

# Chapter 3 – Affected Environment and Environmental Consequences

## Introduction

This chapter describes the environment being affected by the alternatives discussed in Chapter 2 and forms the scientific and analytic basis for the comparison of these alternatives. The impacts for each alternative are discussed for those resources identified during internal and external scoping and considered to be factors in the decision being made.

## Background

The Lynx Conservation and Assessment Strategy (LCAS) (Ruediger et al. 2000) was developed to provide a consistent and effective approach to conserving lynx on Federal lands in the contiguous United States. The overall goals of the LCAS are to recommend lynx conservation measures, provide a basis for reviewing the adequacy with regard to lynx conservation of Forest Service Land and Resource Management Plans (Forest Plans), and to facilitate consultation under Section 7 of the Endangered Species Act.

### **Southern Rocky Mountain Geographic Area Amendment Area**

The Southern Rocky Mountain Geographic Area (SRMGA) is comprised of 12.3 million acres of National Forest System (NFS) lands, with about 6.3 million acres (51 percent) mapped as lynx habitat within Lynx Analysis Units (LAU).

Lynx habitat is mapped within LAUs. Where feasible, and in order to promote integration with other resource analyses, LAU boundaries follow previously delineated units such as watersheds, Forest Plan geographic areas, land type associations, and sometimes national forest boundaries. LAUs approximate the size of a female lynx's annual home range and encompass all seasonal habitats. However, LAUs are not intended to depict actual lynx home ranges, but are intended to provide analysis units of the appropriate scale with which to begin the analysis of potential direct and indirect effects of projects or activities on individual lynx, and to monitor habitat changes.

LAUs contain a mosaic of lynx habitat to the extent they may actually support lynx at the landscape level. LAUs also contain areas of non-lynx habitat, such as some large high elevation grasslands, lower elevation drier sites, lakes, and alpine areas. Lynx conservation measures would apply only to lynx habitat (or habitat matrix for **HU S1**) within LAUs, except those measures related to linkage areas, which would be applied in some areas that are outside of LAUs.

## Cumulative Impacts

Cumulative effects are analyzed for the Southern Rockies Geographic Area, including contiguous non Forest Service lands, temporally for the life of the amended Forest Plans, unless otherwise noted in the individual resource analyses. Below are the past, present, and reasonably foreseeable actions that are included in the cumulative effects analyses. Past actions are programmatic actions where a decision has been made and the direction has been implemented. Present actions are programmatic actions where a decision has not been rendered, but the actions are well into the planning process and their effects are anticipated to occur. Reasonably foreseeable future actions are programmatic actions anticipated to occur within the next 10 to 20 years (e.g. during the time span of a Forest Plan).

### Past Actions

- **Existing Forest Plans in the amendment area.** These documents were approved in various years for the various National Forest System units in the amendment area. The plans form the baseline of effects. The effects of these plans have previously been determined and disclosed in appropriate NEPA documents.
- **Administration of the Forest Transportation System, “The Roads Policy” 36 CFR 212, 2001.** This policy provides direction regarding the forest transportation system. The policy was adopted after the LCAS was finalized. The new road management policy directs the agency to maintain a safe, environmentally sound road network that is responsive to public needs and affordable to manage. The policy includes a science-based road analysis process designed to help managers make better decisions on roads. The intent of the rule is to help ensure that additions to the National Forest System network of roads are those deemed essential for resource management and use; that, construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; and, that unneeded roads are decommissioned and restoration of ecological processes are initiated. Additional guidance on implementing the policy is found in the Forest Service Manual 7700 – Transportation System (last updated December 14, 2001).
- **Roadless Area Conservation Strategy, “The Roadless Policy” 36 CFR 294, 2001.** In January 2001, the Forest Service issued a final rule and record of decision pertaining to prohibitions on road construction, road reconstruction, and timber harvesting in inventoried roadless areas on National Forest System lands (*Federal Register*, Vol. 66, No. 9, pp. 3244-3273). This decision prohibits road construction, road reconstruction, and or timber cutting, sale or removal in inventoried roadless areas except under certain circumstances. On May 10, 2001, the District Court of Idaho issued a preliminary injunction against implementation of the roadless rule. On December 12, the 9<sup>th</sup> Circuit court reversed the District Court of Idaho injunction against the rule. In July 2003 U.S. District Court Judge Clarence A. Brimmer permanently enjoined the Roadless Rule.
- **White River National Forest Revised Forest Plan (April, 2002).** This forest provides the central portion of the lynx habitat within the SRMGA. The White River Revised Forest Plan provides strategies, goals, management areas, and standards and guidelines for lynx conservation, which are very similar to the proposed action in this DEIS.

## Present Actions

- **Northern Rockies Lynx Amendment** - This amendment, which is being promulgated in the same timeframe as the Southern Rockies Lynx Amendment, includes two Region 2 Forests, the Bighorn and the Shoshone National Forests. This amendment is not included in the cumulative effects analysis because the Northern Rockies Geographic Area is geographically apart from the Southern Rockies Geographic Area and there is minimal interchange of population between the two geographic areas.
- **Healthy Forest Initiative** - This August 2002 Presidential initiative, which is a part of the National Fire Plan, affects all Forest Service projects, not just fuels projects. The initiative, as implemented by the Forest Service, includes 1) two new categorical exclusion categories for hazardous fuels reduction activities and stabilization and rehabilitation activities; 2) revision of the Forest Service's appeal regulations including determination of emergency situations; 3) the December 2002 Guidance Memo to the Secretaries of Agriculture and Interior from the Chair of the Council on Environmental Quality (CEQ) clarifies policy on the preparation of EA's including the purpose and content of an EA, incorporation of information by reference, and analysis focused on potentially significant effects; and 4) Endangered Species Act – Guidance Memos on Streamlined Consultation and Consideration of Balance of Harms where the Secretaries of Agriculture, Interior and Commerce have worked together to identify methods for streamlining the Section 7 consultation process and to provide direction to field biologists in regulatory agencies for consideration of balancing short term and long term effects.
- **Other Federal Agency Lynx Management** - Rocky Mountain National Park lynx habitat will be incorporated in this cumulative assessment, as it is part of the Arapaho-Roosevelt National Forest's LAUs. Bureau of Land Management lynx habitat data is in draft form, but will be used for cumulative assessments for those LAUs where BLM lands are incorporated into adjacent National Forest LAUs.
- **Forest Service Energy Implementation Plan** - On July 13, 2001 the Secretary of Agriculture approved the Forest Service Energy Implementation Plan. This plan was formulated by a Forest Service Energy Group to implement specific elements of Executive Order 13212, Actions to Expedite Energy Related Projects (also called the National Energy Plan). The National Energy Plan encourages agencies to "...expedite their review of permits and or take other actions necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections..." Priority areas were identified where high potential for energy development opportunities exist. Within the planning area the Grand Mesa, Uncompahgre and Gunnison National Forests, the San Juan National Forest, and the White River National Forest were identified as high priority due to the presence of oil and gas. Generally these areas have high potential for primarily natural gas occurrence and development. Some of the area of potential gas occurrence and development is in lynx habitat.

The energy implementation plan does not prescribe any specific outcome. It is not a programmatic decision. It only identifies actions that should be taken to respond to the National Energy Plan. Estimates of potential energy development were considered to evaluate effects of how energy development may affect lynx habitat.

- **BLM Vegetation Programmatic EIS** - The BLM is preparing a national, programmatic EIS on BLM's use of prescribed burning, biological control, cultural practices, mechanical, and chemical treatment of vegetation, including noxious weeds and other invasive species in public lands management. These methods would continue to be integrated into BLM's efforts to conserve and restore native vegetation, watersheds and wildlife habitats to protect people, sustain natural resources and provide for long-term multiple uses.

This EIS will not be considered in the cumulative effects analysis because it proposes to implement projects underneath the umbrella of current plans. Current plans are considered as the baseline for the effects analysis.

- **The National Fire Plan** and *A Collaborative approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy* Implementation Plan provide direction for fuels treatments on public lands.

### **Forest Plan Revisions**

- **Medicine Bow National Forest** – Decision scheduled for December 2003 – The Draft Forest Plan identified management direction contained in Alternative B, as currently proposed in this Draft EIS, as part of its preferred alternative.

### **Reasonably Foreseeable Actions**

- **I-70 Mountain Corridor Programmatic Environmental Impact Statement** - This effort focuses on long-term planning associated with the I-70 corridor transportation upgrade plans for the next 20 years. Within this process, a sub-group called "ALIVE" (A Landscape Level Inventory of Valuable Ecosystem Components) was formed to address creating or maintaining permeability for wildlife movements across the corridor through key stretches. The initial focus was on forest carnivores. The intent is to identify and restore key landscape level corridors blocked or impeded by I-70.

### **Forest Plan Revisions**

- **San Juan National Forest** – Decision scheduled for sometime in 2004
- **Grand Mesa, Uncompahgre, Gunnison National Forest** – Decision scheduled for December 2004
- **Pike/San Isabel National Forest** – Decision scheduled for December 2005

## **Organization of Chapter 3**

Chapter 3 is organized by resource. Each resource area will discuss the affected environment for that resource and disclose the environmental direct, indirect and cumulative impacts of the No Action Alternative, the Proposed Action and alternatives to the Proposed Action.

## **The Relationship between Programmatic and Site-specific Effects Analysis**

This analysis is for a “programmatic document”. It discloses the environmental consequences of the rules and policies that govern the use of resources contained in the Forest Plans and applicable at a forest level of analysis. It does not describe or predict the environmental consequences for applications of the standards and guidelines at individual site-specific projects. Those finer-scale determinations of environmental consequences for site-specific projects depend on how the projects are implemented, the ways in which the standards and guidelines are applied to them individually, and the actual environmental conditions at the specific sites.

# **Wildlife**

## **Introduction**

This section is a disclosure of the potential effects of the alternatives on terrestrial wildlife. The proposed objectives, standards and guidelines identified under the various alternatives are applicable within lynx habitat on specific National Forest System lands in the Southern Rocky Mountain Geographic Area (SRMGA). These lands include six National Forest units, in southern Wyoming and Colorado. The Medicine Bow-Routt National Forests were combined recently, and are still operating under two separate Forest Plans; therefore, there are seven Forest Plans to be amended.

## **Canada lynx and lynx habitat**

### **Background**

Within the contiguous United States, lynx range extends into different regions, or geographic areas, that are separated from each other by ecological barriers consisting of large areas that are not suitable for lynx, e.g., the Northern Great Plains and the Wyoming Basin. The LCAS describes five geographic areas in the contiguous United States, while the Final Rule describes four geographic areas, combining the Northern Rocky Mountains and Cascades Geographic Areas into one. The Rocky Mountain Region of the Forest Service occurs in two of these geographic areas. The Shoshone and Bighorn National Forests in northern Wyoming are

included in the Northern Rocky Mountain Geographic Area. The Medicine Bow National Forest in southern Wyoming and all of the National Forests in Colorado are in the Southern Rocky Mountain Geographic Area. The focus of the proposed action is on seven forest plans for the portion of the Rocky Mountain Region of the Forest Service that is within the Southern Rocky Mountain Geographic Area (SRMGA).

## **Biological Elements of the Environment**

Life histories of Canada lynx and its primary prey resource, the snowshoe hare, can be found in *The Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 1999). The proposed actions and alternatives in this amendment would be applied only to *lynx habitat* (or the lynx habitat matrix for standard **HU S1**) within the Amendment Area National Forests and lynx linkage areas on national forests that are identified on Figure 1, Map of the Analysis area, in this document.

The first sections pertain to various components of lynx habitat in the SRMGA: denning and foraging habitat, linkage areas, and connectivity between habitats. Several of the risk factors affecting lynx productivity and lynx movements identified in the LCAS will be described, and effects due to potential changes in habitat from implementing each alternative are disclosed. These are the risk factors the Forest Service has the most ability to affect through land management. Risk factors affecting lynx mortality identified in the LCAS (trapping, predator control, incidental and illegal shooting, competition and predation, connectivity problems) will be addressed, as well as the effects to lynx for each alternative due to human activities.

The effects, by alternative, of incorporating lynx conservation measures into existing forest plans on other terrestrial wildlife species will also be addressed, including threatened, endangered and proposed species (TEP) in the assessment area, as well as each National Forest's Management Indicator Species (MIS) that occur in lynx habitat.

Each section includes a discussion of the Affected Environment and Environmental Consequences of each alternative.

Much of the discussion in the general description of the Affected Environment is based on information contained in the LCAS, the Final Rule listing the Canada lynx as threatened (Federal Register, Vol. 65, No. 58, pages 16052-16086, 03/24/2000), the Interagency Biological Assessment (Hickenbottom et al. 1999), the Fish and Wildlife Service Biological Opinion (USDI Fish and Wildlife Service 2000), and the Lynx Science Team report, *The Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 2000). These documents represent a review and synthesis of virtually all published literature pertaining to Canada lynx and its primary prey, the snowshoe hare, as well as information from ongoing studies. In light of this, individual citations from the scientific literature are not presented in the text, for the most part. General references to the documents are mentioned here. Sources of information used that are not from these four documents are appropriately identified.

## **Characteristics of Lynx Habitat in the Southern Rocky Mountain Geographic Area**

In the contiguous United States, the distribution of the lynx is associated with the southern boreal forest comprised primarily of subalpine coniferous forest in the West and mixed coniferous/deciduous forest in the East. The southern boreal forest of Colorado and southeastern Wyoming is isolated from boreal forest in Utah and northwestern Wyoming by the Green River Valley and the Wyoming Basin. At its southern margins, the boreal forest becomes naturally fragmented into various sized patches as it transitions into other vegetation types. These southern boreal forest habitat patches are small relative to the extensive northern boreal forest of Canada and Alaska, which constitutes the majority of the lynx range. Lynx in the contiguous United States are considered part of a larger metapopulation whose core is located in the northern boreal forest of central Canada. Colorado is the southern edge of the range of the lynx.

Lynx habitat in the SRMGA is usually found in the subalpine and upper montane forest zones, typically between 8,000 and 12,000 feet in elevation. Upper elevation subalpine forests are dominated by subalpine fir and Engelmann spruce. As the subalpine zone transitions down to the upper montane, spruce-fir forests begin to give way to a predominance of lodgepole pine, aspen, or mixed stands. Engelmann spruce and/or subalpine fir may retain dominance on cooler, more mesic mid-elevation sites, intermixed with aspen, lodgepole pine, and Douglas-fir. White fir appears in the San Juan Mountains and Sangre de Cristo Range in southern Colorado.

The lower montane zone is dominated by ponderosa pine, pinyon pine/juniper communities and Douglas-fir, with pine typically dominating on lower, drier, more exposed sites, and Douglas-fir occurring on moister and more sheltered sites. Although this forest zone is generally below lynx habitat, montane forests can be important as connective travel habitat where they may facilitate lynx dispersal and movements between blocks of lynx habitat, and may provide some foraging opportunities during those movements.

In summary, lynx habitat should be thought of in terms of a habitat mosaic within these southern boreal forest landscapes, rather than as simple vegetation types. Spruce-fir, lodgepole pine, white fir, aspen, and mesic Douglas-fir may all provide foraging and/or denning habitat for lynx. Also potentially important in many parts of the SRMGA are the high elevation sagebrush and mountain shrub communities found adjacent to or intermixed with forested communities, affording potentially important alternate prey resources. Riparian and wetland shrub communities (e.g.: willow, alder, serviceberry) found in valleys, drainages, wet meadows, and moist timberline locations may also support important prey resources.

In the SRMGA, most lynx habitat forest types occur on federal lands in public ownership including National Parks, Bureau of Land Management, and National Forest System lands. Forests in the SRMGA are naturally patchy, with many openings and breaks in forested canopies. Much of the SRMGA is in non-developmental management designations such as Wilderness Areas, Research Natural Areas, and other NFS lands where Forest Plans place additional restrictions on human impacts.

Lynx habitat in southern Wyoming and Colorado is geographically isolated from the rest of the Rocky Mountain chain by the vast sagebrush and desert shrub expanses of the Wyoming Basin

and the Red Desert in Wyoming and similar vegetation patterns in the Green and Colorado River plateaus in western Colorado and eastern Utah. This geographic isolation may have some long-term implications for maintenance of lynx populations in the SRMGA, as lynx from the northern meta-populations may not be able to easily disperse into this area.

Snowshoe hares are strongly associated with stands that are densely stocked or have a dense understory and with coniferous cover in the winter months. Densities of snowshoe hare appear to be positively correlated with density of horizontal cover that is one to three meters in height. This structure (dense horizontal cover) is common in early seral stages, but also may occur in mature stands that have a well-developed understory (Hodges 2000).

Studies in northern Wyoming (Beauvais 1997) and a more limited study in Colorado found that snowshoe hares had a strong affinity for the higher elevation mature to late-successional spruce-fir forests. The Wyoming study showed that hares were out-competed by other species in early successional stages (less than 15 years of age), however, these altered conditions probably were not yet providing hare habitat. In Colorado, Dolbeer and Clark (1975) reported higher survival of snowshoe hares in mature spruce-fir forests and mixed spruce-fir/lodgepole pine forests, which contained dense undercover, than in open lodgepole stands lacking understory. The Colorado study was conducted in a very limited area, and did not sample younger sapling stage stands (15 to 40 years) to compare hare densities with those that were reported for mature and late-successional spruce-fir forests. Therefore, it remains somewhat unclear what role early-successional forests play in providing snowshoe hare habitat in the SRMGA; however, it is generally accepted that they are of more value than mid-successional stages, especially in lodgepole pine, based on literature from the northern boreal forests.

Both timber harvest and natural disturbance processes can provide good foraging habitat for lynx when the resulting understory has enough horizontal cover to meet the forage and cover needs of snowshoe hare. These characteristics include a dense, multi-layered understory that maximizes cover and browse at both ground level and at varying snow depths throughout the winter (stems and branches from one to three meters above the ground).

Lack of widespread disturbance processes in lodgepole pine for much of this century have led to many highly stocked, even-aged mid-seral stands that do not now provide the dense ground- and snow-level cover and forage necessary to support higher densities of snowshoe hare, but may provide red squirrel or other prey species. The crowns of these dense stands have lifted far above the reach of hares, and the dense canopies limit light penetration, contributing to the often depauperate (somewhat barren) understory. Late successional spruce-fir forests, by contrast, do provide cover and forage for hares and red squirrels, and thus are generally more valuable than mature lodgepole forests, in providing stable supplies of prey resources. Lodgepole pine is the more dominant vegetation type in the northern portions of the SRMGA, especially on the Medicine Bow-Routt and Arapaho-Roosevelt National Forests. Some large extensive areas of the dry site, climax lodgepole stands that are not in close proximity to denning habitats are not mapped as lynx habitat in this portion of the SRMGA, as they would not be able to function as part of a home range.

Extensive pure stands of aspen may not provide quality habitat for hares due to deficiencies in winter habitat characteristics. These habitat conditions exist in some areas on the western portions of the SRMGA: Grand Mesa, Uncompahgre, and Gunnison, San Juan, and White River National Forests. Some of these pure aspen stands have not been mapped as lynx habitat in this portion of the SRMGA, as they are not in close enough proximity to winter or denning habitats, and therefore would not be expected to provide the required components for lynx home ranges.

Many parts of the Southern Rockies have a shortage of dense early successional forest stands, particularly in lodgepole pine. This may make it very important to protect existing sites that have high densities of snowshoe hares. Regenerating stands of lodgepole pine and mixed conifer-aspen stands, to maximize densities of horizontal cover at ground through maximum snow depth height, would improve habitat for snowshoe hares. It is equally important to protect and encourage those habitats that are good producers of alternate prey, such as red squirrels, grouse, and other lagomorph species (rabbits, hares and pikas). Woody debris can also improve cover where vegetation is lacking.

Lynx habitat in the SRMGA is naturally fragmented due to alpine tundra, open valleys, shrubland communities, and dry vegetation types associated with southerly and westerly exposures or lower montane zone elevation. Because of the southerly latitude, spruce-fir, lodgepole pine, and mixed aspen-conifer forests constituting primary lynx habitat are typically found in elevational bands along the flanks of mountain ranges or on high plateaus. Although naturally fragmented, it remains generally interconnected through the numerous mountain chains and intervening low elevation forests and brushlands. There are important topographic features and vegetation communities that link these fragmented forested landscapes of habitat together, providing for movement of individuals between subpopulations. Connectivity may be provided by narrow forested mountain ridges or plateaus that connect more extensive mountain habitats, or wooded riparian communities that provide travelways across open valley floors between mountain ranges. Lower elevation ponderosa pine, pinyon-juniper woodlands, or shrublands may also serve the same function.

All national forests in the SRMGA have mapped their lynx habitat. Models for denning and foraging habitat were developed using habitat definitions and descriptions contained in the LCAS. Interpretations of the LCAS and development of mapping protocols have been a cooperative dialogue between State, Forest Service, and USDI Fish and Wildlife Service Biologists, as well as the Lynx Biology Team, who authored the LCAS, and the Lynx Science Team, who authored the "Ecology and Conservation of Canada Lynx in the United States". Please refer to the Glossary for more detailed definitions. Each Forest has documented the criteria used along with their rationale as to how they developed their lynx habitat mapping.

### **Historical lynx populations in the Southern Rockies**

Most of the records and literature on lynx abundance and distribution indicate that historical lynx populations were relatively rare in the SRMGA, compared to populations in Alaska and the northern portions of Washington and Montana. Recently discovered records, however, indicate that lynx in Colorado may have been more common than formerly believed. Records on the Routt National Forest on predators taken between the years 1914 and 1922 separated lynx from

bobcats. They show the number of lynx taken as high as 210 in 1916, with the Federal Bureau of Biological Survey reportedly showing that 103 lynx were taken during the winter of 1923-24.

Verified records after the 1920's are rare in southern Wyoming and in Colorado, with central Colorado being the "core" area of lynx records until the early 1970's. A statewide lynx verification program was conducted in Colorado from 1978-1980 and concluded that a viable but low-density lynx population persisted in Eagle, Pitkin, Lake, and Clear Creek counties with evidence of lynx occurrence in Grand and Park Counties. Lack of evidence from other parts of lynx range in Colorado is probably due to lack of adequate surveys. Several surveys conducted since then have not confirmed lynx to be present. While the surveys did not cover the entire state, they were sufficient to conclude that lynx at this time are rare in the Southern Rockies.

Even though lynx individuals appear to persist in the SRMGA landscape, the population has not rebounded despite the removal of key suppressing factors such as commercial trapping and indiscriminate predator control. It was believed that the population was so small in Colorado that it was incapable of rebounding and was augmented with a re-establishment program in 1999. The Colorado Division of Wildlife has released a total of 129 lynx in the San Juan Mountains from 1999 to 2003. Of the total 129 lynx released, there are 46 known mortalities as of August, 2003: nine due to starvation, six shot, six killed on highways, one killed by a bobcat, six from unknown but probably human caused, four unknown but not starvation, three died of plague, and eleven unknown (Dr. Tanya Shenk, Research Wildlife Biologist, Colorado Division of Wildlife, periodic lynx update, 8/2003). This mortality pattern can be expected from reintroduced animals due to unfamiliarity with the area and large-scale movements often characteristic of reintroduced animals. Over the next four years, up to 130 more lynx will be released in southwestern Colorado, where the previous releases have occurred.

