23.7%	28.1%	23.7%	28.1%	23.7%	13.9%	11.9%	-	0.3%
Dolores	9.1%	4.8%	-	-	9.1%	4.8%	-	-	9.1%	4.8%	-	-	14.4%	4.8%	-	-
Douglas	5.4%	9.3%	5.4%	9.3%	5.5%	10.8%	5.5%	10.8%	5.5%	10.8%	5.5%	10.8%	5.5%	10.8%	5.5%	10.8%
Eagle	-	-	-	-	13.9%	10.0%	2.3%	2.0%	13.9%	10.0%	-	-	3.7%	-	-	-
El Paso	-	-	-	-	-	1.0%	-	1.0%	-	1.0%	-	1.0%	-	1.0%	-	1.0%
Fremont	-	-	-	-	27.6%	18.4%	27.6%	18.4%	27.6%	18.4%	27.6%	18.4%	27.4%	18.1%	-	-
Garfield	-	-	-	-	7.6%	6.4%	-	-	7.6%	6.4%	-	-	-	-	-	-
Grand	7.7%	12.0%	0.4%	2.4%	7.2%	10.3%	-	0.7%	7.7%	12.0%	0.4%	2.4%	7.2%	10.1%	-	0.5%
Gunnison	0.1%	0.4%	0.1%	0.4%	1.1%	0.9%	0.1%	0.4%	1.1%	0.9%	0.1%	0.4%	0.1%	0.4%	0.1%	0.4%
Huerfano	-	-	-	-	17.3%	20.4%	17.3%	20.4%	17.3%	20.4%	17.3%	20.4%	1.4%	8.0%	1.4%	8.0%
Jefferson	1.7%	6.3%	1.7%	6.3%	1.7%	6.3%	1.7%	6.3%	1.7%	6.3%	1.7%	6.3%	1.7%	6.3%	1.7%	6.3%
La Plata	16.3%	29.9%	15.5%	28.7%	16.3%	29.9%	15.5%	28.7%	16.3%	29.9%	15.5%	28.7%	7.7%	8.9%	7.7%	8.9%

County	Alternative 1				Alternative 2				Alternative 3				Alternative 4			
	Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3	
	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles
Lake	1.5%	0.5%	1.5%	0.5%	1.5%	0.5%	1.5%	0.5%	1.5%	0.5%	1.5%	0.5%	1.5%	0.5%	1.5%	0.5%
Larimer	13.2%	16.1%	8.4%	9.3%	13.2%	16.1%	8.4%	9.3%	13.2%	16.1%	8.4%	9.3%	12.3%	15.4%	8.4%	9.3%
Mineral	-	0.4%	-	0.4%	-	0.4%	-	0.4%	-	0.4%	-	0.4%	-	-	-	-
Montezuma	10.2%	22.6%	-	-	10.2%	22.6%	-	-	10.2%	22.6%	-	-	14.5%	22.6%	-	-
Park	0.7%	1.6%	0.7%	1.6%	5.1%	8.4%	5.1%	8.4%	5.1%	8.4%	5.1%	8.4%	5.1%	7.2%	2.6%	2.8%
Pitkin	-	-	-	-	17.3%	20.9%	-	-	15.2%	19.5%	-	-	1.4%	10.2%	-	-
Pueblo	-	-	-	-	27.2%	38.4%	15.0%	22.9%	27.2%	38.4%	27.2%	38.4%	-	1.1%	-	1.1%
Summit	0.1%	0.5%	-	-	1.7%	3.5%	0.1%	0.5%	1.7%	3.5%	0.1%	0.5%	0.9%	1.2%	-	-
Total	3.8%	5.9%	2.5%	3.9%	6.9%	9.3%	3.9%	5.5%	6.8%	9.3%	3.8%	5.6%	4.1%	5.6%	2.1%	2.5%

1) Potential means there is some likelihood of tree cutting for the purpose of fuel treatment.

2) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "low" or "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

3) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

Table 3-80. *Change in Share of Total NFS Lands in the Community Protection Zone where Potential[1] Exists for Fuel Treatment Compared with Alternative 3 by County*

County	*Alternative 1 vs. Alternative 3*				*Alternative 2 vs. Alternative 3*				*Alternative 4 vs. Alternative 3*			
	Some Potential for Treatment2		*High Potential for Treatment3*		*Some Potential for Treatment2*		*High Potential for Treatment3*		*Some Potential for Treatment2*		*High Potential for Treatment3*	
	Within 0.5 miles	*Within 1.5 miles*	*Within 0.5 miles*	*Within 1.5 miles*	*Within 0.5 miles*	*Within 1.5 miles*	*Within 0.5 miles*	*Within 1.5 miles*	*Within 0.5 miles*	*Within 1.5 miles*	*Within 0.5 miles*	*Within 1.5 miles*
Archuleta	-	-	-	-	-	-	-	-	-2.5%	-8.5%	-2.5%	-8.5%
Boulder	-5.1%	-4.3%	-5.1%	-4.3%	-	-	-	-	-6.0%	-3.3%	-6.0%	-5.5%
Chaffee	-28.1%	-23.7%	-28.1%	-23.7%	-	-	-	-	-14.2%	-11.8%	-28.1%	-23.4%
Clear Creek	-	-	-	-	-	-	-	-	5.3%	-	-	-
Custer	-0.1%	-1.5%	-0.1%	-1.5%	-	-	-	-	-	-	-	-
Dolores	-13.9%	-1-	-	-	-	-	2.3%	2.0%	-10.2%	-10.0%	-	-
Douglas	-	-1.0%	-	-1.0%	-	-	-	-	-	-	-	-
Eagle	-27.6%	-18.4%	-27.6%	-18.4%	-	-	-	-	-0.2%	-0.2%	-27.6%	-18.4%
El Paso	-7.6%	-6.4%	-	-	-	-	-	-	-7.6%	-6.4%	-	-
Fremont	-	-	-	-	-0.4%	-1.7%	-0.4%	-1.7%	-0.4%	-1.9%	-0.4%	-1.9%
Garfield	-1.0%	-0.5%	-	-	-	-	-	-	-1.0%	-0.5%	-	-
Grand	-17.3%	-20.4%	-17.3%	-20.4%	-	-	-	-	-15.9%	-12.4%	-15.9%	-12.4%
Gunnison	-	-	-	-	-	-	-	-	-8.6%	-21.0%	-7.8%	-19.8%
Huerfano	-	-	-	-	-	-	-	-	-0.9%	-0.7%	-	-
La Plata	-	-	-	-	-	-	-	-	-	-0.4%	-	-0.4%
Lake	-	-	-	-	-	-	-	-	4.3%	-	-	-
Larimer	-4.4%	-6.7%	-4.4%	-6.7%	-	-	-	-	-	-1.2%	-2.5%	-5.6%
Mineral	-15.2%	-19.5%	-	-	2.2%	1.4%	-	-	-13.8%	-9.4%	-	-
Montezuma	-27.2%	-38.4%	-27.2%	-38.4%	-	-	-12.2%	-15.4%	-27.2%	-37.3%	-27.2%	-37.3%
Park	-1.6%	-3.0%	-0.1%	-0.5%	-	-	-	-	-0.8%	-2.3%	-0.1%	-0.5%

County	Alternative 1 vs. Alternative 3				Alternative 2 vs. Alternative 3				Alternative 4 vs. Alternative 3			
	Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3		Some Potential for Treatment2		High Potential for Treatment3	
	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles	Within 0.5 miles	Within 1.5 miles
Pitkin	-3.0%	-3.4%	-1.3%	-1.7%	0.1%	-	-	-	-2.7%	-3.7%	-1.8%	-3.1%
Pueblo	-	-	-	-	-	-	-	-	-2.5%	-8.5%	-2.5%	-8.5%
Summit	-5.1%	-4.3%	-5.1%	-4.3%	-	-	-	-	-6.0%	-3.3%	-6.0%	-5.5%
Total	***-28.1%***	***-23.7%***	***-28.1%***	***-23.7%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***-14.2%***	***-11.8%***	***-28.1%***	***-23.4%***

1) Potential means there is some likelihood of tree cutting for the purpose of fuel treatment.

2) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "low" or "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

3) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

Table 3-81. *Change in Share of Total NFS Lands in the Community Protection Zone where Potential[1] Exists for Fuel Treatment Compared with Alternative 1 by County*

County	Alternative 2 vs. Alternative 1				Alternative 4 vs. Alternative 1			
	Some Potential for Treatment2		***High Potential for Treatment3***		***Some Potential for Treatment2***		***High Potential for Treatment3***	
	Within 0.5 miles	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***
Archuleta	-	-	-	-	-2.5%	-8.5%	-2.5%	-8.5%
Chaffee	5.1%	4.3%	5.1%	4.3%	-1.0%	1.0%	-1.0%	-1.2%
Custer	28.1%	23.7%	28.1%	23.7%	13.9%	11.9%	-	0.3%
Dolores	-	-	-	-	5.3%	-	-	-
Douglas	0.1%	1.5%	0.1%	1.5%	0.1%	1.5%	0.1%	1.5%
Eagle	13.9%	10.0%	2.3%	2.0%	3.7%	-	-	-
El Paso	-	1.0%	-	1.0%	-	1.0%	-	1.0%
Fremont	27.6%	18.4%	27.6%	18.4%	27.4%	18.1%	-	-
Garfield	7.6%	6.4%	-	-	-	-	-	-
Grand	-0.4%	-1.7%	-0.4%	-1.7%	-0.4%	-1.9%	-0.4%	-1.9%

County	*Alternative 2 vs. Alternative 1*				*Alternative 4 vs. Alternative 1*			
	Some Potential for Treatment2		***High Potential for Treatment3***		***Some Potential for Treatment2***		***High Potential for Treatment3***	
	Within 0.5 miles	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***	***Within 0.5 miles***	***Within 1.5 miles***
Gunnison	1.0%	0.5%	-	-	-	-	-	-
Huerfano	17.3%	20.4%	17.3%	20.4%	1.4%	8.0%	1.4%	8.0%
La Plata	-	-	-	-	-8.6%	-21.0%	-7.8%	-19.8%
Lake	-	-	-	-	-0.9%	-0.7%	-	-
Larimer	-	-	-	-	-	-0.4%	-	-0.4%
Mineral	-	-	-	-	4.3%	-	-	-
Montezuma	4.4%	6.7%	4.4%	6.7%	4.4%	5.6%	2.0%	1.1%
Park	17.3%	20.9%	-	-	1.4%	10.2%	-	-
Pitkin	27.2%	38.4%	15.0%	22.9%	-	1.1%	-	1.1%
Pueblo	1.6%	3.0%	0.1%	0.5%	0.8%	0.7%	-	-
Summit	-	-	-	-	-2.5%	-8.5%	-2.5%	-8.5%
Total	***3.1%***	***3.4%***	***1.3%***	***1.7%***	***0.3%***	***-0.3%***	***-0.5%***	***-1.4%***

1) Potential means there is some likelihood of tree cutting for the purpose of fuel treatment.
2) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "low" or "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)
3) Number of CRA acres that overlap with CPZ for at-risk communities where the likelihood of tree cutting for the purpose of fuel treatment is projected to be "high" by forest units in the most recent roadless area activity projection survey (completed summer, 2011)

Benefits and Costs

The final part of economic consequences deals with a national perspective of benefits and costs. Unlike the previous section which dealt with regional economic impacts of jobs, income, and assets, this part considers benefits and costs realized by citizens across the nation. A discussion of benefits and costs, whether expressed in monetary terms or not, is a core function of disclosure and critical to decision-making. Table 2-7 in Chapter 2 provides a summary of environmental consequences by alternatives. A detailed, qualitative discussion of benefits and costs based on Table 2-7 can be found in the Regulatory Impact and Cost-Benefit Analysis (Miller 2011). What follows is a brief summary of tradeoffs by alternative.

Alternative 1

Roads and tree removal are highly restricted in this alternative. Projected road construction and tree removal in IRAs are the lowest in this alternative. About 14 miles of road are anticipated, 12 of which are associated with energy development. The government cost of management would generally be low. Emergency access would be expensive when required. Alternative 1 places the highest priority on protection of non-market roadless area characteristics. Natural processes and current conditions are recognized to be of very high value. This alternative offers the fewest opportunities for hazardous fuel treatments near at-risk communities, treatments for forest health, and energy mineral extraction. Alternative 1 retains the greatest options for roadless values, but effectively foregoes most options for future use or development. While management restrictions for any IRA could be reversed, the time and budgetary costs to do so would be very high.