### **Disturbance regimes important to Lynx habitat in the Southern Rockies**

Fires have been, and will continue to be, a significant influence in forests inhabited by lynx. Fire intensity tends to be high with long natural fire return intervals in lynx forest types in the West. Generally, in forests with high-severity fire regimes, such as lodgepole pine, a number of smaller fires burn a small proportion of the forests, while fewer larger fires account for most of the area burned over time (See Fuels and Fire Ecology section). This creates extensive even-aged patches of regenerating forests.

Fires in the SRMGA spruce-fir forests are generally stand replacement events because of their severity or the inability of the trees to withstand even moderate temperatures associated with fires. Fire frequency in the SRMGA boreal forests ranges from 100 to 400 years. Natural barriers, such as large open parklands, lakes, reservoirs and barren ridges, often play a role in how extensive fires become in the SRMGA boreal forests. In some geographic locations, the spruce-fir forest may be considered to be included in the non-fire regime, due to topographic location and local climatic conditions.

Insects also play a role in the disturbance regimes of SRMGA boreal forests. Most important are the mountain pine beetle in lodgepole pine, and the spruce beetle in spruce-fir forests. Mountain pine beetle generally infest large diameter trees, which can naturally thin, or create openings

within the lodgepole pine stands. In an extreme epidemic, an entire even-aged stand could be killed, thus regenerating the stand. Spruce beetle, at endemic levels, create small openings or canopy gaps by killing small areas of mature trees. At epidemic levels, which are most common in over mature stands, the predominant response is the release of sub canopy trees of both spruce and fir (Veblen et al. 1994), but stands tend to be dominated by subalpine fir after an outbreak (Schmid and Hinds 1974). These large outbreaks also result in additional herbaceous growth on the forest floor.

## Affected Environment and Environmental Consequences

Mapped LAUs for national forests in the SRMGA tend to be large, generally from 65,000 – 120,000 acres in size. As suggested in the LCAS, lynx habitat may not support comparable densities of lynx in the lower 48 states as high as in northern boreal forests due to lower prey densities and inherent habitat patchiness. Lynx in the southern portion of their range may include areas used primarily for traveling between hunting sites, which could increase home range size. Therefore, although this is somewhat speculative, a gradient in home range size may occur in the U.S., with largest home range size occurring in the patchy habitats of the SRMGA.

The Affected Environment includes the six National Forests previously listed (the “Amendment Area”) that are all within the SRMGA. The Amendment Area covers a large portion of the SRMGA, but does not include the White River National Forest, or any other federal, state or private lands within the SRMGA.

Table 3-WL-1 shows the currently mapped denning, winter foraging, and other foraging habitat within LAUs for the Amendment Area. There are approximately 9.6 million acres of NFS lands within LAUs (Table 3-WL-1), of which approximately 6.35 million acres is lynx habitat.

**Table 3-WL-1 NFS Acres of Lynx Habitat within the Amendment Area**

| National Forest    | Total NFS LAU Acres | NFS Denning Habitat* | NFS Winter Forage (Non-denning)* | NFS Other Foraging | Total NFS Suitable Lynx Habitat |
|--------------------|---------------------|----------------------|----------------------------------|--------------------|---------------------------------|
| Medicine Bow/Routt | 1,548,402           | 365,092              | 86,627                           | 776,204            | 1,227,923                       |
| Arapaho-Roosevelt  | 926,128             | 271,277              | 288,289                          | 78,317             | 637,883                         |
| GMUG               | 2,407,700           | 602,847              | 202,174                          | 572,810            | 1,377,831                       |
| Pike-San Isabel    | 1,434,616           | 519,378              | 63,135                           | 276,895            | 859,409                         |
| Rio Grande         | 1,814,471           | 391,516              | 192,556                          | 400,113            | 984,185                         |
| San Juan           | 1,418,959           | 460,685              | 120,417                          | 392,073            | 973,174                         |
| <b>Total:</b>      | <b>9,550,276</b>    | <b>2,610,795</b>     | <b>953,198</b>                   | <b>2,496,412</b>   | <b>6,060,405</b>                |

GMUG: Grand Mesa, Uncompahgre, Gunnison NF’s

\*Denning habitat, in this table, is also considered winter foraging habitat, so the two columns need to be added to get total winter forage habitat.

To provide an adequate amount of habitat to support a resident lynx and to provide a continuous supply of foraging habitat, the LCAS recommends limiting the early seral stages of lynx habitat due to timber harvest and fire to 30 percent of lynx habitat within an LAU, until a broadscale assessment of historical natural conditions can be completed. The 30 percent limitation would apply to the early successional stages of forested stands created by both silvicultural treatments and prescribed fire, and was established based on studies from three independent sources (Poole et al. 1996, Koehler 1990, and Brittell et al. 1989) which indicate that limiting the proportion of a lynx home range currently in unsuitable condition to no more than 30 percent is a reasonable approach to conserve lynx, until more local analysis can be completed.

Table 3-WL-2 displays acres of lynx habitat that are considered to be currently in unsuitable condition. This is defined in the Glossary as areas within identified and mapped lynx habitat that are in early successional stages as a result of recent fires or vegetation management, and in which the vegetation has not developed sufficiently to support snowshoe hare populations during all seasons. Management created openings would include clearcut and seed tree harvest units, and might include shelterwood and commercially-thinned stands depending on unit size and remaining stand composition and structure.

**Table 3-WL-2 Acres of Suitable and Currently Unsuitable Lynx Habitat in the Amendment Area (forest-wide average)**

| National Forest    | SUITABLE<br>(NFS acres) | UNSUITABLE<br>(NFS acres) | Total Lynx<br>Habitat<br>(NFS) | Percent<br>Unsuitable |
|--------------------|-------------------------|---------------------------|--------------------------------|-----------------------|
| Medicine Bow-Routt | 1,227,923               | 50,629                    | 1,278,552                      | 4                     |
| Arapaho/Roosevelt  | 637,883                 | 57,319                    | 695,202                        | 8                     |
| GMUG               | 1,377,831               | 13,080                    | 1,390,911                      | < 1                   |
| Pike-San Isabel    | 859,409                 | 6,608                     | 866,016                        | < 1                   |
| Rio Grande         | 984,184                 | 74,216                    | 1,058,400                      | 7                     |
| San Juan           | 973,174                 | 19,086                    | 992,260                        | 2                     |

In the Amendment Area, there are no LAUs with 30 percent or more of the lynx habitat in unsuitable condition. The highest level of unsuitable conditions within an LAU in the Amendment Area is 17 percent, and this occurs in only two LAUs. Most of the LAU's range from 3 to 8 percent of the lynx habitat being in currently unsuitable condition.

### **Lynx Conservation and Assessment Strategy - Risk Factors**

In the proposed rule to list Canada lynx, the USDI Fish and Wildlife Service (USFWS) identified various risk factors, including competition, habitat loss and fragmentation, and the inadequacy of existing regulatory mechanisms to protect the species, as potentially affecting lynx populations. The USFWS disclosed in the Final Rule for listing that there is inconclusive evidence that any of the factors identified, with the exception of inadequate regulatory mechanisms, may actually adversely affect the contiguous U.S. lynx population. This was reiterated in the July 3, 2003

Federal Register Notice of Remanded Determination, which re-affirmed that the status of Canada lynx in the contiguous United States was “threatened”. Because a substantial amount of lynx habitat in the contiguous United States occurs on federally managed lands, particularly in the West, the USFWS concluded that one factor that was responsible for a low to moderate threat to lynx in the contiguous United States is the lack of guidance in existing Federal land management plans for conservation of lynx and lynx habitat. Implementation of lynx conservation through revision of Federal land management plans would reduce or remove some threats facing lynx and lynx habitat, and therefore would strongly factor in future lynx status determinations.

The LCAS identified several specific management activities and practices termed “risk factors” for the Southern Rockies geographic area. Risk factors affecting lynx productivity included fire exclusion, grazing, and winter recreational uses that create compacted snow conditions. Fire exclusion has resulted in a lack of early successional stages of conifers, which provide important snowshoe hare habitat. Unmanaged grazing by domestic and wild ungulates in aspen and high elevation willow stands can degrade snowshoe hare habitat. Road, trail and recreational activities that results in snow compaction may facilitate increased access into lynx habitat and competition for food resources by competitors (primarily coyotes). However, the Final Rule published July 3, 2003, stated that these risk factors were not threats to the overall population of Canada lynx in the contiguous United States, but there was a possibility of extirpation of lynx in the Southern Rocky Geographic Area due to these risk factors.

Risk factors affecting lynx mortality include trapping, predator control activities and predation by mountain lions, and being hit by vehicles on major highways, such as I-70, State Highway 550, and many of the major mountain passes in the SRMGA.

Risk factors affecting lynx movement include barriers to movements such as major highways and associated development within rights-of-way. Private land development, especially along road corridors in mountain valleys, may also fragment habitat and impede movement of lynx. Urban expansion and development on private land has further fragmented an already patchy distribution of lynx habitat, many times in response to development or expansion of a developed recreational facility on NFS lands within lynx habitats.

Based on the national Lynx Biological Assessment (BA) and Final Rule, existing land management plans in the SRMGA, include approximately 25 percent of the lynx habitat in non-developmental land allocations. For the Amendment Area only, this figure is approximately 31%. These are lands where natural ecological processes may predominate. Fire could be allowed to play a significant role in creating a natural mosaic of vegetation communities and age classes across the landscape. Human activities potentially affecting lynx such as timber harvest, road construction, recreation developments, and motorized dispersed recreation generally do not occur in these areas, or are extremely limited.

Within the land allocations where development of some type is permitted, there is opportunity to maintain lynx habitat through vegetation manipulation and other land management activities. There are also potential impacts to lynx such as road building, recreation and other development, unrestricted alteration of habitat, and motorized recreation activities.

National Forests in the SRMGA area have completed their lynx habitat and LAU maps since the national BA and Final Rule were published. An examination of the distribution of management area prescriptions on NFS lands within mapped LAUs provides better insight into the distribution of management activities, hence, the relative amounts of protection as well as potential impacts or risks to lynx habitat. Table 3-WL-3 shows three broad groups of management area emphasis for national forests in the SRMGA. Non-developmental allocations generally include management area categories 8 and 10 in the original forest plans, and categories 1 and 2 in the newer, second generation forest plans. Developmental allocations are managed for a broader range of multiple-uses, and are separated into two groups in Table 3-WL-3. The first represents development allocations characterized by generally lower levels of multiple-use (less development) and includes management area categories 2 and 3 in the original forest plans, and categories 3 and 4 in the newer forest plans. The second group of development allocations represents full multiple-use management activities (allows for more development) and includes management area categories 1, 4, 5, 6, 7, and 9 in the original forest plans, and categories 5, 6, 7, and 8 in the newer forest plans. Included are the forest plans being amended, therefore, they are automatically incorporated by reference. (See individual Forest Plans for detailed descriptions of the Management Area Descriptions).

**Table 3-WL-3 Groups of Land Management Allocations  
by Percent of Lynx Analysis Unit**

| <b>Forest</b>      | <b>Percent<br/>Non-developmental</b> | <b>Percent<br/>Developmental<br/>(low multiple use –<br/>some development)</b> | <b>Percent Developmental<br/>(full multiple use –<br/>allows more<br/>development)</b> |
|--------------------|--------------------------------------|--|--|
| Medicine Bow       | 10<br>(cat. 8, 10)                   | 22<br>(cat. 2, 3)  | 68<br>(cat. 1, 4, 5, 7, 9)   |
| Routt              | 45<br>(cat. 1, 2)                    | 10<br>(cat. 3, 4)  | 45<br>(cat. 5, 7, 8)   |
| Arapaho-Roosevelt  | 48<br>(cat. 1, 2)                    | 25<br>(cat. 3, 4)  | 27<br>(cat. 5, 7, 8)   |
| GMUG               | 22<br>(cat. 8, 10)                   | 21<br>(cat. 2, 3)  | 57<br>(cat. 1, 4, 5, 6, 7)   |
| Pike-San Isabel    | 29<br>(cat. 8, 10)                   | 29<br>(cat. 2, 3)  | 42<br>(cat. 1, 4, 5, 6, 7, 9)  |
| Rio Grande         | 24<br>(cat. 1, 2)                    | 34<br>(cat. 3, 4)  | 42<br>(cat. 5, 6, 7)   |
| San Juan           | 35<br>(cat. 8, 10)                   | 33<br>(cat. 2, 3)  | 32<br>(cat. 1, 4, 5, 6, 7)   |
| <b>Average (%)</b> | 31                                   | 21   | 47   |

The Routt, Arapaho-Roosevelt, and Rio Grande National Forests follow newer forest plan management area descriptors. The Medicine Bow, Grand Mesa-Uncompahgre-Gunnison (GMUG), Pike-San Isabel, and San Juan National Forests follow the older forest plan management area descriptors.

In the Amendment Area, a total of 2.67 million acres (31 percent) of all NFS lands in mapped LAUs are in non-developmental management area allocations. Most of these “non-developmental allocation” lands are in wilderness areas, research natural areas, and other similar

allocations that generally have minimal impacts from human activities. The risks to lynx and lynx habitat are considered minimal within these allocations but the lack of vegetative management activity limits opportunities to create foraging habitat. However, there are some management activities occurring or being considered in wilderness areas, such as grazing and fire use and management (which includes prescribed and natural ignition fires) that may have limited effects on lynx or lynx habitat. Incorporation of the lynx conservation measures into Amendment Area Forest Plans would result in little or no change in current management direction for these areas, with the exception of possibly allowing fire to play more of a natural role in these areas. Changes to lynx and lynx habitat would be negligible because these resource values are already being addressed by current Forest Plan direction, with the possible exception of the fire management. The LCAS objective of allowing fire to play its natural role as a disturbance process, which could create younger successional stages of forested stands, may benefit lynx habitat long term.

Twenty-one percent of all NFS lands in mapped LAUs are in developmental management area allocations in which potential impacts from management activities are low to moderate. These lands include allocations for special interest areas, backcountry uses, scenic rivers and byways, a variety of dispersed recreation uses, municipal watersheds, and corridors connecting core areas. There are a variety of potential impacts to lynx and lynx habitat from multiple use activities. Anticipated impacts from habitat modification, road construction, motorized recreation, developed recreation, or other developments are relatively low and/or localized due to restrictions placed on them in existing forest plans. The proposal to implement lynx conservation measures into SRMGA Forest Plans may not change the existing level of activities in these management areas, but may preclude increases of winter dispersed recreational activities into currently unused areas. Standards and guidelines associated with the maintenance of lynx habitat, the competitive advantage of lynx, and habitat connectivity could affect specific locations, distribution, and timing of some activities. Therefore, implementation of the proposed action would emphasize conservation actions that provide greater benefit (e.g. connectivity, reduced road mortality) to lynx and lynx habitat within these management area allocations than the current direction in the Forest Plans.

Forty-seven percent of all Amendment Area lands in mapped LAUs are in developmental management area allocations managed for a full range of multiple use activities. These lands include allocations for forest vegetation management (wood fiber production), range vegetation management, other forest products, big game winter range, habitat for wildlife management indicator species, ski-based resorts and other developed recreation complexes, administrative sites, residential/forest interface, and utility corridors. Potential impacts to lynx and lynx habitat from multiple use activities associated with these land allocations are the greatest relative to other land allocations. The proposal to implement lynx conservation measures into Amendment Area Forest Plans would have the greatest potential to reduce or remove risks to lynx and lynx habitat identified in the LCAS and Final Rule on these land allocations. These lands probably also provide the greatest opportunity to maintain or increase lynx foraging habitat through vegetation manipulation and other land management activities.

## **Trapping**

### **Affected Environment**

Lynx seem to be vulnerable to trapping and as a result may have been over exploited in the past. Road access may increase the vulnerability of lynx to trappers. At low population levels, or in situations where reproduction or recruitment are low, trapping mortality can be additive and lead to population declines. Incidental trapping may occur where regulated trapping is permitted for other species (such as coyote and fox) whose range overlaps with that of the lynx.

Regulation of trapping is not within the jurisdiction of the Forest Service but is regulated by the states. Trapping seasons are closed for lynx in Wyoming and Colorado. It is possible that lynx could be incidentally trapped during trapping seasons for other species in Wyoming. Trapping with leghold traps is illegal in Colorado. The Final Rule for listing indicates trapping does not currently appear to be a significant mortality factor in the SRMGA. The July 3, 2003 Notice of Remanded Determination reiterated this indication.

### **Environmental Consequences**

None of the alternatives addresses trapping; therefore there will be no change from existing situation. It will continue to be regulated by the States, with a small potential for incidental or illegal trapping occurring.

## **Predator Control**

### **Affected Environment**

Predator control activities occur on public lands throughout this geographic area to protect livestock from predation. Methods include trapping, shooting, and poisoning. These activities are directed at specific animals or target species. Predator control activities can occur in lynx habitat, but more often take place outside of lynx habitat and at lower elevations.

Predator control activities on NFS lands in lynx habitat are limited. Any predator control activity is directed at a particular species or offending animal and is usually done on sheep allotments in the higher elevations. Unintentionally trapped lynx can be released. Information provided by the Animal and Plant Health Inspection Service shows that no lynx have been incidentally taken in the Western Region for the past 30 years. Predator control activities that affect lynx or lynx habitat on NFS lands must be done in compliance with Section 7 consultation regulations for the Endangered Species Act.

### **Environmental Consequences**

None of the alternatives would change the current practices of predator control on public lands. Predator control activities are done in compliance with Section 7 consultation and/or Biological

Opinions issued by the USFWS in separate planning efforts. Therefore, there will be no change from the existing situation.

## **Incidental or Illegal Shooting**

### **Affected Environment**

Lynx can be mistakenly shot by hunters or illegally killed by poachers. The magnitude of shooting mortality within the contiguous United States is unknown. Road access into lynx habitat can increase the risks of accidental shootings.

Regulation of shooting of animals is not within the jurisdiction of the Forest Service but rather rests with the States. There are very few records of lynx being shot in the SRMGA. Six of the reintroduced lynx in Colorado have been documented mortalities by being shot (Dr. Tanya Shenk, Research Wildlife Biologist, Colorado Division of Wildlife, periodic lynx update August, 2003), with four more mortalities possibly from being shot. (Collars were found cut off, no carcass found). These lynx may be more mobile than lynx with established home ranges, making them more vulnerable to being shot. One of the shooting mortalities occurred in western Nebraska.

### **Environmental Consequences**

None of the alternatives specifically addresses shooting, but alternatives B, C and D may reduce public use of special project and special use roads due to proposed standards and guidelines. This may indirectly reduce illegal shooting.

## **Competition and Predation (Lynx productivity and mortality risk factor)**

### **Affected Environment**

Lynx interact with other carnivores throughout their range. Competition with coyotes, mountain lions, and bobcats have been inferred or documented throughout the range of the lynx. Definitive data on the threats of mountain lions on lynx is somewhat lacking, but because lions and lynx occupy different ecological niches and depend on different prey species, the effects of mountain lions on lynx populations is believed to be minimal

There is no evidence that the bobcat out-competes the lynx for habitat and food resources. There is, however, one confirmed mortality of a released lynx in Colorado due to bobcat predation (Shenk 2003).

Buskirk et al. (in Ruggerio et al. 2000) described the two major competition impacts to lynx as exploitation (competition for food) and interference (avoidance). Of several predators examined (birds of prey, coyote, wolf, mountain lion, bobcat and wolverine), coyotes were deemed to most likely pose local or regionally important exploitation impacts to lynx; coyotes and bobcats were deemed to possibly have important interference competition effects on lynx (LCAS 1-12). Coyotes have greatly expanded their winter range, using packed snow trails and plowed roads,

which now allows them to occupy winter habitats of lynx in some cases. The lynx and coyote seem to hunt under different snow conditions with coyotes using shallower and more compacted snow while lynx tend to use deeper snow areas.

With respect to winter recreation activities, the LCAS describes a programmatic planning standard and guidelines involving the mapping of a winter snow compaction baseline and then mapping and monitoring the location and intensity of snow compaction activities that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information becomes available (Ruediger et al. 2000, LCAS page 7-9). Widespread human activity (snowshoeing, cross-country skiing, snowmobiling, snow cats, etc.) may lead to patterns of snow compaction that make it possible for competing predators such as coyotes and bobcats to occupy lynx habitat through the winter, reducing its value to and even possibly excluding lynx (Ruediger et al. 2000, Ruggerio et al. 2000, Chapter 4).

The Forests within the SRMGA have completed a first draft of their baseline snow compaction mapping, and the total number of miles of snow compacted routes and trails within lynx habitat in the Amendment Area is estimated to be approximately 3,000 miles. (See Table 3-REC3 in the Recreation Section).

## **Environmental Consequences**

### **Direct and Indirect Effects**

While there is some concern that predation on lynx could occur due to the abundance of mountain lions in the Region, predation is not documented to be a factor that is threatening the lynx in the SRMGA. It is hypothesized that coyotes, bobcats, and mountain lions could be competitors with lynx. Where historically the ranges of these species overlapped with the lynx, deep snow excluded them from winter habitats for the lynx. Lynx have evolved a competitive advantage in deep soft snow environments that tend to exclude other predators during the middle of winter, a time when prey is most limiting. Widespread human activity on the snow may lead to patterns of snow compaction that make it possible for competing predators such as coyotes and bobcats to occupy lynx habitat through the winter, reducing its limited prey base. Even though there is no hard scientific evidence that snow compaction can lead to increased competition from other predators as yet, the LCAS recommends that “Until conclusive information is developed concerning lynx management, we recommend the agencies retain future options. That is, choose to err on the side of maintaining and restoring habitat for lynx and their prey.” (Ruediger et al. 2000).

Alteration of forests and development of compacted trails through the snow could facilitate movement of potential lynx competitors into lynx habitat in the winter. Lynx and carnivore biologists (Bider 1962, Ozoga and Harger 1966, Murray and Boutin 1991, Koehler and Aubry 1994, Murray et al. 1995, and Lewis and Wenger 1998, all cited in Ruggerio et al. 1999) have suggested that packed trails created by snowmobiles, cross-country skiers, snowshoers, as well as by other predators, may serve as travel routes for potential competitors and predators of lynx, especially coyotes. Buskirk et al. (in Ruggerio et al. 1999) hypothesizes that the usual spatial segregation of lynx and coyotes “may break down where human modifications to the environment

increase access by coyotes to deep snow areas. Such modifications to the environment include expanded forest openings throughout the range of the lynx in which snow may be drifted, and increased snowmobile use in deep snow areas of the western mountains.” Recent advances in snowmobile technology allow snowmobiles to travel through deeper snow and into areas that were not accessible with the older machines. Coyotes have been shown to increase their use of open habitats between November and March due to the increase in packed snow conditions and the load-bearing strength of snow in openings. It is this strong prey and habitat switching ability of the coyote that may contribute to its success as a competitor (LCAS p. 2-8).

Some timber harvest practices increase edges and openings that may improve conditions for generalists that can move into the areas and compete with lynx. Plowed roads and snow compaction of roads and trails associated with a variety of forest management and recreational activities may also increase the potential for competitors to move into lynx habitat.