Alternative 2

Roads and tree removal are allowed under limited conditions in the non-upper tier acres of Alternative 2. Most projected activities are associated with CPZ projects or oil/gas and coal leases. The government cost of management generally would be modest. Emergency access would be expensive when required. Alternative 2 places a high priority on protection of non-market roadless area characteristics, especially within the upper tier acres. Natural processes and current conditions are recognized to be of high value. This alternative offers some opportunities for hazardous fuel treatments near at-risk communities, some water conveyances, and coal extraction. Alternative 2 retains most options for roadless values, but effectively foregoes many options for future use or development. While management restrictions for any CRA could be reversed, the time and budgetary costs to do so would be high.

Alternative 3

Projected road construction and tree cutting, sale, or removal in IRAs is the highest in this alternative. Entry into each roadless area would be weighed as part of the forest planning process. Entry would require compliance with NEPA and consideration of benefits and costs (market and non-market) for each roadless area. The government cost of management would have the greatest range, from low cost for no entry and treatment in some IRAs to high cost for road construction and maintenance, law enforcement, permit administration, and other routine activities in other roadless areas. The cost of entry also includes administrative costs for NEPA compliance and resource monitoring. Roadless area characteristics would receive the highest priority and remain unchanged in some areas, but could be significantly altered in others, depending on forest plan direction. This alternative includes the largest potential change to wildlife habitat along with the greatest opportunities for hazard fuel reduction for at-risk communities, forest health treatments, energy mineral development and production. Roadless

area characteristics and non-market benefits would be retained. Alternative 3 retains the most options for future use or non-use, and thus limits opportunities foregone.

Alternative 4
Effects are similar to Alternative 2, but with additional upper tier acres, there would be more restrictions on road construction and tree cutting on the additional 1.6 upper tier acres. This alternative would protect most roadless area characteristics on those upper tier acres than the other alternatives, limiting all other future uses.

Cumulative Effects

Values at Risk from Wildfire
Growth of mountain communities, including those near public lands and roadless areas, may be the single most important factor in gauging cumulative effects for values at risk of wildfire. National demographics and income trends are primary drivers in Colorado population forecasts. By 2025, the Colorado population is expected to grow by 30 percent. The western slope and central mountain areas of the state, where most roadless areas are located, are expected to grow by over 40 percent (Colorado Department of Local Affairs [DOLA], Division of Local Governments, State Demography Office 2011). This high growth will likely add to local infrastructure, both public and private, making current at-risk communities even more vulnerable to wildfire hazards. The ability to treat fuels in roadless areas located in the urban interface could prove to be increasingly important to maintaining the quality of life in at-risk communities. Even with responsible, proactive actions on the part of local homeowners, the ability to manage wildland fuels could be critical. Alternatives 2 and 3 offer more options for reducing the threat of wildfire in roadless areas near these communities now and in the future.

Benefits and Costs
With population growth and private land development, the value of non-market roadless area characteristics can be expected to increase. This increase places a higher premium on the retention of roadless area characteristics, such as natural processes, retention of future options, and recreation uses. The same growth, however, also increases the value of wildland protection for communities and energy mineral benefits to the nation. The tradeoffs inherent in each of the alternatives could easily shift in the future, but it is very difficult to assess the direction and magnitude of societal values.

Other Required Disclosures

The NEPA implementing regulations direct agencies to prepare EISs concurrently with and integrated with other environmental review laws and executive orders. Consultation and coordination with the U.S. Fish and Wildlife Service is ongoing during preparation of the EIS for this rulemaking proposal and included completion of a biological assessment in accordance with the Endangered Species Act. None of the alternatives would require consultation under the Fish and Wildlife Coordination Act because they do not authorize impounding or diverting of water, or with the National Historic Preservation Act because they do not authorize any ground-disturbing action.

The U.S. Department of Agriculture rulemaking procedural requirements include provisions for compliance with the Unfunded Mandates Reform Act, Executive Order 12988, and the Civil Justice Reform Act, as discussed in the preamble for the proposed rule. There are no anticipated effects on any State or county laws because of the provisions for honoring existing rights. Effects of each

alternative in relation to the Clean Air Act, Clean Water Act, Migratory Bird Treaty Act, Wilderness Act, and other federal environmental laws, regulations, and executive orders are disclosed in each section of Chapter 3 where an effect is anticipated.

Civil Rights Impact Analysis

A Civil Rights Impact Analysis was completed for this rule-making process and approved by the Washington Office, Civil Rights Department. This document is available upon request and is summarized here.

The Colorado Roadless Proposed Rule and RDEIS has been reviewed and analyzed to ensure compliance with Departmental Regulation (DR) 4300-4, Civil Rights Impact Analysis; 7 CFR 15d, Nondiscrimination in Programs and Activities Conducted by the United States Department of Agriculture DR 1512-1 Regulatory Decision-Making requirements and to identify actual or potential adverse effects based on race, sex, national origin, age, and disabilities.

Purpose of a Civil Rights Impact Analysis (CRIA) – The CRIA describes the civil rights implications of policies, actions or decisions that will affect the USDA workforce or federally conducted or assisted programs and activities. The CRIA provides information about the potential adverse effects of a decision, program, or activity; how and to what degree the effects would be demonstrated; and whether the originally planned policy, action, decision, program, or activity should be modified or otherwise changed if possible to ensure increased benefits or more effective outcomes.

The CRIA helps to advise USDA policy makers, managers, and administrators about whether the action or decision will have the effect of unintentionally or otherwise illegally discriminating against USDA customers based on race, sex, national origin, age, and disabilities. Also, the CRIA serves to advise USDA policy makers, managers, and administrators of the effectiveness of decisions as related to ensuring efficient, appropriate allocation or distribution of goods and services in a manner that ensures compliance with all the laws, rules and regulations under which USDA must operate.