#### Alternative A – No Action

**Alternative A**, the no action alternative, does not directly address snow compacting activities that have the potential to allow competitors to move into lynx habitat. Some Forest Plans have direction for winter sports. The Biological Assessment completed on Forest Service and BLM plans (Hickenbottom et al. 1999) concluded that “both mechanized and non-mechanized winter recreation may contribute to a risk of adverse effects on lynx where they are allowed within the geographic areas, by providing packed trails for other carnivores to more easily enter lynx habitat and either compete with lynx for food resources or prey on lynx.”

#### Alternative B – Proposed Action

**Alternative B**, the proposed action, under **HU S1**, restricts increases in “groomed or designated” recreational snow compacting activities to areas that are already consistently compacted, thus limits to a certain extent, potential increased competition and predation risks to lynx. “Designated” snow compacting activities are those activities that the Forest Service authorizes, promotes or encourages, through special use permits, agreements with Snowmobile Clubs, signing, trailheads, etc. This standard allows for some management flexibility in allowing new authorizations for over the snow activities in areas in which the snow is already consistently compacted by dispersed recreational use. These baseline areas and routes are or would be mapped based on what existed in the years 1998-2000. This standard would maintain the status quo as much as possible, in regards to the areas of snow compaction that allow access in the winter to competitors of lynx. However, **HU S1** allows for increases in grooming on the already designated snow compacted areas. Increased grooming of trails along exiting routes could indirectly lead to an increase in use and possibly an increase in snow compacted areas at the end of the newly groomed trails. This is based upon the assumption of grooming greatly increasing use of trails, bringing more users into areas formerly difficult to access. Predicted groomed trail increases are the same under all action alternatives.

### Alternative C

**Alternative C** allows the standard regarding no net increase in designated or groomed snow routes (**HU S1**) to be addressed at larger scales than that of the LAU scale, which is in the Proposed Action, but could be allowed in combination with immediately adjacent LAUs. Once a combination of LAUs is used for analysis of snow compaction to apply the standard, this combination would become a set analysis boundary to track snow compaction in that area.

Alternative C also allows for some management flexibility in allowing new authorizations for over the snow activities in areas in which the snow is already consistently compacted by dispersed recreational use (according to baseline mapping for snow compaction). It is generally the same as Alternative B, except that it allows for the no net increase in “designated” use to be analyzed at a larger scale. A combination of immediately adjacent LAUs” could be up to 400,000-500,000 acres in the amendment area. Effects that would be different at the larger scale could be increased snow compaction in one LAU, but this could possibly be offset by the protection of more pristine areas of another LAU. Therefore, effects from this alternative on lynx could be positive if lynx habitat features are factored into leaving some pristine areas. However, in general, a large scale use of the no net increase of snow compaction could have negative effects to individual lynx, by allowing more competitors into some LAUs, during the most limiting season for forage resources. Predicted groomed trail increases are the same under all action alternatives.

### Alternative D

The direction on no net increase in authorized snow compaction is a guideline under **Alternative D (HU G10)**, which would not require it to be implemented on all proposed activities.

Failing to implement the **HU G10** guidance at the project level may lead to additional negative impacts to individual lynx from competition for prey resources, depending on the frequency of the guideline not being followed at the project level. Predicted groomed trail increases are the same under all action alternatives.

## **Denning and Foraging Habitat**

### **Affected Environment**

Approximately 2.6 million acres currently meet modeled denning habitat characteristics for the Amendment Area forests (Table 3-WL-1). Denning habitat is defined as habitat used during parturition and rearing of young until they are mobile, and is characterized by large amounts of coarse woody debris that provides escape and thermal cover (see Glossary for more complete definition). Denning habitat in the Southern Rockies is likely to occur most often in late-successional spruce-fir forest with a substantial amount of large diameter woody debris on the forest floor. Lodgepole pine and Douglas fir stands can also be denning habitat provided that the cool, moist conditions and coarse woody debris are present. Usually these conditions occur in lodgepole stands that are successional to the spruce-fir habitat type. Engelmann Spruce and subalpine fir are often present in the stand. Denning habitat often is found on, but is not restricted

to, northerly exposures due to the cooler conditions. In the SRMGA, all modeled denning habitat is also considered foraging habitat, as lynx denning habitat contains the habitat characteristics needed by snowshoe hares, as well.

Currently in the Amendment Area, most of the LAUs have 20-50 percent of each LAU in modeled denning habitat. This is due to the large occurrence of older successional stage forested stands in the Southern Rockies, which were regenerated during the large fires of the mid to late 1800's. Lack of large fires and long fire return intervals for spruce-fir are the most probable reasons for the large amount of mature spruce-fir, which usually provides good denning habitat due to the natural disturbances processes associated with it, such as blowdown, insects and disease. These processes all create snags and down logs, which provide the structure on the forest floor that is used for denning by lynx.

Foraging habitat for lynx in the SRMGA includes all of the primary forest types that make up lynx habitat (spruce-fir, lodgepole pine, Douglas-fir, and aspen). Spruce-fir occupies 45 percent of the lynx habitat in the Amendment Area. Aspen stands account for 24 percent of the lynx habitat, lodgepole occurs on 20 percent, and Douglas fir and mixed conifer occupy 11 percent of the lynx habitat within the Amendment Area. (See Table 3-T1 in the Forest Resources and Timber Management Section). Also potentially important are the high elevation sagebrush and mountain shrub communities, as well as riparian and wetland shrub communities found in adjacent valleys, drainages, wet meadows, and moist timberline locations, which all may support alternate prey resources. Forests in the SRMGA area have modeled winter foraging habitat as a subset of all lynx habitat. Winter is a limiting factor for many wildlife species. Winter foraging areas are those that have the structural characteristics (described earlier) that provide cover and food for snowshoe hares through the deep snow conditions of winter. These areas actually provide yearlong habitat for hares. In summer, hares shift their diet to a higher proportion of grasses, forbs, and herbaceous portions (new growth) of shrubby species that are not available in winter, and thus may occupy additional areas in summer where these plants are more abundant and available. Currently there are approximately 3.8 million acres of modeled winter foraging habitat in the Amendment Area (Table 3-WL-1).

Most of the lynx habitat within the LAUs in the amendment area is currently suitable for foraging, with generally only three to eight percent of most of the LAUs being in the currently unsuitable condition—in an early seral stage (See Table 3-WL-2).

## **Environmental Consequences – Denning Habitat**

### **Direct and Indirect Effects**

#### **Alternative A – No Action**

**Alternative A, No Action**, has direction in existing Forest Plans that potentially maintains denning habitat for lynx even though lynx aren't specifically identified. Table 3-WL-4 shows a summary of direction in existing Amendment Area Forest Plans that provides for some characteristics of lynx denning habitat.

**Table 3-WL-4 Summary of Direction in Existing Amendment Area Forest Plans**

| <b>Forest</b>     | <b>Old Growth Requirement*</b>   | <b>Snag Requirement</b> | <b>Dead and Down Log Requirement</b> |
|-------------------|--|-------------------------|--------------------------------------|
| Medicine Bow      | 10%  | 20-30/10 ac             | 33-50 linear ft/ac                   |
| Routt             | Guideline to provide a mix of successional stages (young to late-successional) | 1/acre                  | 33-50 linear ft/ac                   |
| Arapaho-Roosevelt | Objective to manage for increase in mature and old growth                      | 1/acre                  | 33-50 linear ft/ac                   |
| GMUG              | 5-12%  | 200-300/100 ac          | 10-20 tons/ac<br>50 linear ft/ac     |
| Pike-San Isabel   | 10%  | 20-30/10 ac             | 33-50 linear ft/ac                   |
| Rio Grande        | None   | 2/acre                  | 33-50 linear ft/ac                   |
| San Juan          | 5%   | 20-30/10 ac             | 33-50 linear ft/ac                   |

GMUG = Grand Mesa, Uncompahgre, and Gunnison National Forests.

\* Mature and old growth standards are generally by Diversity Unit, Fourth Order Watershed, or other landscape boundaries, to ensure good distributions across the Forest.

In most Forest Plans, existing direction (Alternative A) for the maintenance of old growth or late-successional forest approximates direction for lynx denning habitat contained in the proposed action (Alternative B). The old growth requirement in the San Juan National Forest Plan is 5 percent, which is lower than the 10 percent minimum for denning habitat in the Proposed Action and alternatives. The Rio Grande National Forest Plan contains no specific provision for old growth retention. However, wilderness areas and other non-developmental lands would also, by default, protect areas of denning habitat from planned management activities or developments, but not necessarily from large, contiguous wildfires. Given the patchiness of the forested lynx habitat within the SRMGA, largely due to grassland and alpine areas, large contiguous wildfires in high elevation lynx habitats are rare. Within the Amendment Area, an average of 31 percent of the land base is in non-developmental management allocations, much of which includes denning habitat.

The USFWS Biological Opinion (USDI 2000) on the current Forest Plans stated that within nondevelopmental allocations denning habitat would likely be maintained at or above historic levels, and that within developmental allocations, existing Plan direction to maintain old growth habitat was judged to be adequate to provide for lynx denning habitat in the SRMGA.

Coarse woody debris is also an important characteristic of lynx denning habitat. All existing Forest Plans in the SRMGA contain some provision for both standing and dead and down coarse woody debris. All existing plan requirements for dead and down logs range from 33-50 linear feet per acre. This standard can usually be met with only one or two downed logs per acre, which represents an essentially bare forest floor, which would not be considered enough down woody debris for denning habitat. Existing Forest Plan requirements for snags (standing dead trees) range from one to three snags per acre. Standing dead trees represent future recruitment to the dead and down log component. The minimum amounts of biomass necessary to meet these two standards is very low and does not compare to the amounts of coarse woody debris characteristic of denning sites. These standards do not provide the regulatory mechanisms, in and of

themselves, to provide for denning structure. However, it must be kept in mind that these standards represent minimums and actual amounts in natural forest conditions within the SRMGA are usually much higher. As these structural characteristics are not protected or maintained very well under the existing Forest Plans, this alternative does not specifically maintain the forest floor structure needed for denning as well as the action alternatives.

### Alternative B – Proposed Action

**Alternative B**, Proposed Action, has direction specific to lynx denning habitat and for addressing denning habitat on a large scale. **VEG S3** addresses denning habitat at the LAU scale by maintaining a minimum of 10 percent of each LAU in denning habitat in patches generally larger than 5 acres each. **VEG S4** addresses denning structure at the site-specific scale, maintaining those natural disturbance patches of less than 5 acres such as blowdown, small fires, insect and disease patches, or other mortality. Under Alternative B, there are allowances for salvaging these smaller than 5 acre patches of dead and/or down trees within:

- developed recreation or administrative sites; designated road and trail corridors for public safety;
- LAUS where denning habitat has been field validated and is at least 10% of the LAU;
- the structure ignition zone, which is within 200 feet of administrative sites, dwellings and/or associated outbuildings. This allowance is to provide for defensible space from wildfires.

These allowances would not result in any quantifiable negative effects to lynx habitat, as the intent of the standard is to maintain denning habitat structure on the forest floor, and *in most cases*, actual lynx denning would occur away from high amounts of human activity, such as near a dwelling, developed recreation site or open roads.

Human uses such as minerals and special uses such as ditches, utility lines, etc, may also affect denning habitats, in some cases. Many of these uses are already in place, and the corridors and roads are permanently maintained in a non-forested condition. For new human use proposals, generally roads and corridors can be located so as to avoid important habitats, so any impacts to denning habitat from new authorizations for human uses would most likely be incidental or very minor. By the addition of these denning habitat standards to the existing Forest Plan standards for well-distributed old growth, along with the fact that 31 percent of the Amendment Area is in wilderness and non-developmental management prescriptions, Alternative B would likely provide sufficient direction to maintain denning habitat across the landscape.

### Alternative C

**Alternative C** is the same as Alternative B with regard to **VEG S3**, to maintain a minimum of 10 percent denning habitat across the LAU, but there are differences in the direction provided by **VEG S4**. Under Alternative C, **VEG S4**, salvage harvest of the smaller than 5-acre patches would also be allowed “in landscape settings *critical* for the creation of defensible fuels profiles to reduce the wildland fire threat to communities and associated infrastructure, developments and municipal watersheds; or to facilitate fire use practices and activities that restore ecological

processes, or that maintain or improve lynx habitat”. This exception would allow for the reduction of denning structure on additional acreages of lynx habitat than would be allowed under Alternative B, but provides more protection of these important components than the No Action alternative (A). In order to use this exception/allowance, the analysis would have to provide the documentation as to why the landscape is *critical* to the defensible fuels profiles. Municipal watersheds are only those that are documented in the Forest Plans.

#### Alternative D

**VEG S3**, the denning habitat standard under Alternative D, adds an allowance for “Fuels treatments identified through a process such as that described in “*A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10 Year Comprehensive Strategy Implementation Plan.*” For site-specific project level analysis, this could result in adverse effects to individual lynx. If the exception to the standard is used, the conditions within an LAU could be changed resulting in less than 10 percent of the lynx habitat having denning habitat characteristics. This could adversely affect individual lynx. The LCAS identified the minimum threshold for denning habitat at 10 percent within each LAU. In most cases, these LAU’s would primarily be those outside of wilderness. However, some Wilderness Areas now have a Fire Use Plan, which would allow fuels treatments in the form of prescribed fire within the some of the Wilderness Areas.

Under Alternative D, **VEG S4** as proposed in Alt. B and C is a guideline called **VEG G8**. As a guideline, these smaller than 5-acre disturbances that provide future denning structure would be more likely to be removed, or salvaged, across the landscape. Under this guideline, future denning structures could be removed, so this alternative could have more negative impacts than Alternative B or C to potential denning habitat, but would likely provide more denning habitat protection than the No Action Alternative (A).

In addition to the above potential impacts to lynx under Alternative D, there may be other impacts to denning habitat, from the **ALL S2** standard which allows the lynx standards to be exempted based on the effects determination by the project level biologist. This could lead to additional impacts to lynx, depending on how much or how often the denning standard is not applied at the project level. It would be very difficult at this programmatic analysis level to estimate how the **ALL S2** standard will be applied, but it could lead to adverse effects to several individual lynx. Ultimately, with no limits on the use of the general allowance, it may negatively impact lynx productivity and, therefore, possibly the lynx population within the Amendment Area.

#### **Summary of Effects to Denning Habitat**

Alternatives C and D may not maintain denning structure as well as Alternative B, as denning structure would likely be reduced in many developed or accessible areas, but these alternatives would likely maintain denning habitat better than the No Action alternative. However, the Biological Opinion for the Forest Plans (USDI 2000) states *that under current conditions*, denning habitat within most geographic areas is probably not limiting to lynx, and existing Forest Plan direction will not result in adverse effects. However, the National Fire Plan has been implemented since this Biological Opinion was issued, which increases expected outputs in

treatments. Alternatives B and C, most likely, would not result in adverse effects to lynx denning habitat across the entire SRMGA, but Alternative C could have adverse impacts to individual lynx in local areas, due to the exceptions to the VEG S3 and VEG S4 standards under Alternative C.

Alternative D could have adverse effects to individual lynx and local lynx populations, due to the fuels treatment exception as well as the general allowance (**ALL S2**), which allows project level discretion on implementation of the lynx standards, which may result in adverse effects to lynx but is anticipated to result in long-term benefits to lynx and lynx habitat. With no limits on the use of exceptions or the **ALL S2** standard there is a greater amount of uncertainty as to the effects to lynx. In the worst-case scenario there could be adverse effects to both denning and the associated foraging habitat, and this could ultimately affect lynx populations in some localized areas.

### **Environmental Consequences – Foraging Habitat**

#### **Direct and Indirect Effects**

The LCAS also infers that limits must be placed on the extent of habitat alteration that can occur at one time within an LAU, to limit the short term effects to an individual lynx, as most treatments to create future foraging habitat can result in short term (15-20 years) unsuitable habitat conditions. Unsuitable habitat conditions are considered to be early structural stages of a forested stand within lynx habitat (primarily coniferous) that do not provide either snowshoe hare or red squirrel (primary prey sources) habitats.

Precommercial thinning occurs both to enhance growth on remaining trees, and to reduce fuels in fuels treatment areas. In the SRMGA, this would primarily occur in the lodgepole pine type (20 percent of lynx habitat) and the mixed conifer type (11 percent), which are the ecosystems primarily affected with unnatural fuel build-ups due to fire suppression, within lynx habitat. Only minor amounts of precommercial thinning occur in spruce-fir, generally to reduce stocking of subalpine fir. The LCAS assumes that maintaining high-quality foraging habitat within each LAU through time is very important. Stem density and/or horizontal cover appear to be directly and positively correlated to snowshoe hare density (Conroy et al. 1979, Sullivan and Sullivan 1988, Koehler 1990, Hodges 2000a). Precommercial thinning reduces the density of sapling sized conifer trees and understory shrubs, and therefore, is likely to be detrimental to snowshoe hare habitat.

Foraging habitat for lynx can be created through regeneration timber harvest under Alternative A, but is specifically provided for in Alternative B, C and D.

### Alternative A - No Action

High quality foraging habitat is not well protected under Alternative A, as it allows for, and directs outputs for the precommercial thinning in those densely regenerating stands that provide high quality snowshoe hare habitat, as well as in the mature stands of spruce-fir, which generally provide stable winter foraging habitat. In the SRMGA, there are approximately 30,683 acres of precommercial thinning needs reported by the Forests (See Table 3-T3 in the Forest Resources and Timber Management Section), much of which would be the young, densely regenerating lodgepole pine stands. In the last five years, approximately 23,000 acres have been precommercially thinned within the SRMGA. Forty-six hundred acres per year is the best estimate of what would continue under the No Action Alternative. The interagency BA (Hickenbottom et al. 1999) determined that precommercial thinning may result in adverse effects to lynx within the SRMGA.

### Alternative B - Proposed Action

Limits on habitat alterations in LAUs are intended to aid in maintaining a distribution of suitable lynx habitat across the landscape and over time. Application of certain conservation measures at the LAU scale allows blocks of quality lynx habitat to be maintained within each LAU, thereby maintaining a good distribution of lynx habitat at the scale of a lynx home range.

One of the major standards in the LCAS that is designed to limit habitat alteration is **VEG S1**, which limits currently unsuitable lynx habitat to no more than 30 % per LAU. In conifer habitats, unsuitable habitat conditions persist for about 20 years after a fire or some types of vegetation management activities, but would vary from forest to forest depending on the forest ecosystems affected and site conditions. This standard would limit potential adverse effects on an individual lynx, as it would be applied at the LAU (home range) scale, until a broad scale assessment is completed, which would suggest what scale is appropriate for the disturbance regimes and vegetative types found in the assessment area. Most of the lynx habitat within the LAUs in the Amendment Area is currently suitable for foraging, with generally only three to eight percent of most of the LAUs being in the currently unsuitable condition—in an early seral stage (See Table 3-WL-2).

Standard **VEG S2** in the Proposed Action is related to the standard described above, however, it regulates the rate of timber harvest that would change suitable lynx habitat into an unsuitable condition. This does not pertain to prescribed or wildland fire, as the intent of the LCAS is to encourage fire. According to the LCAS, timber harvest is not an exact ecological substitute for natural disturbance processes. For a list of these differences, see the LCAS, page 2-2 and 2-3.

This standard could still result in up to 30 percent of an LAU in unsuitable condition within 20 years, but it is highly unlikely that this amount of regeneration harvest would occur in an individual LAU in the SRMGA. On average, the LAUs in the Amendment area have between three to eight percent of the lynx habitats in currently unsuitable conditions, including both timber activities and fire (wild and prescribed). Most of the LAUs within the SRMGA have spruce-fir habitat as the basis for lynx habitat within the LAU's, and typically, clearcutting is not the preferred method of harvest for spruce-fir. However, overstory removal could result in unsuitable

habitat conditions in some cases, in spruce-fir. Generally, it is the clearcutting in lodgepole pine that results in unsuitable habitat conditions temporarily. Clearcutting in aspen also can cause unsuitable conditions temporarily, but aspen can regenerate very quickly, providing snowshoe hare forage above snow levels in five to 10 years.

Standard **VEG S3**, although intended for denning habitat, also provides for well-distributed foraging habitat. Denning habitat also serves as good foraging habitat, as it typically provides habitat for both snowshoe hare and red squirrel, the two primary prey species for lynx.

Standard **VEG S5** protects the majority of the highest quality snowshoe hare habitats, the young, densely regenerating coniferous stands, which may have a higher density of hares than other structural stages of forest, and can serve as an important foraging area in which a lynx may regularly hunt/forage. It also protects the areas of mature stands that provide moderate densities, but likely more stable populations of snowshoe hare. The acreage of foraging habitat potentially affected by the exception for structure ignition zones is unknown, but expected to be very minor.

Standard **VEG S6** protects the majority of the winter foraging or snowshoe hare habitats that are found in the mature and late successional Engelmann spruce and subalpine fir stands. These stands “shall provide for winter snowshoe hare habitat except in a few specific cases, such as the structure ignition zone, which is to provide for defensible space for dwellings, and other buildings. The acreages potentially affected by the allowances under this standard are expected to be very minor.

Standards **GRAZ S1 and S2** would help to manage grazing to protect the regeneration of stands. These vegetation standards would contribute to the maintenance of lynx populations across the landscape of the Amendment Area, as they meet the intent of the conservation recommendations in the LCAS, which is based on the most up to date information available on the potential risks to lynx viability.

### Alternative C

Standard **VEG S1** under Alternative C allows for the 30 percent unsuitable conditions level to be addressed at a larger scale of “**combination of immediately adjacent LAUs**”. With the large LAU’s in Amendment Area, this could be an analysis scale from approximately 250,000 acres to 500,000 acres.

This alternative allows for the limitation of the 30 percent of unsuitable habitat to be analyzed at a larger scale than the LAU scale, without completing a broad scale assessment of the natural historical ecological conditions of the landscape. As the LAUs were delineated based on the approximate home range size of an individual lynx, this could result in the displacement or indirect mortality (starvation) of several lynx. By addressing the 30 percent unsuitable conditions limitation over a larger scale, it is possible that most of the lynx habitat in one or more LAUs could be in unsuitable condition, with no further restrictions placed on vegetation management activities. Allowing this level of disturbance over large scales as described in Alternative C, could be detrimental to individual lynx in the Southern Rockies, as forested

habitats are already highly fragmented naturally, with many areas already having 20 to 30 percent of their landscapes in montane or alpine grasslands.

Standard **VEG S5** under Alternative C adds an exception to the restrictions on precommercial thinning as compared to the proposed action. These exceptions are:

- 1) Precommercial thinning associated with research and genetic tests.
- 2) Precommercial thinning within landscape settings *critical* for the creation of defensible fuels profiles to reduce the wildland fire threat to communities and associated infrastructure, developments and municipal watersheds; or to facilitate fire use practices and activities that restore ecological processes, or that maintain or improve lynx habitat.