The Civil Rights Policy for the USDA, Departmental Regulation 4300-4 dated May 30, 2003, states that the following are among the civil rights strategic goals; (1) Managers, supervisors, and other employees are held accountable for ensuring that USDA customers are treated fairly and equitably, with dignity and respect; and (2) equal access is assured and equal treatment is provided in the delivery of USDA programs and services for all customers. This is the standard for service to all customers regardless of race, sex, national origin, age, or disabilities.

Disparate impact, a theory of discrimination, has been applied to the Colorado Roadless Rule in order to reveal any such negative effects that may unfairly and inequitably impact beneficiaries regarding program development, administration, and delivery. The objectives of this review and analysis are to prevent disparate treatment and minimize adverse Civil Rights impacts that may have caused an effect of discrimination against minorities, women and persons with disabilities and to ensure compliance with all Civil Rights statutes, Federal regulations, and USDA policies and procedures.

The Colorado Roadless Rule CRIA, using USDA Forest Service Civil Rights and Social/Economic direction, Executive Order 12989, Council of Environmental Quality National Environmental Policy Act direction and required analysis within the FEIS, sought to determine whether:

- all minorities, women and persons with disabilities are provided the same opportunities to participate in the Colorado Roadless rulemaking process;
- all minorities, women and persons with disabilities are provided the same or improved opportunities to access information about or have access to roadless areas as managed under the Colorado Roadless Rule.

The CRIA revealed no adverse effects associated with the Colorado Roadless rulemaking process or the final rule to the participation of any persons or groups based on race, sex, national origin, age, and disabilities. The process was open to the participation of any individuals or groups. There were no known barriers at the public meetings;

- all were open to the public,
- all were advertised locally through Forest networks, and
- all meeting facilities were accessible to the public including persons with disabilities.

Under all four alternatives, there would be no difference in opportunities for women, minorities, or persons with disabilities.

Environmental Justice

Executive Order (EO) 12898 (February 11, 1994) directs Federal agencies to focus attention on the human health and environmental conditions in minority and low-income populations. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Table 3-82 highlights the minority characteristics of the roadless counties compared to Colorado state statistics. As defined by the Council on Environmental Quality, a minority population exists if 50 percent or more of the total population is considered to be of any minority group. Based on the 2000 Census data, several counties have minority populations to be aware of; Conejos and Costilla County in the San Luis Valley have the largest minority populations in Colorado. Alamosa, Eagle, Huerfano, Lake, Las Animas, Pueblo, Rio Grande, and Saguache Counties all have minority populations larger than the State average.

***Table 3-82**. Demographic Statistics for Counties with roadless acres in Colorado, 2010 Census.*

County	2010 TOTALS	Native American & Alaska Native	Hispanic Origin (of any race)	Asian/Pacific Islander alone	Black/African American	Two or more races	Some other race alone	Below poverty 2009	Percent Heat with Wood[1] 2000)
Colorado	5,029,196	0.62%	20.65%	2.81%	3.75%	2.01%	0.15%	12.6%	N/A
Alamosa	15,445	0.87%	46.03%	0.88%	0.89%	1.47%	0.21%	22.20%	1.00%
Archuleta	12,084	1.37%	17.78%	0.69%	0.27%	1.55%	0.17%	12.90%	5.30%
Boulder	294,567	0.36%	13.33%	4.12%	0.77%	1.90%	0.16%	12.90%	9.00%
Chaffee	17,809	0.80%	9.42%	0.63%	1.50%	1.01%	0.07%	12.00%	0.50%
Clear Creek	9,088	0.62%	4.72%	0.59%	0.55%	1.29%	0.12%	8.10%	6.50%
Conejos	8,256	0.57%	55.96%	0.27%	0.15%	0.97%	0.29%	24.50%	4.80%
Costilla	3,524	0.82%	66.03%	0.96%	0.17%	0.85%	0.34%	27.40%	11.10%
Custer	4,255	0.54%	4.70%	0.38%	0.96%	1.32%	0.12%	13.90%	12.20%
Delta	30,952	0.61%	14.04%	0.51%	0.44%	1.28%	0.13%	13.90%	6.80%
Dolores	2,064	2.66%	3.97%	0.19%	0.15%	2.08%	0.00%	12.40%	8.60%
Douglas	285,465	0.28%	7.49%	3.76%	1.14%	1.96%	0.14%	3.30%	0.30%
Eagle	52,197	0.26%	30.06%	1.02%	0.47%	0.78%	0.16%	8.00%	1.90%
El Paso	622,263	0.59%	15.05%	2.96%	5.75%	3.47%	0.18%	11.50%	0.30%
Fremont	46,824	1.47%	12.32%	0.62%	3.85%	1.30%	0.04%	18.10%	2.20%
Garfield	56,389	0.53%	28.34%	0.66%	0.42%	1.11%	0.16%	8.60%	2.70%
Gilpin	5,441	0.62%	4.91%	1.54%	0.51%	1.43%	0.06%	7.30%	9.60%
Grand	14,843	0.35%	7.52%	0.86%	0.34%	1.17%	0.07%	8.50%	6.60%
Gunnison	15,324	0.40%	8.19%	0.64%	0.29%	1.27%	0.08%	13.40%	7.60%
Hinsdale	843	0.83%	2.85%	0.36%	0.36%	1.66%	0.71%	11.20%	14.80%
Huerfano	6,711	0.80%	35.29%	0.43%	0.33%	1.18%	0.12%	26.90%	4.40%
Jackson	1,394	0.93%	10.76%	0.07%	0.00%	0.79%	0.00%	15.00%	4.80%
Jefferson	534,543	0.49%	14.30%	2.63%	0.94%	1.59%	0.13%	8.10%	0.50%