The exceptions for **VEG S5** under Alternative C could lead to the possibility of adverse effects to snowshoe hare habitat and lynx foraging habitat. Effects from precommercial thinning that reduces snowshoe hare habitat for defensible space, or structure ignition zones, would be the same as for Alternative B, but the exception for Alternative C also allows precommercial thinning in lynx foraging habitat for the development of defensible fuels profiles. The worst case scenario, however, with no limitations to the exception, is that the alternative may not provide management direction that would ensure the maintenance of well-distributed, high quality lynx foraging habitat.

To provide some context of how much this exception would be expected to be used, the fuels, fire, and fire ecology section indicates that, although not restricted in this exception, it would likely be used as follows:

- In the Wildland Urban Interface (within one mile of communities at risk) and around wilderness or roadless area boundaries, where fire use plans have been completed. Fire use plans have been completed on 4 Forests: Rio Grande, Routt, Arapaho-Roosevelt and the San Juan National Forests.
- The most intensive fuel treatments, which would include precommercial thinning, would be in ponderosa pine (non-lynx habitats) and mixed conifer (generally is lynx habitat) near communities, because those are the vegetative types within the Amendment area that are most changed (outside of normal range of conditions) as a result of fire suppression in the last 50 years. There are not very many “communities at risk” within the mixed conifer vegetation types in the Amendment area; therefore, the overall treatment acres in mixed conifer, which is lynx habitat, would be less than ponderosa pine.
- The overall expected use of precommercial thinning for treatments within lynx habitat under the defensible fuels profile exception is expected to be very limited in amount and intensity.
- In most cases, precommercial thinning for fuels treatments in lodgepole pine stands would be in stands that do not currently provide snowshoe hare winter habitat, (the crowns have lifted to above 3 meters above the ground) which would not be restricted in any way by VEG Standard 5, even under Alternative B.
- Very minor amounts of precommercial thinning would be needed in spruce/fir types, only for fuelbreaks and defensible space more than 200 feet from a dwelling. Fuelbreaks are

terrain dependent, generally ridgetops, saddles, etc. that would be “critical” to suppressing a fire. These are moderately limited across landscapes.

Therefore, it is expected, given this context, that effects to lynx foraging habitat from the defensible fuels profiles exception could be somewhat limited across the landscape. This exception for precommercial thinning may also provide the flexibility to enable more fire use (prescribed and wildfire) activities in higher risk areas. In the long term, this may improve lynx foraging habitat, as long as it is designed with lynx habitat components in mind.

This standard, with exceptions, still protects the majority of the highest quality snowshoe hare habitats, the young, densely regenerating coniferous stands, which may have a higher density of hares than other structural stages of forest, and can serve as an important foraging area in which a lynx may regularly hunt/forage. It also protects the areas of mature stands that provide moderate densities, but likely more stable, populations of snowshoe hare. The acreage of foraging habitat potentially affected by the exception for structure ignition zones and research projects is unknown, but expected to be very minor. The exception for defensible fuels profiles may affect larger acreages, but in the Southern Rocky Mountain Geographic Area, forest fuels management projects principally occur in lower elevation mixed conifer, ponderosa pine, grassland, shrublands and dry site lodgepole pine habitat types, most of which are non-lynx habitat.

Guideline **VEG G7** proposes direction limiting timber harvest activities to changing more than 15 percent of lynx habitat within a LAU to an unsuitable condition within a 10-year period as a guideline. (It is a standard in Alternative B- **VEG S2**). On average, the LAUs in the Amendment Area have between three to eight percent of the lynx habitats in currently unsuitable conditions, including both timber activities and fire (wild and prescribed). It is unlikely that this level of timber harvest (15% of lynx habitat) would occur in the Amendment Area, based on economics primarily. Therefore, this direction was proposed as a guideline for Alternatives C and D. Given that **VEG S1** already limits overall habitat conversions to unsuitable conditions, this should not change the impacts to lynx unless the economic conditions for wood fiber production significantly change within the timeframe of the Forest Plans.

Standard **VEG S6** and guideline **HU G10 (under Alternative C)** address the protection and improvement of winter foraging conditions for lynx. Many human uses (vegetation management, recreation use and facilities) can degrade or remove winter foraging habitat, which may be one of the limiting factors for lynx productivity. Standard **VEG S6** gives direction to maintain the important and stable source of winter foraging habitat provided by mature spruce-fir stands. In guideline **HU G10**, the guidance encourages treatment within the lodgepole stands, as densely regenerating lodgepole stands can provide excellent snowshoe hare habitat. Aspen regeneration would also improve snowshoe hare habitat, if it were in juxtaposition with other winter foraging habitats.

### **Alternative D**

The following are additional exceptions that affect lynx foraging habitat under Alternative D:

Standards **All S1, VEG S1, VEG S3, VEG S5** all contain the following allowance:

“This standard does not apply to fuels treatments identified through a process such as that described in “*A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10 Year Comprehensive Strategy Implementation Plan.*” Under the worst case scenario, this allowance may have negative impacts to lynx foraging habitat, as there is no limit to treatments in lynx habitat defined. With no limits defined within the standard, there could be adverse effects to individual lynx, as well as the Southern Rockies lynx population, if high quality foraging habitat is not maintained in a well-distributed fashion.

The results of this fuels treatment allowance on the above vegetation standards and lynx habitat is expected to be somewhat limited. According to the Fuels, Fire and Fire Ecology section of the DEIS (Table 3-F3), a fuels reduction planning process in 2001 identified 117 fuels reduction projects within the Amendment Area that contain approximately 611,150 acres of lynx habitat. This would be approximately 7% of the lynx habitat within the Amendment Area. Of this, it is likely that only 80,000 acres of lynx habitat (1.3%) would actually be treated in the next 10 years, as there is some documentation (Finney 2001) that has demonstrated that fuels treatment effectiveness can be optimized while treating approximately 20% of the landscape in a strategically placed pattern of overlapping treatments. Depending on how the strategically placed treatments are designed, this could have negative impacts on individual lynx. However, given the fact that the priorities for the “Collaborative Approach” plan are communities and their associated values, most of the negative effects to lynx foraging habitat would likely be adjacent to communities. Overall, given the *expected* amounts of treatment within lynx habitat, foraging habitat could be maintained at sufficient levels within the LAU’s.

Under Alternative D, **VEG S5** restricts some vegetation management activities and practices that reduce snowshoe hare habitat. This applies to more than precommercial thinning practices, it applies to all silvicultural and vegetation treatments that are not specifically excluded. There are seven exceptions and five additional situations under which the **VEG S5** standard does not apply. They are as follows:

1. Research studies and genetic tests.
2. Activities conducted within the structure ignition zone (200 feet of dwellings/administrative sites)
3. Conifer removal within aspen clones and/or “daylight thinning around individual aspen trees.
4. When a broadscale assessment has determined that early seral stages of forested habitat exceed what would be expected under the normal range of historic conditions.
5. Pruning, transplants and Christmas tree and ornamental tree harvest if done so as to not measurably reduce lynx forage habitat.
6. Salvage and regeneration harvests.
  - This standard (VEG S5 under Alt. D.) does not apply to:
    - a. Livestock grazing practices and activities.
    - b. Wildfire suppression
    - c. Fire use practices and activities that restore ecological processes.

- d. Fuel treatments identified through a process such as that described in *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10 year Strategy Implementation Plan*.
  - e. Developed Recreation sites, administrative sites, or authorized special use improvements including within permitted ski area boundaries.
7. Precommercial thinning conducted within the structure ignition zone (200 feet of administrative sites, dwellings and/or associated outbuildings)

Removing conifers in aspen stands that are providing cover and forage between one to three meters above the ground would, in most cases, degrade snowshoe hare habitat. Aspen stands mixed with conifer are generally well used by snowshoe hares, but the year round use is in most cases dependent on the conifer component. Pure aspen stands in general, do not support snowshoe hare in the winter, due to lack of cover. Snowshoe hare mortality is primarily predation; therefore cover is extremely important to their choice of habitats.

Precommercial thinning is a vegetation management practice sometimes used in lodgepole pine to provide structural diversity within lodgepole stands for future or replacement old growth, especially in regards to the characteristic of large diameter trees. This form of treatment is an attempt to replace low intensity fires that historically could underburn a lodgepole pine stand, reducing tree density. With the advent of fire suppression, these fires typically are suppressed, especially in the wildland urban interface. In lynx habitat in the Southern Rockies, lodgepole pine is typically seral to spruce-fir, so old growth pure lodgepole pine (climax lodgepole pine) stands are rare in lynx habitat. However, thinning in lodgepole pine would not by itself, create large diameter trees. In most lodgepole stands, a variety of disturbance agents, such as wind, weather, insects, and disease disturb these lodgepole stands, which leads to changes in the stand structure as it develops. Specific characteristics of the site would also be integral, such as soils, climate, and site productivity, which all would influence whether or not the site can produce certain old growth characteristics, such as larger diameter trees.

Precommercial thinning in densely regenerating lodgepole pine stands has also been documented to be an adverse effect to snowshoe hare densities (as previously cited), as the young regenerating dense stands that are typically precommercially thinned, provide high quality snowshoe hare habitat for a relatively short amount of time (approximately 20 years out of a 200 year life span), but could be highly critical in maintaining high numbers of hares for dispersal, such as in a “source” population. As such, they could also provide key areas for lynx to hunt.

Under Alternative D, the direction for managing spruce-fir stands to provide for winter snowshoe hare habitat becomes a guideline - **VEG G6**. As such, it does not provide the stronger direction that a standard does, and could allow for adverse effects to individual lynx.

The effects of **VEG G7**, under this alternative, are the same as described under Alternative C.

The grazing standards in Alternatives B and C (**GRAZ S1, S2, S3 and S4**) are guidelines under Alternative D (**GRAZ G1, G2, G3 and G4**). As such, it does not provide the stronger direction

that the standards provide. If this grazing direction is not implemented, grazing activities could result in adverse effects to foraging habitat, and therefore to individual lynx.

Under Alternative D, there is an overall “**ALL S2**” standard. This standard allows for project level analysis to override all lynx standards. This could lead to cumulative adverse effects to lynx foraging habitat that are difficult to monitor at the project level. Therefore, **ALL S1**, **VEG S1**, **VEG S3**, and **VEG S5**, with exceptions as proposed in Alternative D, as well as the allowance **ALL S2** implemented at the project level, could lead to adverse effects to individual lynx as well as increase the risk to the ability of lynx populations to persist within the SRMGA. See cumulative effects section for effects to lynx persistence within the Southern Rockies.

### **Summary of Effects to Denning and Foraging Habitat**

All the action alternatives provide better direction for vegetation management for conserving lynx denning and foraging habitat than the No Action Alternative, and Alternative B provides direction that maintains lynx habitat better than Alternatives C and D. Alternatives A, C and D have aspects in the vegetation standards as written, that would allow for adverse effects to individual lynx. Alternatives A and D have aspects that could have adverse impacts to individual lynx within the Southern Rockies, based on what would be allowed in vegetation management, especially in regards to the **ALL S2** standard in Alternative D.

## **Factors Potentially Affecting Lynx Movements**

### **Affected Environment**

Habitat connectivity (landscape) is defined as cover (vegetation) in sufficient quantity and arrangement to allow for the movement of lynx. Linkage areas are defined as “Habitat that provides landscape connectivity between blocks of habitat. Linkage areas occur both within and between geographic areas, where blocks of lynx habitat are separated by intervening areas of non-habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks. Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions or other developments” (LCAS revised definition, Oct. 2001). Special management emphasis is recommended to maintain or increase the permeability of linkage areas.

Alpine tundra, open valleys, shrubland communities, and dry southern and western exposures naturally fragment lynx habitat within the subalpine and montane forests of the Southern Rockies. Because of the fragmented nature of the landscape, there are inherently important natural topographic features and vegetation communities that link these fragmented subalpine forested landscapes together, providing for dispersal movements and interchange among individuals and subpopulations of lynx. Landscape connectivity may be provided by: (a) narrow forested mountain ridges and plateaus connecting more extensive mountain forest habitats, (b) wooded or willow riparian communities providing travel cover across open valley floors between mountain ranges, or (c) lower elevation ponderosa pine, pinyon-juniper woodlands or shrublands that separate high elevation spruce-fir forests.

Human activities that change vegetation patterns of the natural landscape affect ecological processes such as competition, dispersal, and predation in various ways. Generalist species, such as coyotes and great-horned owls, are strongly linked to human-dominated vegetation mosaics where fragmentation and competition provide the environments needed by these generalist species. Although the magnitude of these effects is poorly understood, it is clear that the function and structure of these animal communities can be altered.

Since the mid-to-late 1800's, human actions have continually affected forested landscape linkages in the SRMGA. The gold rush began in the mid-1800s and continued to the end of the century. The effects of mining and large-scale logging are still evident today in much of the landscape. Permanent habitat loss and road building have continued into this century. Building of residences and roads on and into private in-holdings has continued. A rapidly developing ski industry, a growing and affluent population, and telecommuting capabilities have converged to spur rapid growth in many mountain valleys. Transportation corridors have been, and continue to be modified and expanded to handle increasing volumes of traffic and higher speeds, thus altering historical movement patterns of wide-ranging species and creating barriers to movement. These and other factors, both historical and current, have combined to eliminate or degrade many landscape connections within the SRMGA.

The National BA states the Southern Rockies geographic area is the most distant geographic area from Canadian source population. Hostile desert environments separating the geographic area from the Northern Rockies combine with urban, rural, and recreational development and highway impacts to further isolate and fragment landscape connections in this geographic area. Maintaining a persistent population will be challenging in this area and dependent on maintaining landscape linkages primarily within the geographic area itself. (Hickenbottom et al. 1999).

It is suggested in the Ecology and Conservation of Canada Lynx (Ruggerio et al. 2000) that lynx in the contiguous United States may exist as several smaller, but effectively isolated metapopulations. An example of this is the boreal forests in Colorado and Utah are separated from the larger areas of boreal forest in northern Wyoming by at least 100 km. Metapopulation stability depends not only on habitat quality, but also on successful dispersal between isolated habitat patches. The likelihood of a species persistence declines with increasing fragmentation and isolation. That does not mean that more isolated, and therefore more vulnerable, subpopulations are unimportant. Peripheral populations may contain valuable genetic, physiological or behavioral adaptations that allow them to persist (Hickenbottom et al. 1999). Lynx and snowshoe hare habitats are more prone to a metapopulation structure in the western forests due to fragmented landscapes and heterogeneous distribution of topographic, climatic, and vegetative conditions.

Ruggerio et al. (2000) indicates that we know little about the degree of connectivity or its role in the viability of lynx, but assumes that connectivity plays an important role. Protecting, maintaining, and improvement of lynx habitat afforded by the various conservation measures contribute to the conservation of lynx and population viability. Maintaining habitats to provide for dispersal movements and interchange among individuals and subpopulations may be the most important provision for maintenance of population viability contained in the LCAS. An interconnected ecosystem can be essential to maintain the ability of subpopulations to expand and

colonize new habitats, to recolonize areas where subpopulations have been locally extirpated, to provide population support to declining populations, to allow individuals to find mates among neighboring subpopulations, and to effect dispersal and genetic interchanges (Noss and Cooperrider 1994).

In January 2002, an interagency group from throughout the SRMGA met to discuss and draft potential areas of concern for lynx movements. These areas were then to be proposed as lynx “linkage” areas, as defined in the LCAS and required by the Conservation Agreement signed by the Forest Service, Bureau of Land Management (BLM) and USFWS.

The interagency group of biologists expressed several types of lynx movement concerns:

- Areas that required larger scale movements, between isolated and disjunct blocks of lynx habitat. These areas include non-lynx habitats, but have habitats that can provide alternate prey sources such as jackrabbits, grouse, etc. These areas also tend to be mixed land ownership, such as Forest Service, BLM and private. These areas are generally at the large scale.
- Areas that are suspected to be important movement habitats within blocks of lynx habitat. These areas include some areas that have narrow areas of lynx habitats, surrounded by non-habitat, that connect 2 larger blocks of habitat. These areas may have no immediate threats, but it would be important to maintain/protect these areas for movement purposes. This type is generally at the mid-scale.
- Some areas of concern for lynx movements include areas that are limited to remaining undeveloped habitats, in highly developed areas. In this case it would be important to protect and maintain the remaining undeveloped habitat. This type is also generally at the mid-scale, but can be at the site-specific scale.
- One type of movement concern was at the mid-scale, areas where there is good contiguous primary habitats that are intersected with a barrier or impediment that can cause direct mortality, such as 2 or 4 lane highways. In specific cases, important areas near stretches of a highway are in need of maintenance and protection, and the permeability of a highway may be in need of improvement to reduce the potential for mortality. Potential site-specific crossing areas were not identified at in this programmatic assessment.

It is likely that all of these types of concern areas could result in a lack of genetic interchange and direct mortality, which if connectivity is not maintained, could affect the lynx persistence in the Southern Rocky Mountain Geographic Area.

The negative effects of highways on rare carnivores include habitat fragmentation, direct mortalities, direct loss of habitat, displacement due to noise and human activity, and secondary loss of habitat due to associated urban sprawl. When traffic volume increases, there is an evolution of highways from gravel roads to paved two lane roads, and from two lane highways to more problematic four lane highways, and the interstate highways, which have the most adverse effects to wildlife movements. The result of this progression of upgrades in the transportation system is the mortality of individuals attempting to cross the highway and potential sub-population isolation, both of which result in a slow decline in the population and ultimately can

affect viability for some of the low-density carnivores such as lynx and wolverine (Ruediger, et al. 2000a). Critical points in development of highways occur when: 1) gravel forest or backcountry roads are paved, which results in higher speeds, higher traffic volumes and increased human developments.

For most connectivity issues, lynx require a regional or sub-regional approach to management because of their free ranging habits. Lynx need to be able to move between different geographic areas and mountain ranges. In some cases, they move long distances through unfavorable habitat. If linkages or corridors are blocked because of human alteration, lynx populations can become isolated and more vulnerable to extirpation in the long term.

The Southern Rockies has a naturally fragmented spatial pattern of primary habitat. The capability to maintain a meta-population in this area depends on successful dispersal between habitat fragments, and potentially between geographic areas. Increased fragmentation and isolation has occurred due to cumulative impacts from highways and residential and recreational development often tied to ski areas developed on National Forest System lands (Hickenbottom et al. 1999). While the ecosystem remains largely interconnected at this time, ongoing development and other activities continue to pressure those linkages. The I-70 highway corridor along with the development of resort and the associated subdivisions and entire communities, have compromised the permeability of portions of the area in the center of the SRMGA. As the SRMGA may not be connected to the Northern Rockies due to large expanses of desert in between, maintenance of regional scale habitat connectivity is perhaps more important in this geographic area than any other. (Hickenbottom et al. 1999).

### **Environmental Consequences**

**Alternative A** does not specifically address connectivity in most existing Forest Plans. The revised Arapaho-Roosevelt National Forest Plan contains a goal and a guideline for the establishment, maintenance, and protection of landscape linkages. Connectivity on the Forests would have to be addressed at the project level through Biological Assessments and consultation with the USFWS. In projects that would be within linkage areas, cumulative effects of all activities would be addressed during the Section 7 (ESA) consultation process. Overall weakness of the Forest Plans in the SRMGA in addressing linkage or connectivity potentially contributes to a risk of adverse effects to lynx under this alternative, based on the Biological Opinion on the Forest Plans (USDI 2000) which states that connectivity concerns with highway and development are especially relevant to the more fragmented nature of lynx habitat in the mountains of the SRMGA.

**Alternatives B and C** contain provisions for the maintenance of connectivity between patches of lynx habitat within and between LAUs, through the objectives, standards and guidelines to be applied in the overall lynx habitat as well as the additional objectives, standards, and guidelines specific to the identified linkage areas. Within the LAU's, these measures include **ALL 01, ALL S1, ALL G1 and HU G6**, which would help to ensure that connectivity within lynx habitat would not be severed or greatly decreased, in most cases. The **All S1** standard applies not only in linkage areas, but all lynx habitat as well and is as follows: ***“New or expanded permanent***

***developments and vegetation management practices and activities must maintain habitat connectivity.”***

For the Amendment Area Linkage areas, the measures include **ALL O1, ALL S1, ALL G1, LINK O1, LINK S1, LINK S2, and LINK G1** . These special provisions under alternatives B and C would help to facilitate movement of lynx throughout and between landscapes within the Amendment Area. Chapter 1 and Appendix D describe these linkage areas. Twenty-six of these involve primarily NFS lands, and 12 have predominately mixed ownerships, including BLM, State Forest, and National Park Service lands, intermingled with private lands. Under this amendment process, objectives, standards and guidelines proposed in Alternatives B and C under “ALL Management Activities and Practices”, as well as the direction under “Linkage Areas” would apply to all NFS lands within linkage areas that are within the Amendment Area, not just the lynx habitat. They would not apply to other federal or private lands.

If linkage areas occur within lynx habitats, all other proposed lynx standards and guidelines (by alternative) would also apply. All action alternatives incorporate conservation measures (objectives, standards and guidelines) to maintain connectivity, both in LAUs and in linkage areas.

**Alternative D** has all the above objectives, standards and guidelines, but it has several additional exceptions to the **ALL S1** standard, which provides direction to maintain habitat connectivity. These additional exceptions are:

- Fuel treatments identified through a process such as that described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.
- Fossil fuel exploration and development practices and activities.
- Energy transmission facilities, associated practices and activities.

Alternative D also allows an exception to all lynx standards (**ALL S2**), if a project specific analysis determines it is not likely to adversely affect lynx (see below), or if it has short-term adverse affects with long-term benefits in that project.

The results of the fuels treatments allowance, expected and worst case analysis, was discussed under foraging habitat. The juxtaposition of foraging habitat directly relates to connectivity and movements of lynx, so the analysis of expected treatment acreages and worst case analysis would be the same for connectivity, regarding the hazardous fuels reduction exception to **ALL S1**, the connectivity standard. However, as the standard for maintaining connectivity is critical in the Southern Rockies, any exceptions to this standard would potentially have adverse effects to both individuals and possibly to the local populations of lynx.

The exceptions for fossil fuel exploration and development, as well as the energy transmission facilities are topics that are more difficult to assess at the programmatic level. Most Forests within the Amendment Area have low “richness potential” for oil and natural gas resources. However, the San Juan and the Grand Mesa National Forests have “high” potential for development of natural gas. Specific details for each Forest are provided at the Forest level, either in the Forest Plans, or the Forest’s Oil and Gas Leasing analysis documents. For this programmatic

assessment, the assumption is that if the above exceptions to the maintaining connectivity standard, **ALL S1**, are utilized, habitat connectivity could be adversely effected in the areas of development.

The effects to lynx, if habitat connectivity is not maintained, can be a critical factor in the persistence of the population, especially in habitats that are naturally fragmented by open parks and alpine grasslands, such as occurs in the Southern Rockies. Depending on the scale of the project, or how many times these exceptions are implemented across the Amendment Area, the exceptions to maintaining connectivity could reduce the likelihood that the Canada lynx population would have the ability to persist in the Southern Rocky Mountain Geographic Area.