County	*2010 TOTALS*	*Native American & Alaska Native*	*Hispanic Origin (of any race)*	*Asian/Pacific Islander alone*	*Black/African American*	*Two or more races*	*Some other race alone*	*Below poverty 2009*	*Percent Heat with Wood[1] 2000)*
Lake	7,310	0.63%	39.10%	0.44%	0.30%	1.12%	0.25%	13.80%	4.80%
La Plata	51,334	4.98%	11.80%	0.58%	0.34%	1.85%	0.11%	11.60%	5.90%
Larimer	299,630	0.43%	10.56%	1.96%	0.75%	1.74%	0.12%	14.70%	0.70%
Las Animas	15,507	1.10%	41.57%	0.66%	1.26%	1.18%	0.08%	18.50%	2.90%
Mesa	146,723	0.61%	13.33%	0.82%	0.53%	1.51%	0.09%	11.80%	1.70%
Mineral	712	0.56%	2.95%	0.14%	0.28%	0.84%	0.00%	10.50%	19.40%
Moffat	13,795	0.71%	14.39%	0.60%	0.23%	1.26%	0.08%	10.10%	2.00%
Montezuma	25,535	11.45%	11.04%	0.51%	0.18%	1.68%	0.08%	16.90%	8.90%
Montrose	41,276	0.49%	19.69%	0.63%	0.29%	1.26%	0.14%	12.80%	6.70%
Ouray	4,436	0.32%	4.42%	0.68%	0.14%	0.99%	0.07%	8.50%	9.20%
Park	16,206	0.72%	4.83%	0.62%	0.43%	1.73%	0.09%	9.10%	8.80%
Pitkin	17,148	0.15%	9.10%	1.25%	0.48%	1.07%	0.09%	6.50%	2.80%
Pueblo	159,063	0.62%	41.37%	0.78%	1.66%	1.30%	0.17%	16.90%	0.60%
Rio Blanco	6,666	0.66%	9.98%	0.50%	0.74%	1.71%	0.08%	30.70%	3.70%
Rio Grande	11,982	0.87%	42.45%	0.35%	0.21%	0.91%	0.13%	17.00%	6.90%
Routt	23,509	0.29%	6.81%	0.68%	0.39%	1.12%	0.06%	6.40%	4.50%
Saguache	6,108	1.11%	40.14%	0.79%	0.18%	1.33%	0.03%	30.10%	7.60%
San Juan	699	0.14%	12.02%	1.00%	0.00%	1.43%	0.29%	13.50%	11.10%
San Miguel	7,359	0.45%	8.56%	0.76%	0.26%	1.35%	0.11%	10.70%	7.80%
Summit	27,994	0.20%	14.25%	1.01%	0.74%	0.97%	0.11%	8.70%	2.70%
Teller	23,350	0.72%	5.54%	0.75%	0.45%	1.91%	0.06%	8.20%	6.30%

***Source**: US Census Bureau, 2000 & 2010 Census.*

1) Heat with wood information was not updated as part of the 2010 Census, so 2000 data are presented.

This information for all counties in Colorado is provided in a spatial format in Appendix E.

In addition to minority populations, environmental justice also addresses low-income populations. Table 3-82 also displays the percent of county and state individuals living below the poverty level in 2009, as defined by the U.S. Census Bureau. The percentage of households that heat with wood as their primary heat source is also included by county in Table 3-82 as this is often another low-income indicator. In some areas of the State, heating with wood is an important factor to consider when looking at potential impacts of Forest Service actions as many low-income families gather and use wood as their primary source of affordable heat.

The State had about 12 percent of the total population living below the poverty level in 2009. Alamosa, Conejos, Costilla, Saguache, Huerfano and Rio Blanco Counties all had individual poverty rates 20 percent or higher in 2009. In 1999, Huerfano and Rio Blanco counties poverty rate was below 20 percent but both have seen their poverty rates increase to over 20 percent in the last 10 years. In addition, Conejos, Costilla and Saguache Counties also had higher levels of households heating with wood. These counties are within the Southern San Luis Valley (SSLV) in southern Colorado, and have historically seen lower income levels and higher minority populations than the rest of Colorado.

Within the SSLV, many rural Hispanic families continue to live in traditional ways on lands farmed by their ancestors. Many families operate outside the cash economy, relying on access to public lands for resources they need. This includes subsistence hunting and gathering, gathering wood for heating and cooking, grazing small herds of domestic animals under permit, and gathering traditional cultural products. (Romero, 2001).

It is unlikely that any of the alternatives would have a disproportionately negative impact on the counties identified. Under any alternative, it is likely that districts would be able to find enough substitute sites to provide for the local fuel wood gathering demands.

Public meetings were held throughout Colorado during the rulemaking process, no specific EJ issues or concerns were brought forward.

Chapter 4 Preparers and EIS Distribution

This section provides a list of the people who were primarily responsible for preparing this final environmental impact statement (FEIS), in accordance with regulations at 36 CFR 1502.17. This section is organized by primary contributors and other contributors.

List of Preparers

Primary contributors were those who were primarily responsible for preparing the FEIS, preparing significant background material, or managing the process.

Primary Contributors to the EIS

Name	*Organization*	*FEIS Contribution*	*Education*	*Years of Relevant Experience*
Abing, Timothy, F.	Forest Service, Washington Office, Leasable Minerals	Oil and Gas Minerals	B.S. Mining Engineering	31
Brown-Hoekstra, Kit	Comgenesis, LLC	Writer-Editor	M.S Technical Communication B.S. Biology	20
Carlson, Joan	Forest Service, Rocky Mountain Regional Office	Water Resources	M.S. Forest Engineering B.S. Forest Science M.B.A.	21
Cawrse, Dave	Forest Service, Washington Office, Forest Management Service Center	Climate Change	B.S. Forest Resource Management M.S. Forest Economics, M.A. Forestry Silviculture	32
Cleary, Dennis	Forest Service, Rocky Mountain Regional Office	GIS Maps and Analysis	B.S. Watershed Sciences M.S. Soil Sciences	23
Dale, Lisa	Colorado Division of Parks and Wildlife	Rule Development	Ph.D. Environmental Policy	17
Dean, Cindy	Forest Service, Rocky Mountain Regional Office	Process Documentation	B.S. Forest Management	25
Houghton, Bonnie	Forest Service, Rocky Mountain Regional Office	Rangeland and Grazing	B.S. Animal Science	22
Jerman, Kate	Forest Service, Rocky Mountain Regional Office	Process Management and Documentation	B.A. Art History and Studio Art	1
John, Tommy	Forest Service, Rocky Mountain Regional Office	Soil Resources	M.S. Forest Soil B.S. Forestry	33
Johnson, Susan	Forest Service,	Tribal Consultation	B.S. Biology	20