The result of the exceptions to **ALL S1** and the potential effects of the implementation of **ALL S2** exception/ standard may adversely affect not only individual lynx, but may affect lynx persistence as well within the SRMGA, as the connectivity and linkage standards may be some of the most critical standards for lynx for this Geographic Area. Hickenbottom et al. (1999) stated in the National BA for lynx in the SRMGA the following: “Maintaining a persistent population will be challenging in this area and dependent on maintaining landscape linkages primarily within the geographic area itself.” The connectivity concerns are broadscale, landscape issues. It may be very difficult at the project level to assess and/or monitor cumulative effects to connectivity and permeability for lynx across the entire SRMGA.

## **Other Effects to Lynx Productivity and Movements**

The Ecology and Conservation of Lynx in the United States (Ruggerio et al. 2000) states: “Because lynx occupy large home ranges and occur at low densities, the long-term viability of lynx populations cannot be achieved at the spatial scale of relatively small parcels of public land, or even larger units such as individual National Forest’s or National Parks. Consequently, we believe that lynx conservation in the contiguous United States can only succeed as part of an ecosystem management strategy that is designed to address the needs of a variety of potentially conflicting resource uses over long periods of time and broad spatial scales.”

The common exception/allowance in standard **ALL S2** in Alternative D applies to all lynx standards. This exception allows short-term adverse effects to lynx with long-term benefits to lynx or lynx habitat. The **ALL S2** exception standard for all lynx standards, under Alternative D, would be discretionary at the project level, and the cumulative effects analysis at a project level may be very difficult to accomplish, in order to adequately address cumulative effects for the SRMGA lynx population.

The USFWS Biological Opinion on the existing LRMP’s states: “ For most agency actions, noncompliance with the standards in the LCAS increases the likelihood that actions would adversely affect lynx.”

**ALL S2**, or deviations from standards allowed under it, may allow for direct and indirect actions that may adversely effect lynx or lynx habitat. This could cumulatively adversely affect the lynx habitat conditions and connectivity between habitats. This may impact how well sufficient

quantity, quality and distribution of lynx habitat would be likely to provide for lynx persistence and recovery within the SRMGA.

## Cumulative Effects to Lynx Productivity and Movements

This analysis focuses on the effects to lynx of past, present and reasonably foreseeable programmatic actions. Programmatic actions set the sideboards for future development and/or availability.

### Geographic area for Cumulative Effects

Cumulative effects were evaluated for the Amendment Area and the Southern Rocky Mountain Geographic Area. These boundaries were used to evaluate the cumulative effects of this amendment in addition to other past, present and reasonably foreseeable actions within the amendment area and how this amendment cumulatively would affect lynx within the entire Southern Rocky Mountain Geographic area.

Cumulatively, with the White River National Forest (WRNF), Rocky Mountain National Park, (NPS) and BLM lynx habitat data added in, the SRMGA as a whole contains approximately 7.7 million acres of lynx habitat. See Table 3-WL-5 for SRMGA lynx habitat data.

**Table 3-WL-5 SRMGA Acres of Suitable Lynx Habitat on Federal Lands**

| National Forest       | Total LAU Acres<br>(Federal lands)        | Denning<br>Habitat           | Winter Forage<br>(Non-denning) | Other<br>Foraging    |
|-----------------------|---|------------------------------|--------------------------------|----------------------|
| Medicine<br>Bow/Routt | 1,548,402                                 | 365,092                      | 147,924                        | 776,204              |
| Arapaho-<br>Roosevelt | 926,128(NFS)<br>232,759(NPS)<br>307 (BLM) | 271,278 (NF)<br>(92,762 NPS) | 288,289(NF)<br>40,323 (NPS)    | 78,574<br>3958 (NPS) |
| GMUG                  | 2,407,700<br>100 (BLM)                    | 602,847                      | 202,174                        | 572,810              |
| Pike-San Isabel       | 1,434,616<br>90,608 (BLM)                 | 519,378                      | 63,135                         | 276,895              |
| Rio Grande            | 1,814,471                                 | 391,516                      | 192,556                        | 400,113              |
| San Juan              | 1,418,959<br>62 (BLM)                     | 460,685                      | 120,417                        | 392,073              |
| White River           | 2,286,442<br>22,180 (BLM)                 | 459,795                      | 321,377                        | 344,575              |
| <b>Total:</b>         | 12,182,734                                | 3,163,553                    | 1,376,195                      | 2,845,202            |

\*BLM lynx habitat data is shown in the total acres column only, as it is unclassified and is draft information.

The cumulative effects of the indirect and direct activities on private lands within LAUs are likely to reduce the suitability of areas for lynx to forage, reproduce, and rear young successfully on private lands within the Southern Rockies Geographic area. Spatial considerations of forage and denning habitat are generally not incorporated into project activities on private lands and may result in further reductions in habitat suitability on these lands and adjacent federal lands.

### Alternative A - No Action

Under the No Action Alternative, management direction would not be incorporated into Forest Plans; however, administrative units would still strive to provide for habitat needs for lynx due to its status as a federally listed threatened species. It is probable that the units would apply the recommendations from the LCAS to provide for these needs. Recommendations contained in the LCAS may not occur. Project level consultation would still be conducted and management actions would be designed to avoid jeopardy. It is possible that some projects, which may have adverse effects on lynx, could occur. As a result, recovery of lynx may occur over a longer period.

The White River National Forest Plan Revision has incorporated direction similar to the LCAS conservation measures, which may help to maintain habitat and habitat connectivity in the central portion of the SRMGA. The linkage area standards and guidelines the White River National Forest has adopted will pertain to the linkages that are on the White River National Forest. This Forest is in the center of the SRMGA, and is critical for maintaining connectivity within the geographic area.

Transportation improvements are being considered by the Colorado Department of Transportation for the Interstate 70 (I-70) mountain corridor to address increased traffic volumes as a result of rapid human population growth in Colorado and the western United States. The I-70 mountain corridor carries both interstate (freight transport and passenger travel) and intra-state (commuters and summer and winter recreationists) traffic. In 1998, the Colorado Department of Transportation (CDOT) completed a Major Investment Study to identify short-term and long-term solutions to increase safety and reduce congestion along the I-70 mountain corridor between Denver International Airport and Glenwood Springs. In response to public comment, CDOT and the Federal Highway Administration began preparation of a programmatic EIS for the proposed 127-mile mountain corridor. As part of that effort, interagency teams were formed to address and streamline compliance with NEPA and ESA for wildlife, fish and rare plants. The team addressing terrestrial species (ALIVE) developed a landscape level inventory of natural resource features within the I-70 corridor and surrounding landscape. Part of this inventory included identification and prioritization of wildlife crossing areas along the I-70 corridor. Twelve areas have been identified that are of particular concern with regard to impeding wildlife movements and causing wildlife mortalities, which will be considered in the development of alternatives for the I-70 PEIS. The information relevant to lynx is incorporated into the analysis of effects for the Southern Rockies Lynx Amendment DEIS. This CDOT I-70 programmatic planning process may result in better crossing areas or structures for lynx and other wildlife at a site-specific scale, but may also add additional impacts due to the upgrading of the transportation corridor over the next 20 years.

The BLM is considering the LCAS conservation measures in project planning within lynx habitat, under their Conservation Agreement with the US Fish and Wildlife Service.

Rocky Mountain National Park is considering the LCAS conservation measures when applicable, under Section 7 (ESA) consultation processes.

The Forest Service roadless area conservation strategy includes direction that could maintain security and connectivity needs for lynx, although this direction may be modified.

Cumulatively, the other past, present and reasonably foreseeable programmatic actions described above would generally have beneficial effects on lynx. The majority of these cumulative actions include direction that improves security, reduces competition and maintains habitat needs for lynx. It is likely that activities on private land within lynx habitat may continue to affect lynx through habitat loss.

#### Alternative B, proposed action

Alternative B would incorporate management direction into land management plans that is very similar to the conservation recommendations in the LCAS. Lynx habitat needs would be maintained by regulatory mechanisms and adequate management direction throughout the SRMGA on NFS lands, including the White River National Forest. Lynx habitat on BLM would be maintained short-term through their Conservation Agreement with the USFWS.

Habitat connectivity has been addressed through the addition of several objectives, standards and guidelines for the identified linkage areas within the SRMGA. The CDOT I-70 programmatic planning process may also help to maintain or increase permeability of the transportation corridor at the site-specific planning level.

Cumulatively, this management direction, in addition to other past present and reasonably foreseeable programmatic direction described above, would have beneficial effects on lynx.

#### Alternative C

The cumulative effects described under Alternative B are similar under this alternative with some exceptions. A slight loss of lynx foraging habitat may occur because of exceptions to the delaying of precommercial thinning as compared to Alternative B. It is also possible that individual lynx may be more likely to be adversely affected using multiple LAUs to apply standards for limits on vegetative disturbance (i.e. 30 percent) and snow compacting activities because standards would not be applied at an individual LAU scale. There are no exceptions to the no precommercial thinning standard in the White River National Forest Plan.

#### Alternative D

The cumulative effects described under Alternative B are similar under this alternative with some exceptions. Over time, there may be a greater loss of lynx denning and foraging habitat because of changes in standards applicable to vegetation management activities as compared to Alternative B. It is possible that individual lynx would be more likely to be adversely affected as a result. The distribution of lynx habitat over broad areas through time is likely to be less uniform than under Alternatives B and C. This may reduce the ability of a single or multiple LAUs to sustain lynx. This alternative contributes to the conservation of lynx more than the No Action alternative. The exceptions allowed under **ALL S2** could result in adverse effects. It is less

certain that habitat components and connectivity would be maintained in sufficient quantity and distribution to provide for lynx persistence and recovery in the SRMGA. (See synthesis and conclusion section).

## **Summary of Effects to Lynx**

As discussed previously, the lynx population in Colorado is relatively very small, is distant from source populations, and appears to be isolated from the Northern Rocky Mountains Geographic Area. Small, isolated populations have inherently high risk of extirpation due to random events, habitat alteration, competition, and other factors (Mace and Lande 1991, Soule 1987).

Furthermore, lynx populations at the southern edge of their range have comparatively large home range sizes and low survival of kittens, reinforcing the importance of maintaining suitable habitat and prey (snowshoe hare) populations through time (Ruediger et al. 2000).

### **Alternative A: (No Action)**

#### **Competition and Predation**

The Biological Assessment completed on Forest Service and BLM existing plans (Hickenbottom et al. 1999) concluded that “both mechanized and non-mechanized winter recreation may contribute to a risk of adverse effects on lynx where they are allowed within the geographic areas, by providing packed trails for other carnivores to more easily enter lynx habitat and either compete with lynx for food resources or prey on lynx.”

#### **Denning Habitat**

The USFWS Biological Opinion (USDI 2000) on the current Forest Plans stated that within non-developmental allocations denning habitat would likely be maintained at or above historic levels, and that within developmental allocations, existing Plan direction to maintain old growth habitat was judged to be adequate to provide for lynx denning habitat in the SRMGA.

The standards in existing plans within developmental allocations for coarse woody debris retention (that would provide denning structures) do not provide the regulatory mechanisms, in and of themselves, to provide for denning structure, as they are very minimal. Since these structural characteristics are not protected or maintained under the existing Forest Plans, this alternative does not specifically maintain the forest floor structure needed for denning structures as well as the action alternatives.

#### **Foraging Habitat**

The interagency BA (Hickenbottom et al. 1999) determined that precommercial thinning might risk adverse effects to lynx (foraging habitat) within the SRMGA, due to lack of compatible direction in the Forest Plans.

## **Connectivity**

The overall weakness of the Forest Plans in the SRMGA in addressing linkage or connectivity potentially contributes to a risk of adverse effects to lynx under this alternative, based on the Biological Opinion on the Forest Plans (USDI 2000) which states that connectivity concerns with highway and development are especially relevant to the more fragmented nature of lynx habitat in the mountains of the SRMGA.

## **Alternative B**

### **Competition and Predation**

The **HU S1** standard as proposed under Alternative B would result in maintaining the status quo as much as possible for areas of snow compaction that allow access in the winter to competitors of lynx. At the same time, it would allow some management flexibility in allowing new winter recreation special uses, and to improve lynx habitat by consolidating use.

### **Denning Habitat**

By the addition of the denning habitat standards **VEG S3 and S4** to the existing Forest Plan standards for well-distributed old growth, along with the fact that 31 percent of the SRMGA is in wilderness and non-developmental management prescriptions, Alternative B would likely provide sufficient management direction to maintain denning habitat across the landscape.

### **Foraging Habitat**

Standards **VEG S1, S2, S3, S4 and S5** under Alternative B would limit potential adverse effects on lynx, in regards to foraging habitat.

## **Connectivity**

**Alternative B** contains provisions for the maintenance of connectivity between patches of lynx habitat within and between LAUs, through the objectives, standards and guidelines to be applied in the overall lynx habitat as well as the additional objectives, standards and guidelines specific to the identified linkage areas. These special provisions for the SRMGA linkage areas would help to facilitate movement of lynx throughout and between landscapes.

## **Alternative C:**

### **Competition and Predation**

The **HU S1** standard allows for the snow compaction analysis and management to be at a larger scale than that of an individual lynx home range. In general, a large scale use of the no net increase of snow compaction could have negative effects to individual lynx, by allowing more competitors into some LAUs, during the most limiting season for forage resources. Therefore,

this alternative may have some negative effects to individual lynx, but provides more benefits to lynx than Alternative A.

### **Denning Habitat**

By the addition of the denning habitat standards **VEG S3** and **S4** to the existing Forest Plan standards for well-distributed old growth, along with the fact that 31 percent of the SRMGA is in wilderness and non-developmental management prescriptions, this alternative would likely provide sufficient management direction to maintain denning habitat across the landscape.

### **Foraging Habitat**

Allows for the analysis of the **VEG S1** 30 percent unsuitable conditions limitation over a larger scale of up to 500,000 acres, which results in the possibility that a majority of the lynx habitat in one or more LAUs could be in unsuitable condition, with no further restrictions placed on vegetation management activities. Allowing this level of disturbance over large scales could be detrimental to individual lynx in the Southern Rockies, as habitats are highly fragmented naturally in the SRMGA.

### **Connectivity**

See Alternative B above.

### **Alternative D:**

#### **Competition and Predation**

**HU G10**, under Alternative D, has direction on no net increase in authorized snow compaction as a guideline. Deviations to the no net increase direction at the project level could lead to additional negative impacts to individual lynx from competition for prey resources, depending on how often the **HU G10** guidance is not applied at the project level. Cumulative impacts from competition may be more difficult to monitor or address both at the Forest level and SRMGA-wide.

#### **Denning Habitat**

By the addition of the denning habitat standard **VEG S3** to the existing Forest Plan standards for well-distributed old growth, along with the fact that 31 percent of the SRMGA is in wilderness and non-developmental management prescriptions, Alternative D would likely provide sufficient direction to maintain denning habitat across the landscape; however, **ALL S2**, as well as the fuels treatment allowance/exception, would allow for adverse effects. Alternative D provides direction for maintenance of denning forest floor structure as a guideline **VEG G8**, instead of a standard, as it is under Alternatives B and C. Under this guideline, many potential denning structures could be removed, so this alternative would likely have more negative impacts than Alternative B or C to potential denning habitat. Alternative D would likely provide more denning habitat protection than the No Action alternative, given “expected” vegetation treatments as described under Environmental Consequences.

## Foraging Habitat

Standards **All S1**, **VEG S1**, **VEG S3**, **VEG S5** all have the following allowance in Alternative D:

“This standard does not apply to fuels treatments identified through a process such as that described in *“A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10 Year Comprehensive Strategy Implementation Plan.”* This allowance may have negative impacts to lynx foraging habitat, as there is no limit to treatments in lynx habitat defined. Under the worst case scenario, with no limits defined, there could be adverse effects to individual lynx, as well as the Southern Rockies lynx population, if high quality foraging habitat is not maintained in a well-distributed fashion.

Under Alternative D, **VEG S5** also allows vegetation management activities and practices that reduce snowshoe hare habitat under seven exceptions and five additional situations.

Precommercial thinning for specific fuels management and risk reduction purposes is allowed. Precommercial thinning treatments in “replacement” or “future” old growth lodgepole pine stands would be allowed. Precommercial thinning in densely regenerating lodgepole pine stands has been documented to be an adverse effect to snowshoe hare densities, as these stands provide high quality snowshoe hare habitat for a relatively short amount of time (approximately 20 years out of a 200 year life span), but could be highly critical in maintaining high numbers of hares for dispersal, such as in a “source” population. As such, they could also provide key areas for lynx to hunt.

Removing conifers in aspen stands that are providing cover and forage between one and three meters above the ground would, in most cases, degrade snowshoe hare habitat.

Precommercial thinning in spruce-fir (including “weed and release” activities) would, in most cases, degrade snowshoe hare habitat. **ALL S2** would allow for adverse effects. Therefore, **VEG S5**, with exceptions as proposed in Alternative D, could allow adverse effects to individual lynx in regards to foraging habitat.

## Connectivity

See Alternative B above, except that **ALL S2** reduces the effectiveness of the standards. Also, there are several exceptions to the **ALL S1** standard (maintaining connectivity) for hazardous fuels reduction, fossil fuel exploration and development, and energy transmission facilities. This is one of the most critical standards for the Canada lynx in SRMGA, as connectivity concerns with highway and development are especially relevant to the more fragmented nature of lynx habitat in the mountains of the SRMGA. The exceptions to maintaining connectivity could allow adverse effects to occur to individual lynx, as well as the SRMGA population.

## **Other Effects to Lynx Productivity and Movements**

The USFWS Biological Opinion on the existing Forest Plans states: “For most agency actions, noncompliance with the standards in the LCAS increases the likelihood that actions would adversely affect lynx.”

In addition, the Ecology and Conservation of Lynx in the United States (Ruggerio et al. 2000) states: “Because lynx occupy large home ranges and occur at low densities, the long-term viability of lynx populations cannot be achieved at the spatial scale of relatively small parcels of public land, or even larger units such as individual National Forest’s or National Parks.”

The exception for all lynx standards (**ALL S2**) under Alternative D can lead to deviations from lynx standards at the project level. The USFWS Biological Opinion on the existing LRMP’s (USDI 2000) states: “ For most agency actions, noncompliance with the standards in the LCAS increases the likelihood that actions would adversely affect lynx.”

Alternative D common exception **ALL S2** may lead to cumulative adverse effects within a National Forest and throughout the SRMGA, and with lynx populations being at extremely low levels, this exemption may not ensure that management requirements are implemented that would provide for lynx persistence and recovery in the SRMGA. It is very uncertain how often this exception standard might be used at the project level. Use of this standard will be monitored.

## **Synthesis and Conclusions: Lynx Conservation**

Under the 1982 NFMA regulations, Forest Plan documentation must demonstrate that management direction would provide habitat to insure viability of all native and desired non-native plant and animal species. All alternatives evaluated are not expected to achieve the goal of providing for viability of lynx with the same level of certainty. Alternatives differ in the level of risk to lynx, which may affect species viability within the SRMGA.

The following is a synthesis of the above analysis for Canada lynx, using an outcome rating to display the likelihood of lynx persistence in the SRMGA, based primarily on habitat quantity, quality and conditions, existing and potential, under each alternative. The majority of lynx habitat in the SRMGA is found on NFS lands; therefore, habitat conditions on NFS lands are a critical factor in the conservation of lynx in the southern Rockies. Because the NFMA regulations focus on habitat conditions on National Forests within the planning area, Forest Service evaluations are most useful when they partition the effects of ecological conditions on National Forests from other effects. Cumulative effects discussions, at the end of the lynx effects section, are based on these habitat conditions, as well as population status and non-habitat related risks and uncertainties.

The potential outcomes of the likelihood of lynx persistence in the Southern Rocky Mountain Geographic Area are based on an estimate of habitat quantities, conditions and distributions, and how well the alternatives are likely to ensure the maintenance or improvement of lynx habitat components. How each alternative influences lynx productivity, movements, and

mortality is discussed in the Summary of Effects to Lynx section above. The analysis for Table 3-WL-6 is based only on habitat quantity, quality and conditions that would be sufficient to maintain lynx persistence in the SRMGA. The “Outcome” numbers used are described below. There is some uncertainty as to the effects of management actions on lynx in the SRMGA. Due to uncertainties with the population status and the fact that some lynx risk factors are outside the jurisdiction of National Forest management, cumulative factors that influence lynx persistence are discussed separately.

- **Outcome 0:** This outcome level does not ensure the maintenance of broad scale habitat quantity, distributions and conditions that would provide for long term persistence of Canada lynx within the SRMGA, through management direction on federal lands. Long-term, this outcome may result in substantial decreases in the likelihood of lynx persistence, and may eventually result in species extirpation within the SRMGA.
- **Outcome 1:** This outcome level results in a lower likelihood of persistence of Canada lynx, as compared to the baseline of Outcome 3, which is the expected outcome that incorporates the LCAS conservation measures. Primarily, this is due to the lower level of management direction to ensure sufficient habitat quantity, quality, distributions and conditions within the SRMGA which may decrease the species productivity, or reduce habitat connectivity relative to Outcomes 2 and 3
- **Outcome 2:** This outcome level results in slight decreases in the likelihood of persistence of Canada lynx, as compared to Outcome 3 (which has the applicable conservation measures from the LCAS incorporated and is considered the baseline for the Outcome levels). It provides management requirements that would result in maintenance of habitat of sufficient quantity, quality, and conditions to allow the species to maintain some breeding populations, with some possible gaps in the habitat distribution, or some barriers in landscape connectivity within the SRMGA. These gaps or connectivity barriers may be permanent or long-term and may result in some limitation of interactions among local populations. The outcome is likely to allow the species to maintain productivity and movements, in some areas, but allows for gaps in suitable habitat that may reduce population productivity.
- **Outcome 3:** This outcome level includes the applicable conservation measures necessary to conserve lynx, developed from the Lynx Conservation Assessment and Strategy, which is based on the best available scientific knowledge and recommendations. The USDI Fish and Wildlife Service has analyzed these conservation measures in formal consultation on the existing LRMP’s, and concluded that, if these conservation measures are incorporated into the LRMP’s and BLM’s land use plans, that “the Plans would likely not jeopardize the continued existence of lynx”. It provides management direction that would likely result in maintenance of sufficient habitat quantity, quality, distribution and conditions to allow the species to maintain breeding populations within most historic habitats. Permanent or long-term connectivity barriers may result in some limitation of interactions among local populations, but sufficient connectivity will be maintained for long-term persistence. The alternative is likely to maintain lynx productivity and movements, while minimizing mortality. This outcome is the baseline for comparison of the likelihood of lynx persistence in the SRMGA.

**Table 3-WL-6, Relative Likelihood of Lynx Persistence Outcomes in SRMGA**

|   | <b>Alternative A</b> | <b>Alternative B</b> | <b>Alternative C</b> | <b>Alternative D</b> |
|---|----------------------|----------------------|----------------------|----------------------|
| Outcomes:<br>Relative<br>Likelihood of<br>Lynx<br>Persistence in<br>the SRMGA | <b>0</b>             | <b>3</b>             | <b>2</b>             | <b>1</b>             |

***Rationale for Outcomes:***

**Alternative A** is rated as Outcome 0 because the Biological Assessment done for the Forest Plans in the amendment area resulted in a “Likely to Adversely Affect” determination during the Section 7 consultation process (USDI Fish and Wildlife Service, 2000). The alternative, without the Conservation Agreement which agrees to consider the LCAS conservation measures, would not ensure that habitat is maintained in sufficient quantity, quality or distribution, nor would it ensure maintenance of conditions at the broad scale to support lynx production and provide for lynx movements.

**Alternative B** is rated as Outcome 3 because it includes the conservation measures, recommended by the LCAS, which is based on the most recent science, and provides the basis for broad scale management to conserve lynx. It would add the management direction to the Forest Plans to ensure that broad programmatic direction (regulatory mechanisms) for lynx conservation would be implemented consistently across the SRMGA.

**Alternative C** is rated as Outcome 2 as it is similar to Alternative B, however, there are two standards (**HU S1** and **VEG S5**) that allow for adverse effects to individual lynx, which lead to a slightly decreased likelihood of persistence as compared to the Proposed Action.

**Alternative D** is rated as Outcome 1, due to the exceptions to the vegetation standards, the exceptions to the connectivity standard, and the standard **ALL S2**, with the associated uncertainties of how the lynx standards may or may not be implemented at the project level. The All S2 standard could allow adverse effects to habitat in a number of LAUs. This could lead to habitat degradation across the SRMGA. If the linkage or connectivity standards, in particular, are not followed, these exceptions to lynx standards may lead to a lower likelihood of lynx persistence across the SRMGA than Alternatives B and C. Some vegetation management activities excepted under **VEG S5** (see discussion under Denning and Foraging Habitat), along with the **ALL S2** exception to all lynx standards, may allow adverse effects to lynx habitat components and connectivity across the SRMGA.

**Cumulative Conclusions****Factors Considered When Determining Cumulative Effects**

- The population of lynx within the SRMGA may be effectively isolated from the Northern Rockies Geographic Area, which makes it particularly vulnerable to

extirpation, as there is likely no immigration from source populations (Ruggerio et al. 2000). The majority of lynx habitat within the SRMGA is on NFS lands. However, not all risk factors for lynx can be influenced by national forest management.

- Small, isolated populations have inherently high risk of extirpation due to random events, habitat alteration, competition, and/or other factors (Mace and Lande 1991, Soule 1987). Furthermore, lynx populations at the southern edge of their range have comparatively large home range sizes and low survival of kittens, reinforcing the importance of maintaining suitable habitat and prey populations through time (Ruediger et al. 2000). When a very small population size exists, small habitat degradations can lead to problems for long-term persistence. It is for this reason that a more conservative management approach is recommended in areas with low population levels. However, with small populations, random events/disturbances can still lead to extirpation, even with conservative management approaches.
- The current population status of lynx in the SRMGA is uncertain. The lynx population in Colorado was believed to be at extremely low levels in the 1990's, which prompted the Colorado Division of Wildlife to translocate 129 lynx from Alaska and Canada in 1999-2003. There have been 45 known mortalities from these translocated lynx (Shenk 2003). The CDOW is planning on the translocation of up to 130 additional lynx to the state of Colorado during the years 2003-2005.

#### **Additional Factors Considered that are Outside Forest Service Authority**

- Trapping and predator control are two potential lynx mortality factors for which the Forest Service has no management control. Trapping with leg-hold traps is illegal in Colorado, which reduces the accidental take of lynx by trapping in Colorado. Leg-hold trapping is not illegal in Wyoming; therefore, accidental trapping of lynx could occur. Predator control activities (trapping, shooting and poisoning) on NFS lands in lynx habitat are limited. Predator control activities within lynx habitat on NFS lands must be done in compliance with Section 7 consultation regulations for the Endangered Species Act.
- Incidental/illegal shooting mortality has occurred with the recently translocated lynx population in Colorado. Six lynx mortalities have been documented as definite shootings, and four additional lynx were "probably" shot" (Shenk 2003). At low population levels or in situations where recruitment is low, this mortality can be additive and lead to population declines.
- Highway mortalities have resulted in six mortalities, possibly eight, in Colorado, since 1999. Providing permeability across highways can be influenced and managed by the Forest Service on NFS lands, but problem areas, at times, are outside of the National Forest jurisdiction.

## Summary Conclusion

When all factors are considered cumulatively, including small population size, national forest management direction, other federal land management, private land management, and the entire range of risk factors, the uncertainties of maintaining ecological conditions and sufficient populations to maintain viable populations are increased. Alternative B conservation measures provide the highest likelihood of maintaining lynx population persistence in a well-distributed manner across the SRMGA. Alternative C is similar to B, but does not limit habitat alteration and snow compaction to single LAUs; therefore, it could adversely affect individual lynx. Alternative D includes fewer standards replacing them with guidelines, and many specific exceptions to the standard **VEG S5**. Alternative D also has the project level exception, **All S2**, which would allow for more deviations from all of the lynx standards. These changes could lead to habitat degradation in lynx foraging habitats across the SRMGA. Alternative D has a lower likelihood of maintaining lynx persistence and recovery than Alternatives B or C.

## Management Indicator Species

### Affected Environment

The diverse fauna of the national forests in the SRMGA occupies a wide variety of habitats. Spruce-fir is the most common forest type and makes up about one-fourth of all NFS lands in the SRMGA, most of which is mapped within LAUs. Aspen and lodgepole pine habitat types each make up approximately 13 percent of the SRMGA, with about 79 and 76 percent (respectively) mapped within LAUs. Lodgepole pine is found more predominantly in the northern forests of the SRMGA and aspen more predominately in the southwestern forests of the analysis area.

Douglas fir and shrub types within LAUs make up about seven percent and four percent, respectively, of the SRMGA. The remaining NFS lands in the SRMGA were grouped together and represent a variety of types generally not considered to be lynx habitat. This category includes a variety of grass and forbs types, ponderosa pine, pinyon-juniper, alpine, lakes, and rock. Some of these types of habitats may be included in some portions of LAUs, as they can be intermingled with patches of lynx habitat.

Data from all forests in the Rocky Mountain Region indicate approximately 77 percent of the spruce-fir is in mature to late successional stages. Seventy percent of the lodgepole pine is in a mature to late successional stage (Mullen et al. 1992. Biological Diversity Assessment – a technical report used in amending the Rocky Mountain Regional Guide).

## **Environmental Consequences**

### **Direct and Indirect Effects**

#### **Alternative A - No Action**

Current management emphasis and other levels of protection afforded wildlife and wildlife habitats would be maintained under existing Forest Plan direction if Alternative A is implemented. Existing Forest Plans have a series of multiple-use management area prescriptions that describe how management of various areas of a Forest is to be conducted. Under the existing Forest Plans, approximately 20 percent of the Region is being managed to emphasize wildlife. Additional prescriptions exist to provide for management that will maintain or enhance particular ecosystems (e.g., aspen and riparian areas) or non-developmental areas (e.g., wilderness areas). These prescriptions will also benefit wildlife. Finally, various aspects of wildlife and wildlife habitat are considered in the remaining prescriptions, but are not the primary emphasis.

The No Action Alternative would not have any effect to population trend or viability of the current MIS within each Forest Plan, with the exception of Canada lynx. Because there is new information regarding lynx, it is now known that the existing Forest Plans lack direction that would provide for the conservation of lynx in not providing:

- Protection of densely regenerating young forested stages (high quality snowshoe hare habitat)
- Guidance for maintaining small areas of potential denning structures (course woody debris)
- Limitations on amount of vegetation management activities that result in early successional stages within approximately a watershed scale
- Limitations on new areas of snow compaction
- Broad scale planning for landscape connectivity for wide ranging species.

#### **Proposed Action (Alternative B)**

A list of Management Indicator Species (MIS) from each National Forest unit in the Amendment Area was gathered (See Appendix F for list by Forest), and the following is the summary list of those MIS that would be likely to occur in lynx habitat, which is where the Proposed Action would apply.

Based on expected changes that would take place in vegetation and human uses, a qualitative assessment was made for each of these species as to whether they will be affected positively, negatively, or have no effect to each MIS within the amendment area, and are displayed in Table 3-WL-7. The results would be similar for Alternatives C and D, if the ALL S2 lynx standard exception (in Alternative D) is not taken into account. (See “Other Effects to Lynx Productivity and Movements section above).

Based on the standards and guidelines proposed for the amendment area, the assumptions used for the MIS effects (Table 3-WL-7) are:

1. Precommercial thinning in forested stands may be reduced from historical levels in the higher elevations inhabited by lynx, or it may happen later in stand development, when the stand is no longer providing snowshoe hare habitat. However, fire use is encouraged in the objectives, and that may lead to fire being used (either wild or prescribed) to underburn dense forested stands to create the thinning process naturally. With the ability to precommercially thin stands later (after they no longer provide snowshoe hare habitat), along with the encouragement to use fire to mimic historical patterns and structure, this standard may have no effect on most MIS within the Amendment area. Species that prey upon snowshoe hare would be benefited by this standard. These MIS species include: lynx, marten, bobcat, Northern goshawk, and great-horned owl. (See Table 3-WL-7).
2. The grass-forbs stage of forested stands (early seral) would be limited to 30 percent of the forested types that are considered lynx habitat. This does not limit the amount of natural grasslands and meadows within LAUs, however, so grassland or early successional species may have more than 30 percent of the LAU in grass-forb habitats. Much of the Amendment Area is naturally “patchy”, with many open grasslands, parks and meadows; therefore, early successional species should not be limiting in most cases. MIS that are dependent on or can be benefited by grasslands, meadows and openings include: elk, mule deer, bighorn sheep, long-tailed vole, western jumping mouse, mountain bluebird, and white-crowned sparrow.
3. Species requiring down and standing dead logs/snags will benefit from both the denning standard, and the standard involving restrictions on salvaging the less than five acre disturbances, such as blowdown, bug mortality, etc. These MIS include: lynx, marten, black bear, dwarf shrew, red-backed vole, hairy woodpecker, mountain bluebird, northern goshawk, flammulated owl, three-toed woodpecker, common flicker, ruby-crowned kinglet, pine grosbeak, and boreal toad.
4. Species requiring or benefiting from shrubby or coniferous horizontal cover on the forest floor will benefit from the standard regarding favoring the development of snowshoe hare habitat in aspen and lodgepole pine, and managing livestock grazing to ensure regeneration. MIS in this category include: lynx, marten, red-backed vole, bobcat, northern goshawk, and green-tailed towhee.
5. Species requiring mid-late seral stages of shrub-steppe, willow, and riparian habitats would benefit due to the livestock grazing standard. MIS in this category include: lynx, beaver, elk, mule deer, river otter, red-backed vole, Wilson’s warbler, green-tailed towhee, boreal toad and northern leopard frog.
6. Species dependent on mature structural stages of forests would benefit by standards and guidelines that would maintain mature forested stands across the landscape. MIS in this category include: lynx, marten, bobcat, northern goshawk, flammulated owl, three-toed woodpecker, golden-crowned kinglet, ruby-crowned kinglet, and pine grosbeak

7. Aspen dependent species would have beneficial effects for the long term. Regeneration of aspen usually results in loss of mature stages for approximately 50-60 years, which would be a negative effect, but maintenance of aspen long term would be beneficial MIS in this category include: beaver, black bear, elk, mule deer, northern goshawk, flammulated owl, warbling vireo, blue grouse, and yellow-bellied sapsucker.
8. Aquatic dependent species would have net beneficial effects due to road reclamation guidelines and requiring designated routes for most non-recreation special use permits or operating plans. One potentially conflicting guideline is to avoid building roads on ridgetops and saddles, which could lead to building new roads on sideslopes, in some cases. MIS in this category include: beaver, river otter, brook trout, brown trout, Colorado River cutthroat trout, rainbow trout, greenback cutthroat trout, boreal toad and northern leopard frog.
9. Species that need refuge areas (away from human activities) may benefit by the limitations on the expansion of snow compacting activities for winter recreation. Some non-recreation winter uses may be allowed to expand into previously unused areas during the winter, but these uses would be restricted to designated routes. MIS in this category include: lynx, bighorn sheep, and wolverine.
10. Maintaining habitat and landscape connectivity and linkage areas will benefit lynx, other carnivores and any other wide-ranging species, including pine marten, wolverine, as well as big game. Habitat quality and connectivity standards and guidelines associated with a variety of forest management activities (e.g., developed and dispersed recreation areas, special uses, oil and gas, mining, utility corridors, forest roads and trails, livestock grazing) will benefit a variety of bird and small mammal species, including alternate prey species. Maintaining the permeability of these areas to dispersal movements of animals has positive implications for maintaining population viability for many species. MIS in this category include: lynx, marten, black bear, elk, mule deer, and wolverine.
11. Species that are associated with disturbance events that provide either insect prey (e.g. spruce or pine beetle) or newly burned snags would benefit. MIS in this category include: hairy woodpecker, three-toed woodpecker, and common flicker.

**Table 3-WL-7 Potential Effects to MIS Under All Action Alternatives**

| <b>MIS within amendment Forests that are within lynx habitat</b> | <b>Potential Positive Effects</b> | <b>Potential Negative Effects</b> | <b>Both Positive and Negative Effects</b> | <b>No Effect</b> | <b>Assumptions or rationale for all alternatives, unless noted.</b> |
|--|-----------------------------------|-----------------------------------|---|------------------|---|
| <b>Mammals:</b>  |                                   |                                   |   |                  |   |
| American marten  | X                                 |                                   |   |                  | #1,3, 4, 6, 10  |
| Beaver   | X                                 |                                   |   |                  | #5, 7, 8  |
| Black bear   | X                                 |                                   |   |                  | #3, 7 (prey), 10  |
| Deer mouse   |                                   |                                   |   | X                | Habitat generalist  |
| Elk  | X                                 |                                   |   |                  | #2, 5, 7, 10  |

| <b>MIS within amendment Forests that are within lynx habitat</b> | <b>Potential Positive Effects</b> | <b>Potential Negative Effects</b> | <b>Both Positive and Negative Effects</b> | <b>No Effect</b> | <b>Assumptions or rationale for all alternatives, unless noted.</b>   |
|--|-----------------------------------|-----------------------------------|---|------------------|---|
| Mule deer  | X                                 |                                   |   |                  | #2, 5, 7, 10  |
| River otter  | X                                 |                                   |   |                  | #5, 8   |
| Bighorn sheep  | X                                 |                                   |   |                  | #2, 9   |
| Wolverine  | X                                 |                                   |   |                  | B: #9, 10; C: #10; D: similar to No Action  |
| Dwarf shrew  | X                                 |                                   |   |                  | #3  |
| Long-tailed vole   |                                   |                                   |   | X                | #2, Meadow habitats   |
| Western jumping mouse  |                                   |                                   |   | X                | #2, Meadow habitats   |
| Red-backed vole  | X                                 |                                   |   |                  | #3, 4, 5  |
| Bobcat   | X                                 |                                   |   |                  | #1, 4, 6  |
| <b>Birds:</b>  |                                   |                                   |   |                  |   |
| Hairy woodpecker   | X                                 |                                   |   |                  | #3, 11  |
| Mallard  |                                   |                                   |   | X                | No effects to lakes   |
| Merriam's turkey   |                                   |                                   |   | X                | Uncommon in lynx habitats; requirements met in other habitats.  |
| Mountain bluebird  | X                                 |                                   |   |                  | #2, 3: assumes additional snags would occur near forest edges.  |
| Northern goshawk   | X                                 |                                   |   |                  | #1, 3, 4, 6 and 7: Prey species abundance important; PA will improve and protect prey habitats; #6,7 maintains nesting habitat. |
| Peregrine falcon   |                                   |                                   |   | X                | No effects to cliff habitats or peregrine prey  |
| Bald eagle   |                                   |                                   |   | X                | Uncommon in lynx habitat in SRMGA, except fall migration. No effects to lakes.  |
| Flammulated owl  | X                                 |                                   |   |                  | #3, 6, 7  |
| Three-toed woodpecker  | X                                 |                                   |   |                  | #3, 6, 11   |
| Warbling vireo   |                                   |                                   | X   |                  | #7 Long term positive, short term could be negative (harvest of aspen to regenerate).   |
| Golden-crowned kinglet   | X                                 |                                   |   |                  | #6  |
| Wilson's warbler   | X                                 |                                   |   |                  | #5  |
| Red crossbill  |                                   |                                   |   | X                | Highly erratic, cone crop dependent.  |
| Osprey   |                                   |                                   |   | X                | No effect to lakes  |
| Greater sandhill crane   |                                   |                                   |   | X                | Uncommon in lynx habitat, usually in open grasslands, wet   |

| MIS within amendment Forests that are within lynx habitat | Potential Positive Effects | Potential Negative Effects | Both Positive and Negative Effects | No Effect | Assumptions or rationale for all alternatives, unless noted.  |
|---|----------------------------|----------------------------|------------------------------------|-----------|---|
|   |                            |                            |                                    |           | meadows.  |
| Blue grouse   | X                          |                            |                                    |           | #7,: promoting aspen regeneration within conifer stands would improve habitat. (not aspen dependent though) |
| Yellow-bellied sapsucker                                  |                            |                            | X                                  |           | #7  |
| Common flicker  | X                          |                            |                                    |           | #3, 11  |
| Ruby-crowned kinglet                                      | X                          |                            |                                    |           | #3, 6,: prefers canopy gaps in mature conifer stands for foraging.  |
| Yellow warbler  |                            |                            |                                    | X         | Not much overlap of habitat, usually lower elevation.   |
| White-crowned sparrow                                     | X                          |                            |                                    |           | #2,5  |
| Pine grosbeak   | X                          |                            |                                    |           | #3,6: prefers canopy gaps in mature conifer stands for foraging.  |
| Green-tailed towhee                                       | X                          |                            |                                    |           | #4, 5   |
| Great-horned owl  | X                          |                            |                                    |           | #1, improves prey abundance   |
| <b>Fish:</b>  |                            |                            |                                    |           |   |
| Brook trout   |                            |                            | X                                  |           | #8  |
| Brown trout   |                            |                            | X                                  |           | #8  |
| Colorado River cutthroat trout                            |                            |                            | X                                  |           | #8  |
| Rainbow trout   |                            |                            | X                                  |           | #8  |
| Greenback cutthroat trout                                 |                            |                            | X                                  |           | #8  |
| <b>Herpetofauna:</b>                                      |                            |                            |                                    |           |   |
| Boreal toad   | X                          |                            |                                    |           | #3, needs coarse woody debris, #5, 8  |
| Northern leopard frog                                     | X                          |                            |                                    |           | #5 (indirectly), 8  |

Direction to be consistent with historical vegetation processes (including fire) to the extent practicable is present in most Forest Plans, especially the newer Forest Plans. This direction is consistent with the concepts of ecosystem management, forest health, and the more recent National Fire Plan. The concept is that properly functioning ecosystems inherently will maintain themselves and the plant and animal communities and species that have evolved with them.

Maintenance of suitable acres and juxtaposition of lynx habitat should not have an appreciable effect on amounts of forest management activities. However, maintaining quality lynx foraging

habitat in proximity to denning habitat may alter the distribution of forest management activities. Maintaining denning habitat, which is usually in late successional spruce-fir forest and sometimes lodgepole pine, and is characterized by high amounts of coarse woody debris, will benefit a variety of species. These stands support snowshoe hares and red squirrels, both important prey species of northern goshawk and great-horned owl (MIS). These forests also provide habitat for other small mammal species including the red-backed vole. The red-backed vole is a primary prey species for other forest predators including the marten and boreal owl. A variety of bird species, including primary and secondary cavity nesters, will benefit from maintaining these late-successional stands for denning habitat, as well as the less than 5 acre disturbance patches being restricted from salvage harvest. Even though some direction exists in most existing Forest Plans for late-successional forest, snag and down dead components, incorporation of these lynx conservation measures will focus distribution of this habitat within LAUs and across the broader landscape.

The creation and maintenance of quality lynx foraging habitat in proximity to denning habitat through time is consistent with current forest direction for species that benefit from early successional stages. The vegetation management standards that regulate the rate and extent of habitat altering activities should be consistent with most Forest Plans existing direction for maintaining big game hiding cover and habitat capability/effectiveness. Most big game habitat capability/effectiveness models currently in use will show increases in habitat quality either from an increase in foraging areas or a decrease in open roads, or some combination thereof. Hiding cover often is not lacking in the SRMGA. Hence, vegetation management activities will initially create foraging areas for big game, will result in an increase in birds and small mammals that prefer earlier successional stages (e.g., chipmunk, deer mouse, bluebirds), and ultimately will become lynx foraging habitat as young regenerating stands develop and are re-colonized by snowshoe hares. The restriction on precommercial thinning while these young stands are providing snowshoe hare habitat will benefit not only the hares, but the predator species that prey upon hares, such as goshawk, great horned owl, lynx and marten.

Regeneration activities that maintain closed-canopied, single layer lodgepole pine stands may ultimately benefit northern goshawk nesting stands in the long term. (Squires and Ruggiero 1996). Mature spruce-fir and aspen mixed stands are also important to goshawks for nesting and foraging habitat within portions of the SRMGA. These would be provided in a well-distributed manner under the provisions of the proposed action (Alternative B).

Species that need refuge areas (away from human activities), such as wolverine, may benefit by the limitations on the expansion of snow compacting activities for winter recreation. Some non-recreation winter uses may be allowed to expand into previously unused areas during the winter, but these uses would be restricted to designated routes.

Maintaining habitat and landscape connectivity and linkage areas will benefit lynx and any other wide-ranging species, especially other forest carnivores including pine marten, fisher, and wolverine, as well as big game. On a smaller scale, habitat quality and connectivity measures associated with a variety of forest management activities (e.g., developed and dispersed recreation areas, special uses, oil and gas, mining, utility corridors, forest roads and trails, livestock grazing) will benefit a variety of bird and small mammal species. Maintaining the permeability of these

areas to dispersal movements of animals has implications for maintaining population viability for many species.

### **Alternative C**

The effects to MIS from Alternative C are the same as Alternative B, with the following differences. Only those standards which are different from Alternative B (Proposed Action) will be discussed.

Alternative C allows for the maximum amount of “currently unsuitable lynx habitat” to be addressed at a larger scale than the LAU, therefore habitat within one LAU or more may become more than 30 % of the forested stands in a grass/forb seral stage. Therefore, Alternative C may negatively affect individuals of species associated with mature forested stands, but would benefit species associated with early successional stages of vegetation such as grassland or seedling/sapling successional stages.

Alternative C may not maintain down/dead woody forest floor structure as well as Alternative B, as down/dead structure would likely be reduced in many developed or roaded areas. Species associated with forest floor down/dead logs and woody debris would have a slightly reduced habitat capability, as compared to alternative B, near roads and structures under these alternatives. However, population viability would still be maintained overall, because of the minimum of 10 percent of each LAU in denning habitat, which would include down and dead forest floor structure. These alternatives would maintain down/dead woody forest floor structure better than the No Action alternative.