Name	*Organization*	*FEIS Contribution*	*Education*	*Years of Relevant Experience*
	Rocky Mountain Regional Office	Strategy and Tribal Involvement		
Kowynia, Ken	Forest Service, Rocky Mountain Regional Office	Developed Ski Areas	M.F. Forest Management B.A. Pre-Medicine, Psychology	36
Kratz, Andrew	Forest Service, Rocky Mountain Regional Office	Threatened, Endangered, and Sensitive Plants	M.S. Biology (Plant Synecology) B.A. Biology	29
Langowski, Paul	Forest Service, Rocky Mountain Regional Office	Fuels & Fire Ecology	B.S. Resource Management	32
Liestman, Terri	Forest Service, Rocky Mountain Regional Office	Cultural Resources	M.A. Anthropology B.A. Anthropology	30
Mattson, Liane	Forest Service, Washington Office, Leasable Minerals	Leasable Minerals and Coal Mining	B.S. Geological Engineering	15
McClure, Tom	Forest Service, Rocky Mountain Regional Office	Invasive Plants	B.S. Range and Forest Ecology	29
Miller, Debra	Forest Service, Rocky Mountain Regional Office	Air Quality	M.S. Forest Sciences B.S. Aerospace Engineering	13
Moll, Jeffry	Forest Service, Rocky Mountain Regional Office	Roads	Registered Professional Engineer M.S. Civil Engineering B.S. Civil Engineering	32
O'Connell, Michele	Forest Service, Rocky Mountain Regional Office	Land Special Use Authorizations	B.S. Resource Management/ Forestry	28
Randall, Robert	Colorado Department of Natural Resources	Rule Development	J.D. B.A. Journalism B.A. Interdisciplinary Studies	17
Retzlaff, Mike	Economic Insights of Colorado, LLC	Economics	M.S. Economics B.S. Hydrology	35
Reynolds, Fran	Forest Service, Rocky Mountain Regional Office	Writer-Editor	B.S. European Art and History	34
Schaefers, Julie	Forest Service, Rocky Mountain Regional Office	Social Report, GIS Analysis, and EIS	M.S. Natural Resource Economics B.S. Forestry Management	18

Name	Organization	FEIS Contribution	Education	Years of Relevant Experience
Schillie, Trey	Forest Service, Rocky Mountain Regional Office	Process Management and Documentation	M.S. Environmental Management B.S. Geography	11
Skeels, Pamela	Forest Service, Rocky Mountain Regional Office	Roadless Rule and EIS Writing-Editing, and Roadless Areas Information	M.S. Forest and Range Management B.S. Forest Resource Management	36
Sorkin, Jeff	Forest Service, Rocky Mountain Regional Office	Air Resource	M.S. Environmental Science M.S. Public Affairs B.S. Zoology	11
Sporl, Chris	Forest Service, Rocky Mountain Regional Office	Dispersed Recreation and Scenic Resources	M.L.A. Masters of Landscape Architecture B.S. Horticulture	16
Swain, Ralph	Forest Service, Rocky Mountain Regional Office	Wilderness and Other Congressionally Designated Areas	M.S. Natural Resource Management B.A. Marketing	28
Thinnes, Jim	Forest Service, Rocky Mountain Regional Office	Forest Vegetation and Health	Post- Bac. Forest Engineering and Silviculture B.S. Natural Resource Management	30
Tu, Ken	Strategic Planning, Rocky Mountain Regional office	Process Management	B.S. Forest Management	26
Young, Doug	Governor's Office Senior Policy Advisor	Rule Development	BA Political Science Juris Doctor	21
Warren, Nancy	Forest Service, Rocky Mountain Regional Office	Terrestrial Habitat and Species, Including Federally-Listed Species	M.S. Wildlife Management B.S. Wildlife Biology	30
Wilson, Janice E.	Forest Service, Rocky Mountain Regional Office	GIS analysis and maps	B.A. Geography	26
Winters, David	Forest Service, Rocky Mountain Regional Office	Aquatic habitat and species, and reference landscapes	M.S. Zoology with an emphasis in Aquatic Biology B.S. Fishery Biology A.A.S. Fish and Wildlife Technology	22

Other Contributors to the EIS

The following people contributed to the FEIS, RDEIS and/or DEIS by providing oversight, guidance, document reviews, or other information. They are Forest Service employees, except where otherwise noted.

Other EIS Contributors

Name	*Primary Contribution*	*Office*
Bruin, Susan	Environmental Coordination	Washington Office
Casamassa, Glenn	Process Oversight/Guidance	Rocky Mountain Regional Office
Ciapusci, Teresa Ann	EIS Writing-Editing	Coronado National Forest
Clark, David	Tribal Consultation	Southwestern Regional Office
Cook, Richard	Process Oversight/Guidance	Washington Office
Cossette, Steve	Process Oversight/Guidance	Washington Office
Cox, Brian	Biological Evaluations	Bureau of Land Management
Dewitte, Vince	Legal Compliance	Office of General Council-Washington Office
Dickerson, Joan	Peer Review	Northern Regional Office
Dillon, Madelyn	Writing-Editing/Publishing	Publishing Arts-Washington Office
Dunn, Michael	Locatable and Saleable Minerals, Geological and Paleontological Resources and Abandoned Mines	Rocky Mountain Regional Office Retired
Ernst-Ulrich, Gwen	Public Involvement	Independent Resources, Washington Office
Faye, Frank	Peer Review	Washington Office
Friedman, Sharon	Process Oversight/Guidance	Rocky Mountain Regional Office
Granger, Geneen	EIS Writing-Editing, Comment Processing and Analysis, Peer Review	Southwest Regional Office
Hawkins, Robert H.	Peer Review	Washington Office
Holm, Melody	Leasable Minerals, Oil and Gas Resources	Minerals and Geology Centralized and National Operations
ICF- Jones and Stokes, Inc.	Public Comment Processing and Analysis	ICF- Jones & Stokes, Salt Lake City, UT Office
Janik, Anne	Roadless Area Profile Editing	GMUG National Forest
Karkula, Ken	Process Oversight/Guidance	Washington Office
Karsteadt, Randy	Process Oversight/Guidance	Rocky Mountain Regional Office
Keller, Peech	NEPA	White River National Forest
Kurtz, Kathy	Process Management	Rocky Mountain Regional Office
Laperriere, Monique	Copy-Editing	Publishing Arts-Washington Office
Loomis, Dave	Process Management, Writer-Editor	Rocky Mountain Regional Office
Losapio, Carol	Document Formatting	Publishing Arts-Washington Office
Lui, Karen	Economic Regulatory Impact Analysis	Washington Office
McDonald, Peter	TES Wildlife, ESA Consultations	Rocky Mountain Regional Office
Miller, Chris	Economic Regulatory Impact Analysis	Washington Office
Milligan, Joshua	Writer/Editor	NEPA Chugach National Forest

Name	Primary Contribution	Office
Mitchell, Veronica	Roads	Rocky Mountain Regional Office
Nightingale, William B.	Peer Review	Eastern Regional Office
Overturf, Jeff	Cultural Resources	Rocky Mountain Regional Office
Page, Dennis	Vegetation Review	Pike-San Isabel National Forest
Palmer, Kelly	Air Resource	San Juan National Forest
Parker, Tracy	Saleable and Locatable Review	Washington Office
Regan, Claudia	Ecology	Rocky Mountain Regional Office
Riffe, Mark	Copy-Editing	Publishing Arts-Washington Office
Rinella, Steve	Lands	Rocky Mountain Regional Office
Rolofson, Bud	Air Quality	Retired Forest Service
Rupe, John	Forest Planning and Analysis	Rocky Mountain Regional Office
Sieber, Skye	Comment Response	White River National Forest
Skorkowsky, Robert	Migratory Birds	Medicine Bow-Routt National Forest
Smith, Janelle	Communications Plan	Rocky Mountain Regional Office
Supulski, Bill	Process Oversight/Guidance	Washington Office
Sutton, Jody	Comment Analysis and Responses	Washington Office
Woolever, Melanie	Terrestrial Animal Habitat and Species	Rocky Mountain Regional Office

Expert Review Panels

Expert panels reviewed and provided feedback on the aquatics, economics, forest vegetation/fuels, and terrestrial wildlife analyses. During this process, the teams analyzed concepts, assumptions, and conclusions of the specialist reports. This analysis provided a valuable starting point for the foundation of the EIS. Information provided by the review panels were incorporated into analyses for the RDEIS and FEIS.

Aquatics

The aquatics review panel consisted of the following experts:

- Tom Nesler, Colorado Department of Parks and Wildlife
- Adam Misztal, U.S. Fish and Wildlife Service
- Ann D. Carlson, U.S. Forest Service, Northern Region
- Kelly Larkin-McKim, U.S. Forest Service, Arapaho-Roosevelt National Forests
- Ed Rumbold, Bureau of Land Management

Economics

The economic review panel consisted of the following experts:

- Brad Burmark, Regional Planner U.S. Forest Service, Pacific Southwest Region
- Josh Wilson, Economist U.S.-Forest Service

- Elizabeth Garner, State Demographer, Colorado Department of Local Affairs
- Keith Stockmann, Economist U.S. DA-Forest Service Northern Region

Vegetation and Fuels

The forest vegetation/fuels review panel consisted of the following experts:

- Russ Graham, Research Silviculturist
- Terrie Jain, Research Silviculturist
- Dave Cawrse, Fort Collins Forest Management Service Center Manager
- Tom Martin, Intermountain Regional Silviculturist
- Jeff Witcosky, Lakewood Service Center Leader and Entomologist
- Joe Duda, Forest Management Division Supervisor for Colorado State Forest Service
- Phil Bowden, California Region Fuels Manager
- Jay Kurth, Fire Management officer for Mystic Ranger District
- Karen DeBord, Senior Forest Inventory Specialist and Silviculturist for Bureau of Indian Affairs
- Ed Morgan, Forest Inventory Specialist for Bureau of Indian Affairs

Terrestrial Wildlife

The terrestrial wildlife review panel consisted of the following experts:

- Shane Briggs, Colorado Department of Parks and Wildlife
- Cay Ogden, National Parks Service
- Adam Misztal, U.S. Fish and Wildlife Service

National Forest Coordinators

The following Forest Service employees were the primary contacts between the regional office planning team and the national forests in Colorado. They coordinated the data gathering and document reviews with appropriate national forest resource specialists and managers. The GIS staffs and other specialists on each forest contributed data throughout the planning process.

National Forest Coordinators

Name	*National Forest office*
Dyer, Harold	Rio Grande National Forest
Gayton, Dyce	Arapaho-Roosevelt National Forests
Haskins, Wendy	White River National Forest
Howe, Carol	Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG)
Jewkes, Pamela	Manti-La Sal National Forest
Powers, Jim	San Juan National Forest
Smith, Tony	Routt National Forest
Dow, John	Pike-San Isabel National Forest

Consultation

The following organizations and agencies assisted in this process, or were contacted for information in identifying issues and developing aspects of the EIS.

- **Colorado Department of Natural Resources:** The Colorado Department of Natural Resources (DNR) worked closely with the Forest Service as a cooperating agency to develop the proposed rule revisions. In addition, the DNR participated in implementing public meetings held throughout the state and reviewing comments to determine how to address the substantive issues generated from the public comment period.
- **Colorado Division of Parks and Wildlife:** As an agency of the Colorado Department of Natural Resources, the Colorado Division of Parks and Wildlife served as a cooperating agency in developing the proposed rule. The Colorado Division of Parks and Wildlife worked closely with the Forest Service throughout the development of the proposed rule by providing information on fish and wildlife habitat, assisting with proposed language of the rule, participating in public meetings held throughout the State, and assisting in developing the environmental documentation.
- **Colorado State Historic Preservation office:** The Forest Service notified the Colorado State Historic Preservation office of the proposed rule and the agency determined that the proposed rule would have no potential to affect historic properties.
- **Colorado State Forest Service:** The Colorado State Forest Service acted as a cooperating agency to the Forest Service throughout the development of the proposed Rule by collaborating on definition and use of community protection zones and treatments for fire and fuels within proposed roadless areas.
- **State of Colorado Governor's office:** The State of Colorado Governor's office submitted the petition and subsequent revisions that provided the foundation for developing the proposed rule. In addition, the Governor's office worked collaboratively with the Forest Service in the drafting and developing the proposed rule provisions.
- **U.S. Fish and Wildlife Service:** The Forest Service contacted the U.S. Fish and Wildlife Service (USFWS) in March 2008 regarding the proposed rule and requested concurrence of a list of threatened and endangered species to be analyzed and consulted as appropriate. In June 2008, the USFWS concurred with the species list. The Forest Service and USFWS have been meeting throughout the development of the proposed rule to discuss the analysis of listed species. A biological assessment was submitted to USFWS in September 2011, requesting concurrence on determination of effects on listed species from the proposed rule.