Alternative C exceptions to the restrictions on precommercial thinning would have minor effects on the overall seedling/sapling stage (densely regenerating) forested habitat, based on the assumption that most private land structures are at lower elevations than lynx habitat, and structures within lynx habitat would likely be a minor amount of habitat. However, there will be some reduction of snowshoe hare habitat (which is an important prey species for many of the MIS species) near structures, which in most cases, is not the high quality (densely regenerating) snowshoe hare habitat. This is based on the assumption that, in general, regeneration harvests have not been planned near summer homes and private land dwellings. This minor reduction in snowshoe hare habitat will have some impacts to all MIS species that use snowshoe hare as a prey source, as compared to Alternative B. However, this alternative protects snowshoe hare habitat, and therefore the associated MIS species, better than the No Action alternative.

Alternative C would allow the no net increase in designated snow compacting activities to be addressed at larger scales than that of the LAU scale. This may result in some areas becoming unusable or ineffective habitat by some species such as wolverine.

### **Alternative D**

The effects to MIS from Alternative D are the same as Alternative B, with the following differences. Only those standards that are different than Alternative B (Proposed Action) will be discussed.

The several exceptions to the delaying of precommercial thinning standard (**VEG S5**) would lead to the possibility of negative effects to snowshoe hare and species that use the hare as a prey resource. Aspen stands mixed with conifer are generally well used by snowshoe hares, but the year round use is in most cases dependent on the conifer component. Pure aspen stands in general, do not support snowshoe hare in the winter, due to lack of cover. Snowshoe hare mortality is primarily predation; therefore cover is extremely important to their choice of habitats.

The exception for precommercial thinning in lodgepole pine to develop larger diameter trees for old growth characteristics in the future could lead to negative impacts to snowshoe hare and the species that depend upon snowshoe hare as a prey resource. Precommercial thinning on a densely regenerating site will not necessarily produce the “old growth characteristics” that might be desired, without other site conditions being conducive. Pre-commercial thinning in densely regenerating lodgepole pine stands has been documented to have negative effects on snowshoe hare densities, as these stands provide high quality snowshoe hare habitat for a relatively short amount of time (approximately 20 years out of a 200 year life span), but could be highly critical in maintaining high numbers of hares for dispersal, such as in a “source” populations. As such, they could also provide key areas for lynx to hunt.

Because densely regenerating sapling stages of aspen and lodgepole pine have been determined to be well below historic levels by historic range of variability documents within the SRMGA, additional losses of horizontal cover within these high quality snowshoe hare foraging habitat may have an adverse effect on MIS species that prey upon snowshoe hare (marten, lynx, bobcat, northern goshawk and great-horned owl).

This alternative would, however, have less impact to snowshoe hare habitat (and it’s associated predator species) than the current situation (No Action alternative), because it would reduce the acreage of stands that are precommercially thinned.

Alternative D may not maintain down/dead woody forest floor structure as well as Alternative B, as down/dead structure would likely be reduced in many developed or roaded areas. Species associated with forest floor down/dead logs and woody debris would have a slightly reduced habitat capability, as compared to alternative B, near roads and structures under these alternatives. However, population viability would still be maintained overall, because of the minimum of 10 percent of each LAU in denning habitat, which would include down and dead forest floor structure. These alternatives would maintain down/dead woody forest floor structure better than the No Action alternative

Alternative D would allow the no net increase in designated snow compacting activities to be addressed at larger scales than that of the LAU scale. This may result in some areas becoming unusable or ineffective habitat by some species such as wolverine.

### **Cumulative Effects To MIS**

This analysis focuses on the effects to lynx of past, present and reasonably foreseeable programmatic actions for the life of the Forest Plans, approximately 15 years. Programmatic actions set the sideboards for future development and/or availability.

## **Southern Rocky Mountain Geographic Area**

Cumulative effects were evaluated for the amendment area, and the Southern Rocky Mountain Geographic Area. These boundaries were used to evaluate the cumulative effects of this amendment in addition to other past, present and reasonably foreseeable actions within the amendment area and how this amendment cumulatively would affect lynx and other MIS within the entire Southern Rocky Mountain Geographic area.

### **Alternative A - No Action**

Under the no-action alternative, management direction would not be incorporated into Forest Plans; however, administrative units would still provide for habitat needs for MIS due to existing direction for these species in the Forest Plan that has designated the MIS for a specific forest. These units have addressed the viability of these species in the analysis done for the existing Forest Plans or at project level. Cumulatively, the other past, present and reasonably foreseeable programmatic actions described above would generally have beneficial effects on many terrestrial and aquatic species. These actions include direction that improves security and habitat needs for a variety of species, including lynx.

### **Alternative B – Proposed Action**

Alternative B would incorporate management direction into land management plans. Cumulatively, this management direction, in addition to other past present and reasonably foreseeable programmatic direction described above, would have beneficial or no effects on most MIS species. Some species would have both positive and negative effects. See Table 3-WL-6. The MIS that have the potential of both positive and negative effects are: warbling vireo, yellow-bellied sapsucker and all the trout species. Warbling vireo and yellow-bellied sapsuckers have the potential of negative effects from the encouragement of aspen regeneration, which would temporarily reduce their habitat, but would provide for the aspen habitat long term. The trout species have the potential for positive effects from the road reclamation guidelines and the requirement for designated routes for most non-recreation special use permits or operating plans. However, there is also a potential for negative impacts to trout species if the guidelines to avoid building roads on ridgetops and saddles leads to building new roads on sideslopes of a trout stream.

### **Alternative C**

The cumulative effects described under Alternative B are similar under this alternative with some exceptions. A slight loss of snowshoe hare habitat may occur because of exceptions to precommercial thinning as compared to Alternative B. It is also possible that mature forest dependent species may be more likely to be negatively affected using multiple LAUs to apply standards for limits on vegetative disturbance (i.e. 30 percent) and snow compacting activities because standards would not be applied at an individual LAU scale. There are no exceptions to the precommercial thinning standard in the White River National Forest Plan, and the National Park Service does not do vegetation management such as precommercial thinning.

## **Alternative D**

The cumulative effects described under Alternative B are similar under this alternative with some exceptions. Over time, there may be a greater loss of denning structure habitat because of changes in standards applicable to vegetation management activities as compared to Alternative B. It is possible that snowshoe hare and the species that use it as a prey resource may be more likely to be negatively affected as a result due to the additional exceptions. However, there are no exceptions in the new White River National Forest Plan, and the National Park Service does not do vegetation management such as precommercial thinning.

## **Threatened, Endangered and Proposed Species**

Some of the wildlife species occurring in the amendment area Forests are either listed as threatened or endangered, proposed for federal listing, or are otherwise considered sensitive species by the Forest Service. The effects of the proposal to incorporate lynx conservation measures into SRMGA Forest Plans on other threatened, endangered, proposed, and Forest Service sensitive species will be specifically addressed.

The species addressed in the wildlife portion of the BA are as follows: Canada lynx, bald eagle, Mexican spotted owl, southwest willow flycatcher, whooping crane, greenback cutthroat trout, and Uncompahgre fritillary. Federally listed plants will be addressed in the BA, but effects are summarized in the rare plant section of the report.

As lynx has already been discussed in previous sections, it will not be discussed in detail in this section. The following is a list and a summary of effects for all the threatened, endangered and proposed wildlife species addressed in the BA for this amendment, which applies only to lynx habitat and lynx linkage areas. Plant species will be summarized in the plant section of the chapter.

**TABLE 3-WL-7 Endangered and Threatened Species****KEY**

GMUG - Grand Mesa, Uncompahgre, and Gunnison National Forests

MEDB - Medicine Bow National Forest

RIOG - Rio Grande National Forest

ARRO - Arapaho/Roosevelt National Forests

ROUT - Routt National Forest

PKSN - Pike/San Isabel National Forests

SANJ - San Juan National Forest

X - Species currently documented to occur on NFS lands, either National Forest or National Grassland.

1 - Species is likely to be extirpated from NFS lands, historical occurrences documented on or in vicinity of NFS.

2 - Species may not occur on NFS lands, however it may be impacted by Forest Service management actions.

3 - Species currently found within vicinity of NFS lands, otherwise not known to be present on NFS.

4 - Species or habitat suspected to occur on NFS lands, but unconfirmed.

**STATUS: ENDANGERED**

|   | ADMINISTRATIVE UNIT |      |      |      |      |      |      |
|---|---------------------|------|------|------|------|------|------|
|   | GMUG                | MEDB | RIOG | ARRO | ROUT | PKSN | SANJ |
| <b>MAMMALS</b>  |                     |      |      |      |      |      |      |
| <b>BIRDS</b>  |                     |      |      |      |      |      |      |
| Whooping Crane<br><i>Grus americana</i>                               |                     | 2    | 3    | X    |      | 2    | 3    |
| Southwestern Willow<br>Flycatcher<br><i>Empidonax trailii extimus</i> |                     |      | X    |      |      |      | 3    |
| <b>INVERTEBRATES</b>  |                     |      |      |      |      |      |      |
| Uncompahgre fritillary<br>butterfly<br><i>Boloria acrocynema</i>      | X                   |      |      |      |      | 3    | 3    |
| <b>PLANTS</b>   |                     |      |      |      |      |      |      |
| Osterhout milk-vetch<br><i>Astragalus osterhoutii</i>                 |                     |      |      |      |      | 4    | 3    |

**STATUS: THREATENED**

|   | ADMINISTRATIVE UNIT |      |      |      |      |      |      |
|---|---------------------|------|------|------|------|------|------|
|   | GMUG                | MEDB | RIOG | ARRO | ROUT | PKSN | SANJ |
| <b>MAMMALS</b>  |                     |      |      |      |      |      |      |
| <b>BIRDS</b>  |                     |      |      |      |      |      |      |
| Mexican spotted owl<br><i>Strix occidentalis lucida</i>         | 3                   |      | 4    | 4    |      | X    | 3    |
| bald eagle<br><i>Haliaeetus leucocephalus</i>                   | X                   | X    | X    | X    | X    | X    | X    |
| <b>FISH</b>   |                     |      |      |      |      |      |      |
| greenback cutthroat trout<br><i>Oncorhynchus clarki stomias</i> |                     |      |      | X    |      | X    |      |

**STATUS: THREATENED**

|  | ADMINISTRATIVE UNIT |      |      |      |      |      |      |
|--|---------------------|------|------|------|------|------|------|
|  | GMUG                | MEDB | RIOG | ARRO | ROUT | PKSN | SANJ |
| <b>PLANTS</b>  |                     |      |      |      |      |      |      |
| Penland alpine fen mustard<br><i>Eutrema penlandii</i> |                     |      |      |      |      | X    |      |

**Summary of Biological Assessment (Species other than lynx)**

**No Action:** With the exception of lynx, there should be no change in effects on listed species from those described in existing Forest Plans. Management Area objectives, standards and guidelines would remain unchanged in these plans. Species viability is required by every Forest Plan, and Section 7 consultation with the U.S. Fish and Wildlife Service must occur if any action “may affect” a listed or proposed species. The No Action alternative has been documented, given the new information regarding lynx, to have an “adverse” effect on lynx, as documented in the USFWS Biological Opinion on the Forest Plans in October of 2000.

**Proposed Action and action alternatives:****SPECIES: BALD EAGLE** (*Haliaeetus leucocephalus*)**STATUS:** Federal - THREATENED

**DISTRIBUTION/HABITAT:** Breeding bald eagles are rare in Colorado and southern Wyoming. Although some nesting does occur, most eagles migrate in summer to northern breeding grounds but return to lower latitudes during the winter. Winter habitat consists of roost trees along larger rivers and other large open bodies of ice-free waters that allow access to fish.

**DETERMINATION: No effect.** The bald eagle occurs primarily in lower elevations, outside of lynx habitats. Some individuals migrate through lynx habitat during fall migration, when high elevation lakes are ice-free.

**SPECIES: MEXICAN SPOTTED OWL** (*Strix occidentalis lucida*)

**STATUS:** Federal - THREATENED

**DISTRIBUTION/HABITAT:** Historic records include most of the Front Range and Southwest Colorado. The owl may be found in steep-sided canyons with old growth mixed conifer forests in southwestern Colorado. It may also be found in the shady, cool canyons of the piñon-juniper zone. All nests in Colorado found to date occur on cliff ledges or caves along canyon walls. The Pike-San Isabel National Forest is the only SRMGA forest with known occurrences and Critical Habitat for the Mexican Spotted owl. The Critical Habitat is located outside of lynx habitat. The GMUG and the San Juan have known pairs in the vicinity of the National Forest, but none have been documented on the National Forest.

**DETERMINATION:** **No effect.** Mexican spotted owl nests in lower elevations than lynx habitat, and most foraging occurs in non-lynx habitats.

**SPECIES:** **Southwestern Willow Flycatcher** (*Empidonax trailii extimus*)

**STATUS:** **Federal –ENDANGERED**

The current range as discussed in the draft Recovery Plan includes southern Colorado in portions of the Rio Grande National Forest, south of the Rio Grande River. It also may occur on the San Juan National Forest in some watersheds. Generally it is thought that the species occurs up to approximately 8500 feet elevation. The habitat of the subspecies is willow, cottonwood, or tamarisk with slow moving water adjacent or nearby. This subspecies occurs primarily outside of lynx habitat, although there may be some overlap at the 8000-8500 foot elevations. In those areas, there would potentially be beneficial effects, as compared to the No Action alternative, due to the grazing standards and/or guidelines.

**DETERMINATION:** **May Effect, Not Likely to Adversely Affect.** This determination is based on a beneficial effect, due to the grazing standards that require (Alternative B and C) or suggested guidance(in Alternative D) that willow habitats are to be managed in mid to late seral stages.

**SPECIES:** **Whooping Crane** (*Grus Americana*)

**STATUS:** Federal - ENDANGERED

**DISTRIBUTION/HABITAT:** The Whooping Crane occurs as a migrant during the spring and fall in Colorado. They migrate annually, from the northern fresh-water breeding grounds to the southern winter grounds along the coastal prairies and salt marshes of the Texas Gulf. Whooping cranes are generally found in shallow wetlands, which have wide-range visibility and are free from human disturbance. They usually have stopover spots at lower elevations than lynx habitat, but sometimes stop at higher elevation wetlands for the night.

**DETERMINATION:** **No effect.** There is very incidental use of wetland habitat within lynx habitat while this species is migrating. It generally migrates at lower elevations.

**SPECIES:** **Greenback Cutthroat Trout** (*Oncorhynchus clarki stomias*)

**STATUS:** Federal - THREATENED

**DISTRIBUTION/HABITAT:** The Greenback cutthroat trout occurs in the well-oxygenated headwaters of mountain streams and lakes on the Pike-San Isabel and Arapaho-Roosevelt

National Forests. Due to competition and hybridization with non-native trout, Greenbacks are restricted to only a few small drainages. There are efforts throughout the Greenbacks' range to increase the number of populations.

**DETERMINATION: No Effect.** There are potentially beneficial effects, due to the guidelines that call for remote monitoring of energy facilities during the winter, instead of plowing; reclamation plans for road closures; and the restriction of public use of project specific roads, and then eventual reclamation of those temporary roads. One guideline that could lead to potential negative effects calls for locating permanent roads away from ridgelines, which could possibly lead to placing roads on sideslopes and could increase sedimentation into creeks. As this is a guideline, if there was a conflict between aquatic species and this guideline for lynx, other laws and regulations will need to be adhered to as well, such as the Clean Water Act, Regional Watershed Conservation Practices, State Best Management Practices, etc. Because of these laws and policies, the greenback cutthroat habitat is protected in all cases, even No Action, therefore, there is No effect to this species.

**SPECIES: Uncompahgre Fritillary Butterfly (*Boloria acrocne*)**  
**STATUS:** Federal - ENDANGERED

**DISTRIBUTION/HABITAT:** At present, this species is known to occur only above 12,500 feet on The Uncompahgre National Forest. Females lay their eggs on snow willow (*Salix nivalis*), and the adults can be found in late July. The USFWS species occurrence list shows this species as potentially occurring in several counties within central Colorado.

**DETERMINATION: No effect.** This species may occur within LAUs, but its habitat is in the alpine ecosystem, which is not considered lynx habitat.

**SPECIES: Penland alpine fen mustard**  
**Status:** Federal - threatened

**Distribution/Habitat:** Penland alpine fen mustard (*Eutrema penlandii*) occurs in wet areas in alpine tundra of the Mosquito Range in central Colorado.

**Determination: No Effect.** No adverse effects are expected on Penland alpine fen mustard from proposed action.

**Species: Osterhout milkvetch**  
**Status:** Federal -endangered

**Distribution/Habitat:** Occurs adjacent to NFS lands, and may occur on NFS lands. Osterhout milkvetch (*Astragalus osterhoutii*) occurs on moderate slopes in sagebrush habitats at 7,400-7,900 feet in central Grand County.

**Determination: No Effect.** No adverse effects are expected on Osterhout milkvetch.

### **Cumulative Effects on TEP species (Other than lynx)**

Cumulatively, with White River National Forest, NPS and BLM LAU data added in, the SRMGA as a whole contains 7.7 million acres of lynx habitat.

**Alternative A, no action**

There would be no change from the existing situation under the No Action Alternative.

**Alternatives B, C and D**

Alternatives B, C and D would incorporate management direction into land management plans. Cumulatively, this management direction, in addition to, other past present and reasonably foreseeable programmatic direction described above would have beneficial or no effects on listed species. Any changes in alternatives would not have any different effects on the listed wildlife and fish species.

# Fisheries

## Affected Environment and Environmental Consequences

Amending Forest Plans in the Southern Rocky Mountains with this Proposed Action or alternatives is not expected to have an adverse effect on fisheries resources as much of the lynx habitat is at relatively high elevation where streams are generally small and of low productivity and lake fisheries are often cold-water, low productivity and generally stocked to sustain recreational angling.

Greenback cutthroat trout are found in a few Front Range, headwater streams on the Pike/San Isabel and Arapahoe/Roosevelt National Forests. Due to a variety of reasons, including introduction of exotic species and habitat modification, its range has been greatly reduced. It has been designated “threatened” under the Endangered Species Act since 1979. An interagency recovery plan was developed in 1996.

Colorado cutthroat trout are found in headwater streams in the Colorado River drainage. As with other native salmonids, introduction of exotics and habitat modification have greatly reduced its range. An interagency conservation agreement and strategy was completed in 2001.

Rio Grande cutthroat trout are found in headwater streams of the Rio Grande River drainage. As with other native trout sub-species, their range has been greatly reduced. An interagency conservation agreement and strategy is being developed.

Populations of desirable non-native trout species inhabit many headwater streams across the Region. These include brook, brown, and rainbow trout. These populations are often well established and provide significant recreation angling. Some populations are maintained by stocking.

Generally, the proposed objectives, standards, and guidelines would have a net neutral or beneficial effect on fisheries resources.

Since Clean Water Act, Regional Watershed Conservation Practices, state Best Management Practices and Forest Plan standards and guidelines will be adhered to in the implementation of this action, the Proposed Action is not expected to have any adverse effects on fisheries resources.

# Plants

## Affected environment

There are 47 Threatened, Endangered, and Sensitive (TES) plant species that may occur in the area affected by this amendment. They include two species designated under the Endangered Species Act (one Endangered, and one Threatened), and 45 species (one of which is also a candidate for federal listing) designated by the Regional Forester as sensitive within the administrative boundaries of Rocky Mountain Region NFS lands. The majority of these plants are forbs, including several species of moonworts (*Botrychium* spp.). Others included a few true grasses and grass-like plants, and four willow species (*Salix* spp.). Populations of these TES plants are infrequent and generally have a localized distribution.

Slender moonwort (*Botrychium lineare*) is a candidate species for Federal listing under the Endangered Species Act. It is known to occur on the flanks of Pikes Peak in grassy areas in streamside pine forest, and may have additional habitat elsewhere in the amendment area.

One federally listed Threatened plant species was identified as having known populations and habitat in the amendment area. Penland alpine fen mustard (*Eutrema penlandii*) occurs in wet areas in alpine tundra of the Mosquito Range in central Colorado. In addition, one federally listed endangered plant was identified as occurring adjacent to NFS lands, and may occur on NFS lands. Osterhout milkvetch (*Astragalus osterhoutii*) occurs on moderate slopes in sagebrush habitats at 7,400-7,900 feet in central Grand County.

## Environmental Effects

Amending Forest plans in the SRMGA area to protect Canada lynx from adverse impacts due to timber management, wildland fire management, recreation, livestock grazing, and the other activities as outlined in Chapter 1 is not expected to have any adverse effects on Threatened, Endangered, or Sensitive (TES) plants. To the contrary, meeting the stated conservation objectives through the proposed standards and guidelines may have some beneficial effects, especially over the long run.

Standards and guidelines that may have beneficial effects include:

- Managing vegetation to be consistent with historical succession and disturbance regimes.(VEG 01)
- Using fire to restore ecological processes.(VEG 03)
- Using integrated pest management practices to manage non-native invasive plants.
- Restricting the widening of roads. (HU G6)
- Restricting precommercial thinning and timber salvage.(VEG S4, VEG G8,VEG S5)

Depending on project-specific details, and whether or not TES plants or their habitats are involved, many of the proposed standards and guidelines could lead to on-the-ground project designs that are beneficial to TES plants.

Other standards and guidelines are expected to have no effect on TES plants (e.g., minimal roadside brushing on low-speed and low-volume roads).

Restoring historic succession and disturbance regimes, and using fire to restore ecological processes, should help create a broad array of habitats and niches in various conditions across the landscape. This should be beneficial for TES plant species over the long run.

Livestock grazing restrictions in riparian zones and burned areas should have positive effects for most TES plant species in those areas.

#### Alternative A - No Action

Current direction for TES plants would remain in place under the no action alternative. Current direction requires site-specific analysis prior to implementing site-specific projects; therefore, there would be no direct or indirect effects on these plant species.

#### Alternative B - Proposed Action

The proposed action represents programmatic direction, and therefore, would have no direct effect on TES plant species. Direct effects could occur later, at the project level, when each project is implemented, and could be beneficial, neutral, or negative. However, these projects will be evaluated for potential effects on TES plants prior to implementation, allowing site-specific decisions to be made. Most of the effects identified in this present analysis would be indirect effects that would occur later as a result of this programmatic decision.

The proposed action identifies **VEG O1** through **O4** for managing vegetation. Other objectives that could influence plant species include **GRAZ O1** and **HU O3** and **O5**. Standards and guidelines are designed to meet the objectives -- **VEG S1, S2, and S5, and GRAZ S3** and **S4** have the potential to affect TES plants.

Standard **VEG S5** focuses largely on early seral timber habitat. This standard would not have detrimental effects to any specific habitat types or ecological communities upon which any TES plant species depend, and may, in the long term, prove beneficial to many through habitat diversification.

Restoring historic succession and disturbance regimes, and using fire to restore ecological processes, are among the objectives of the proposed action. Vegetation treatments developed from these objectives should contribute to the creation of a broad array of habitats and niches in various conditions across the amendment area, which in turn, should benefit TES plants over the long run.

The restrictions on livestock grazing would not have detrimental effects on any specific habitats or ecological communities upon which these TES plant species depend, and may prove beneficial in the long term. Grazing restrictions, especially in riparian zones, would

have positive effects. Grazing management in shrub-steppe habitats, riparian areas, and willow carrs would help recreate conditions that occurred under historic disturbance regimes.