Distribution of the Final Environmental Impact Statement

This section provides a list of the agencies that were sent copies of the final EIS or notified of its availability on the Internet. This list includes federal, state, and local governments, elected officials, and federally recognized tribes who submitted comments or requested to be on the mailing list for this final EIS. It does not include the thousands of individuals and organizations on the mailing list who were also sent copies of the EIS or notified of its availability on the Internet, depending on the preference they expressed in response to a Forest Service inquiry. This information is available upon request.

Government Agencies and Tribal Governments

Advisory Council on Historic Preservation
Agriculture, U.S. Department of

Animal and Plant Health Inspection Service (APHIS)
Forest Service, Washington office
Forest Service, Rocky Mountain Regional office
Forest Service, Intermountain Regional office
Forest Service, Arapaho and Roosevelt National Forests
Forest Service, Grand Mesa, Uncompahgre, and Gunnison National Forests
Forest Service, Manti-La Sal National Forest
Forest Service, Medicine Bow-Routt National Forest
Forest Service, Rio Grande National Forest
Forest Service, Pike and San Isabel National Forests
Forest Service, San Juan National Forest
Forest Service, White River National Forest
National Agricultural Library
Natural Resources Conservation Service
office of Civil Rights

Air Force, U.S.
Army Corps of Engineers, U.S.

Washington Office
Northwestern Division
South Pacific Division

Army Engineer Division, U.S.
Colorado, State of

Department of Public Health and the Environment
Air Quality Commission
Water Quality Commission
Department of Natural Resources
Division of Wildlife
Division of Forestry
Federal Lands Coordination
Oil and Gas Conservation Commission
State Land Board
Department of Transportation
Historical office
office of Archaeology and Historic Preservation
Northwest Colorado Council of Governors

Colorado Congressional Delegations, U.S.
City Governments

U.S. Conference of Mayors

County Governments

The 41 counties in Colorado with roadless area lands (listed in chapter 3-Social)

Defense, U.S. Department of
Environmental Protection Agency, U.S.

Office of Federal Activities
EPA- Region 8

Environmental Impact Branch
Energy, U.S. Department of

Western Area Power Administration

Federal Aviation Administration
Federal Energy Regulatory Commission
Federal Highway Administration
Interior, U.S. Department of the

Bureau of Land Management , Gunnison Resource Area
Bureau of Land Management, Uncompahgre Field office
Fish and Wildlife Service
National Park Service
Black Canyon National Park
Office of Environmental Policy and Compliance

National Oceanic and Atmospheric Administration
Navy, U.S.

Chief of Naval Operations

United States Coast Guard
Utah, State of

Department of Natural Resources

Tribal Consultation

The United States has a unique relationship with Indian Tribes, as provided in the Constitution of the United States, treaties, and Federal statutes. This relationship extends to the Federal government and its management of public lands. The Forest Service strives to ensure that its consultation with Native American Tribes is meaningful, and in good faith.

Many other Tribes located outside Colorado maintain tribal interests, including aboriginal and ceded territories that retain inherent aboriginal rights within the State. Given this, the Forest Service has been continuously consulting with Colorado-affiliated Tribes regarding this proposed rulemaking action and analysis process. Information applying to the proposed Colorado Roadless Rule was provided to the Ute, Mountain Ute and Southern Ute Indian Tribes prior to the release of the Notice of Intent (NOI). Additionally, an introductory letter and the NOI, along with background information on the proposed Colorado Roadless Rule and with an offer for additional information or meetings, was sent to Tribes based on their current proximity to Colorado, their current use of lands in Colorado, and their historic use of lands within Colorado.

The San Juan National Forest staff held meetings with both Tribes to discuss the proposed rule. The 2008 Proposed Rule and DEIS were sent to each Tribe and each was contacted by phone to determine interest in meeting or obtaining information. A letter was sent outlining the key points of this revised proposed rule and the Forest Service met with those tribes that requested further consultation.

In October 2010, the Forest Service met with Tribal members of the Ute Mountain Utes and Southern Utes to obtain information. In April 2011, the proposed rule was sent to 24 Tribes, based on their current proximity to Colorado, and their current and historic use of lands within Colorado, to determine interest in meeting or obtaining information. Follow-up phone calls were made to each of the Tribes. Based on traditional use and inherent aboriginal rights, National Forest staff conducted consultation meetings. Specifically in September 2011, the GMUG and San Juan National Forests updated the Northern Ute, Southern Ute, and Ute Mountain Ute Tribes. Tribal consultation efforts continue and offers for additional consultation have been made. To date, the tribes have not requested additional consultation meetings specific to the proposed rule.

Federally Recognized Tribes Consulted for Colorado Roadless Rule

Apache Tribe of Oklahoma	Arapaho Tribe of the Wind River Reservation, Wyoming
Cheyenne and Arapaho Tribes Oklahoma	Comanche Nation
Hopi Tribe	Jicarilla Apache Nation
Kiowa Tribe of Oklahoma	Navajo Nation
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation	Northern Utes
Ohkay Owingeh	Pueblo of Acoma
Pueblo of Jemez	Pueblo of Nambe
Pueblo of Picuris	Pueblo of Pojoaque
Pueblo of San Ildefonso	Pueblo of Santa Clara
Pueblo of Taos	Pueblo of Tesuque
Pueblo of Zuni	Shoshone Tribe of the Wind River Reservation, Wyoming
Shoshone-Bannock Tribes of the Fort Hall Reservation	Southern Ute Tribe
Ute Mountain Ute Tribe	

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