Any activity that removes vegetation or soils or fragments habitat has the potential to impact TES plant populations or their habitat. Therefore, managing human activities to limit disturbance from special uses, mineral exploration and development, and placement of utility corridors, should reduce the potential for negative impacts to TES plant populations and their habitats.

No adverse effects are expected on Penland alpine fen mustard from proposed project activities. Similarly, no effects are expected on Osterhout milkvetch. Habitat for the slender moonwort should not be adversely affected by this amendment, and it's possible that beneficial effects may accrue over time as historic succession and disturbance regimes are restored.

### Alternative C

As with Alternative B, Alternative C represents programmatic direction with no direct effect on TES plant species. Alternative C would have similar effects to Alternative B. Indirect effects likely would be mostly beneficial to TES plant species and their habitats.

### Alternative D

As with alternatives B and C, Alternative D represents a programmatic direction with no direct effect on TES plant species. Indirect effects likely would be mostly beneficial to TES plant species and their habitats.

### **Cumulative effects**

Cumulatively, the lynx amendment, in combination with other past programmatic decisions and reasonably foreseeable programmatic proposals, would have a beneficial effect on TES plant species, by restoring historic succession and disturbance regimes, using fire to restore ecological processes, and incorporating landscape considerations at the project level for all alternatives except the No Action Alternative.

# Forest Resources and Timber Management

## Affected Environment

### General Characteristics of Forest Resources in the Southern Rockies Geographic Area

The majority of lynx habitat in the Southern Rockies includes somewhat xeric to mesic coniferous forests that characteristically have cold, snowy winters and vegetation composition, structure and extent which provide a prey base of snowshoe hare and suitable denning habitat (Quinn and Parker 1987; Koehler and Brittell 1990; Koehler 1990; Koehler and Aubrey 1994; Mowat et al. 2000; McKelvey et al. 2000b; Ruggiero et al. 2000b). Forest tree cover types that typify lynx habitat in the Southern Rockies include Engelmann spruce-subalpine fir, lodgepole pine, and to a lesser extent, quaking aspen and the Douglas-fir-dominated mixed conifer. Table 3-T1 displays acres by cover type within LAUs by National Forest in the Southern Rockies covered in this analysis.

**Table 3-T1 Acres, by Cover Type within LAUs by National Forest in the Southern Rockies**

| National Forest                   | Spruce-Fir Acres | Lodgepole Pine Acres | Aspen Acres | Douglas-fir Acres |
|-----------------------------------|------------------|----------------------|-------------|-------------------|
| Grand Mesa, Uncompahgre, Gunnison | 666,975          | 272,362              | 496,560     | 79,605            |
| Medicine Bow                      | 155,908          | 115,615              | 13,813      | 332               |
| Routt                             | 426,856          | 329,038              | 255,446     | 6,483             |
| Rio Grande                        | 571,748          | 30,654               | 264,623     | 200,974           |
| Arapaho-Roosevelt                 | 183,513          | 305,503              | 27,169      | 35,560            |
| Pike/San Isabel                   | 357,621          | 188,851              | 143,113     | 172,772           |
| San Juan                          | 475,057          | 1,233                | 279,322     | 201,720           |
| TOTAL                             | 2,837,678        | 1,243,256            | 1,480,046   | 697,446           |

Timber management activities, specifically tree harvest and timber stand improvement activities including thinning, have contributed to the character of the landscape across the Southern Rocky Mountains. Many of the stands less than 80 years of age have originated from harvest activities. The extent of the landscape modified by timber management activities, however, is considerably less than for fire, insects and windthrow. Wildfire historically played a very significant role in determining forest structure, composition and landscape patterns in the Southern Rocky Mountains (Arno 1976, 1980; Perry and Lotan 1979; Lotan, Brown, and Neuenschwander 1984; Arno and Fischer 1992; Antos and Habeck 1981). Other disturbance agents like insects (particularly spruce beetle) and windthrow events had large roles in determining landscape character, affecting species dominance, horizontal and vertical structure, and age homogeneity.

The vast majority of conifer stands in the Southern Rocky Mountains are over 80 years old (Long, 1995; Alexander, 1987). Forest Survey data from 1983 for Colorado outside designated Wilderness showed eight percent of the spruce-fir cover types, nine percent of the lodgepole pine and seven percent of the Douglas-fir were less than 80 years old (Green and Van Hooser, 1983). The generally advanced age of the stands implies that the Southern Rocky Mountains are lacking in the young age classes snowshoe hares seem to prefer but may have large extents of suitable denning habitat for the lynx. Snowshoe hare seems to prefer stands that have large components of relatively dense, small-diameter trees with crowns extending above the snow and available for the hare to browse during winter months (LCAS, 2000). In much of the Southern Rockies, that translates to trees over 5 feet tall and with crown basal heights of 10 feet or less. Once the crown base height exceeds 10 feet, the hare cannot reach the foliage during most winters. These conditions are met by regenerating patches or stands of 15 to 30 year old Engelmann spruce, true fir, lodgepole pine, and occasionally Douglas-fir and white fir. Timber harvest and wildfire are the primary disturbance agents that provide young, dense stands of conifer regeneration, although regeneration periods are often lengthy (50 years) for natural regeneration of spruce-fir stands replaced by wildfire.

Table 3-T2 displays acres suitable for commercial timber production within LAUs by National Forest in the Southern Rockies covered in this analysis.

**Table 3-T2 Acres Suitable for Commercial Timber Production in LAUs by National Forest**

| <b>National Forest</b>            | <b>Suitable Acres</b> |
|-----------------------------------|-----------------------|
| Grand Mesa, Uncompahgre, Gunnison | 547,991               |
| Medicine Bow                      | 162,929               |
| Routt                             | 372,296               |
| Rio Grande                        | 292,930               |
| Arapaho-Roosevelt                 | 356,530               |
| Pike/San Isabel                   | 165,003               |
| San Juan                          | 256,178               |
| <b>TOTAL</b>                      | <b>2,153,857</b>      |

The timber management program for the National Forests in the Southern Rockies utilizes a variety of silvicultural tools to accomplish the objectives of providing a sustained supply of wood fiber to the local and national economies, maintaining forest health and vigor and meeting other resource objectives.

Spruce-fir forests are harvested by individual tree and group selection methods under the uneven-aged regulation system, and two or three-step shelterwood methods under the even-aged regulation system. Precommercial thinning is used primarily to reduce stocking of subalpine or corkbark fir or lodgepole pine regeneration in the gaps provided by selection harvests or in the understory following shelterwood harvest. Relatively little precommercial thinning is done in spruce-fir in the Southern Rockies. Commercial thinning or stocking

control is used to remove trees recently dead or at risk of dying from competition, insects and disease or to maintain overall stand vigor.

Lodgepole pine forests are usually managed under the even-aged regulation system using clearcutting. Occasionally seed tree or single-step shelterwood methods are used. Lodgepole regenerates well with the use of these methods due to its ecological niche as an early seral species with low shade tolerance. Seedling stocking rates often are over 1000 seedlings per acre and can range over 10,000 seedlings per acre (Lotan and Perry, 1983). Precommercial thinning is a very cost-effective method to gain a commercial product from heavily stocked lodgepole pine stands. It also provides the ability to increase proportions of other species in the post-thinning stand and maintains the trees' ability to respond to future thinning with increased growth (Johnstone, 1985). The majority of precommercial thinning in the Southern Rockies is done in lodgepole pine. Commercial thinning is used to reduce mountain pine beetle risk in larger diameter stands as well as to provide micro sites for additional regeneration.

Douglas-fir and white fir are managed using both even-aged and uneven-aged regulation systems. Individual tree selection, group selection, single and two-step shelterwood and seed tree harvest methods are all used. Clearcutting is rare and only used when aspen and/or lodgepole pine are the major components of the pre-harvest stand. Precommercial thinning and/or stocking control are used to maintain overall stand vigor and concentrate growth on more desirable individual trees.

Aspen forests are managed using the even-aged regulation system with clearcutting and coppice regeneration methods. These methods provide the sprout stimulation and full sunlight needed for ample regeneration of the species. Sprout densities after harvest have been measured at 31,000 stems per acre (Crouch, 1983). This provides rapid reoccupation of the site. Precommercial thinning is rarely used in aspen due to its ability to thin itself very quickly and effectively (Jones, 1976). Commercial thinning is also rare due to aspen's susceptibility to logging damage. Commercial harvest of aspen is limited to the San Juan, White River and Grand Mesa, Uncompahgre and Gunnison National Forests.

Salvage of dead or dying trees occurs in all conifer cover types, depending on market conditions, public safety concerns and forest health risks. Standing dead spruce and lodgepole pine are often quite sought after for house logs. Aspen has a limited market as salvage, due to its relatively quick deterioration after death.

## **Environmental Consequences**

The Proposed Action (Alternative B) and the alternatives to the Proposed Action (Alternatives C and D) all add standards and guidelines to the seven Forest Plans that would conserve the Canada lynx while providing for other multiple use objectives to varying extents. Alternative A is the No Action alternative, which would not add additional standards to the Forest Plans.

Standards and Guidelines in Alternatives B, C and D that have the potential to affect timber management operations are **ALL S1, VEG S1, VEG S2, VEG S3, VEG S4, VEG S6 (Alternatives B and C); VEG G1, VEG G2, VEG G6 and VEG G8** for Alternative D.

In turn, the standards and guidelines presented in the alternatives may affect the following components of the timber management program:

1. Ability to conduct timber harvest across the suitable timber management base where suitable lynx habitat is located.
2. Ability to respond to small-scale disturbance events, notwithstanding potential extent of forest health effects.
3. Ability to precommercially thin stands to enhance growth potential, forest health and maintain snowshoe hare habitat.
4. May promote additional timber harvest to increase lynx forage habitat.

The indicators for these program elements are the degree of limitations the standards and guideline place on the program elements. The alternatives will be evaluated on the degree of limitations placed on:

1. Harvest Acres
2. Salvage harvest
3. Acres precommercially thinned

### **Direct and Indirect Effects**

#### Alternative A - No Action

This alternative would continue current forest resource management direction contained in the Forest Plans for the San Juan; Rio Grande; Pike/San Isabel; Grand Mesa, Uncompahgre, Gunnison; Arapaho-Roosevelt; Medicine Bow and Routt National Forests. The range of stand culture activities, including regeneration harvest, salvage harvest of insect or disease-killed, blowdown and fire-killed trees as well as precommercial thinning, would continue at Forest Plan or funded levels in the portions of the Forests designated as suitable for production of commercial forest products or otherwise available for these activities.

Table 3-T3, below, displays the acres of precommercial thinning needed, displayed in the FY 2001 SILVA silvicultural accomplishment report by Forest, which is the program “need” regardless of funding. Precommercial thinning “need” is determined by the acreage of successfully regenerated stands that are suitable for commercial timber production in the activities database (RMACT) with existing stocking beyond Forest Plan desired stocking levels. Table 3-T3 also displays the annualized level of precommercial thinning by Forest over the past five years. This amount of precommercial thinning is the existing program level for the purpose of this analysis. The annual precommercial thinning program for the Forests in this analysis is 4,630 acres. Stand vigor would be maintained in the precommercially thinned acreage, reducing future losses to insects and disease pathogens and maintaining future management options. Regeneration harvest in lodgepole pine would remain at current

Forest Plan levels. No additional harvest for production of habitat for snowshoe hare would occur as a management objective.

**Table 3-T3 Acres of Precommercial Thinning Need and the Annualized Level of Precommercial Thinning by Forest Expected with Implementation of Alternatives B, C or D.**

| ADMINISTRATIVE UNIT                   | Acres of Thinning Needs (FY 01 SILVA) | Alt A<br>Avg Annual Acres of Accomplished Thinning Last 5 Years | Alt B<br>Avg Annual Acres of Thinning | Alt C<br>Avg Annual Acres of Thinning | Alt D<br>Avg Annual Acres of Thinning |
|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|---------------------------------------|
| Grand Mesa, Uncompahgre, Gunnison NFs | 3332                                  | 507   | 250                                   | 250                                   | 275                                   |
| Medicine Bow NF                       | 6,978                                 | 1123  | 835                                   | 835                                   | 865                                   |
| Routt NF                              | 9,879                                 | 1080  | 720                                   | 720                                   | 755                                   |
| Rio Grande NF                         | 587                                   | 151   | 40                                    | 40                                    | 50                                    |
| Arapaho-Roosevelt NFs                 | 5395                                  | 464   | 170                                   | 170                                   | 200                                   |
| Pike/San Isabel NFs                   | 1221                                  | 620   | 350                                   | 350                                   | 375                                   |
| San Juan NF                           | 2891                                  | 685   | 685                                   | 685                                   | 685                                   |
| White River NF                        | 3,104                                 | 237   | 0                                     | 0                                     | 0                                     |
| TOTAL                                 | 33,787                                | 4,867   | 3050                                  | 3050                                  | 3205                                  |

The acres of precommercial thinning displayed in Table 3-T3 are based on dropping any thinning planned for lynx habitat by each of the affected Forests over the next 5 years for Alternatives B and C. Alternative D displays only those acres of precommercial thinning allowed by the proposed standards and guidelines applicable to that alternative. No change is shown for the San Juan National Forest, since the planned precommercial thinning for the Forest falls entirely outside lynx habitat. Virtually all the precommercial thinning in lynx habitat on the Grand Mesa, Uncompahgre and Gunnison NF's, the Medicine Bow and the Routt NF's are in regenerating lodgepole pine stands. The precommercial thinning on the other National Forests occurs in a variety of cover types.

#### Alternative B – Proposed Action

Alternatives B and C would effect the timber programs similarly, resulting in slightly more reductions in timber treatments than Alternative D. Effects of implementing each of the standards and guidelines follow.

Standard **ALL S1** would require that new or expanded permanent developments and vegetation management practices and activities maintain lynx habitat connectivity. Lynx habitat maintenance in linkage areas would have similar effects on vegetation management as in LAU's, i.e., no precommercial thinning in regenerating stands providing snowshoe hare

habitat. Additional regeneration harvest where young stands are less than 30 percent of the age class distribution in the linkage area could be allowed within other resource constraints. Individual vegetation management projects within linkage areas may have to be modified, but no reduction in timber management outputs is expected with implementation of this standard.

Standard **VEG S1** limits conversion of suitable lynx habitat to unsuitable conditions to no more than 30 percent of the lynx habitat within a LAU, unless a broad scale analysis substantiates a higher historical level. No LAUs in the Southern Rockies have more than 30 percent unsuitable habitat. The highest level of unsuitable habitat is 17 percent, and most LAUs range between 3 percent and 8 percent. Standard **VEG S1** will not, in itself, reduce timber management activities in the Southern Rockies.

Standard **VEG S2** may limit the amount of harvest activity that takes place in an individual LAU, but overall will not reduce timber management activities in the Southern Rockies over the next 10-year period.

Implementation of standard **VEG S3** is similar to **VEG S2** in that individual LAUs may have restrictions on the acres that could be harvested or salvaged using even-aged methods and practices that reduce coarse woody debris, but no overall reduction in timber management practices should occur.

Standard **VEG S4** has the potential to substantially increase the size of insect infestations resulting from blowdown and small infestations, resulting in significant loss of trees and increases in fuel loads.

Standard **VEG S5** would result in limited precommercial thinning within lynx habitat for an indefinite period. A reduction of approximately 1,580 acres of precommercial thinning would occur annually (Table 3-T3). Height and diameter growth in all conifer species would be adversely affected by lack of precommercial thinning in regenerating stands. For those management areas where commercial timber production is a goal, reduced production of sawlog-sized material (7 inches DBH or more) would occur. Lodgepole pine would be affected to the greatest degree. Diameter reduction would be greatest in those stands with the highest densities and the reduction would be cumulative over time, that is, the degree of reduction would increase relative to thinned stands as time progressed. Johnstone (1984) reported an 89 percent larger mean diameter and a 131 percent larger five-year periodic diameter increment 25 years after thinning a 22 year old stand at a density of 494 stems/hectare (200 stems/acre) compared to a density of 7,907 stems/hectare (3,200 stems/acre). He also found that 80 year old stands stocked at 4,000 stems/hectare (1,620 stems /acre) at age 20 on an average quality site had 47 percent of the stand volume in sawlog-sized trees. When stocking at age 20 increased to 10,000 stems/hectare (4,050 stems/acre), sawlog volume at age 80 was only five percent of the total stand volume, a reduction of 89 percent.

Precommercial thinning within lynx habitat has occurred in spruce-fir, Douglas-fir, white fir and occasionally aspen cover types as well as lodgepole pine on the National Forests in the Southern Rockies Geographic Area in the past. The reductions in sawtimber volume for

forest cover types other than lodgepole in the absence of precommercial thinning are not as dramatic, due to better self-thinning tendencies. The Grand Mesa, Uncompahgre and Gunnison National Forests, the Medicine Bow National Forest and the Routt National Forest precommercial thinning programs in lynx habitat have been concentrated in regenerating lodgepole pine stands, so volume reductions in the future from lack of precommercial thinning would have the most impact there. Using an average yield of 1,800 cubic feet of sawtimber per acre, based on recent timber sale volumes on the Medicine Bow and Routt National Forests, the reduction in annual sawtimber volume at the time of final harvest of the stands which could not be thinned and the percentage that volume accounts for of annualized Long Term Sustained Yield (LTSY) would be as follows:

| <b>Forest</b>                        | <b>Volume Reduction</b> | <b>% LTSY</b> |
|--------------------------------------|-------------------------|---------------|
| Grand Mesa, Uncompahgre,<br>Gunnison | 412,000 cubic feet      | 3.3 %         |
| Medicine Bow                         | 461,000 cubic feet      | 2.9 %         |
| Routt                                | 577,000 cubic feet      | 18.0 %        |

There would be reductions in sawtimber yield from unthinned lodgepole pine stands on the other Forests in the Southern Rockies Geographic area, but the reduction would be 1% or less of LTSY.

The effect of the sawtimber volume reduction on actual harvest volumes from these three National Forests approximately 60 years from now could be masked by additional regeneration harvest for snowshoe hare habitat.

Shaw (2002) states that delaying thinning to age 50 (when measured height to diameter ratios are 80-100) will result in significant fuel loading and post-harvest wind/snow damage. In his research, live crown ratios on co-dominant crown classes at age 50 drop from an average of 76 percent on thinned stands to 50 percent on unthinned. Elimination of thinning at a young age will likely deter stand progression to large stand structure, probably not moving beyond a 3C Vegetation Structural Stage.

Substantial information exists that indicates inability of lodgepole pine to respond to thinning once the live crown ratio is reduced to 30 percent or less (Johnstone, 1984). Therefore, delaying precommercial thinning until lodgepole pine has reached pole size (5 to 7 inches DBH) would have limited beneficial effects on diameter growth and merchantable volume attainment.

**VEG S6** would promote use of uneven aged regeneration harvest in spruce-fir stands to provide additional snowshoe hare habitat in conjunction with lynx denning habitat in areas where it is lacking. Any such harvest would have to comply with other Forest Plan standards and guides. Stocking control or precommercial thinning of the regeneration coming from such harvests would not occur in order to maintain maximum hare cover and forage opportunity

Guideline **VEG G1** encourages, but does not require, additional regeneration harvest within LAUs in stands that do not provide snowshoe hare habitat or lynx denning habitat. Such harvest would be for the purpose of establishing additional snowshoe hare habitat and future denning habitat. Implementation of this guideline has the potential for allowing better timber management regulation of LAUs, within the bounds of **VEG S1, S2 and S3**, thereby providing habitat over time. The potential for better regulation is reduced by the restriction on precommercial thinning in **VEG S5**. If the harvest was done to the maximum level allowed by **VEG G1**, a total of 76,230 acres could be regenerated annually (Table 3-T4). However, actual harvest levels are expected to be similar to those currently experienced, since harvest would be subject to the rest of Forest Plan standards, guidelines and resource constraints.

**Table 3-T4 Number of acres that could be regenerated annually if harvest was done to the maximum level allowed by VEG G1**

| <b>ADMINISTRATIVE UNIT</b>               | <b>Alternative A<br/>Average Annual Acres of<br/>Regeneration Harvest 5 years<br/>prior to listing</b> | <b>Alternatives B, C, D<br/>VEG G1 Potential Maximum<br/>Annual Acres of Regeneration<br/>Harvest</b> |
|--|--|---|
| Grand Mesa, Uncompahgre,<br>Gunnison NFs | 888  | 19,290  |
| Medicine Bow/Routt NFs                   | 1,096  | 14,180  |
| Rio Grande NF                            | 1,221  | 7,870   |
| Arapaho-Roosevelt NFs                    | 179  | 6,210   |
| Pike/San Isabel NFs                      | 96   | 12,030  |
| San Juan NF                              | 316  | 12,650  |
| <b>TOTAL</b>                             | <b>3,796</b>   | <b>76,230</b>   |

Guideline **VEG G2** has similar effects as **VEG G1**. Provision of vertical diversity may limit “slashing” of true fir in mixed species stands, reducing the effectiveness of management actions aimed at guiding species composition.

#### Alternative C

**ALL S1** and **VEG S3** as well as **VEG G1** and **G2** are the same for this alternative as for Alternative B, and the effects for those standards and guidelines would be the same. Standard **VEG S1** as written for Alternative C would allow combination of LAUs in a landscape for analysis purposes. This would not have any difference in effects for forest resource management in the Southern Rockies relative to Alternative B.

**VEG S4** as written in this alternative would allow salvage of areas less than five acres to provide defensible space around dwellings and outbuildings and would allow personal use firewood collection. No major difference would result in general salvage program levels in lynx habitat compared to Alternative B. Effects on forest stands would be similar to those projected for Alternative B.

**VEG S5** as written for this alternative would allow precommercial thinning in stands where stand composition and/or stand structure do not provide snowshoe hare cover and forage during winter conditions with average snow pack. This implies stands already have lower levels of stocking than 1,000 trees per acre. Relatively few stands with that level of stocking are thinned under the current program. It would also allow precommercial thinning for research and genetic tests. The level of research thinning outside of Research Forests in the Southern Rockies is minimal – 25 acres or less annually. Precommercial thinning for genetic tests is done on less than 10 acres annually. Long-term reductions in sawtimber production for the unthinned acreage would be similar to Alternative B.

**VEG S6** would be substantially the same in Alternative C as in Alternative B, except even aged harvests in spruce-fir stands could occur in landscape settings critical to the creation of defensible fuels profiles for communities, infrastructure or watershed protection; or to facilitate fire use practices; or to maintain or improve lynx habitat. The amount of area that would be affected by these practices in the spruce-fir cover type is expected to be very small, since most communities at risk are in non-lynx habitat. Even aged harvests in spruce-fir have declined dramatically over the past decade in the Southern Rockies Geographic Area in response to a variety of other management objectives.

**VEG G7** is the same as **VEG S2**, except that, as a guideline, it allows flexibility regarding change of more than 15 percent of lynx habitat to “unsuitable” within a 10-year period. Effects of implementation of this guideline are the same as for **VEG S2** in Alternative B.

#### Alternative D

**ALL S1**, **VEG S1**, and **VEG S3** as well as **VEG G1** and **G2** are similar for this alternative as for Alternative C, and the effects for those standards and guidelines would be the same. **VEG G6** is similar to **VEG S6** in Alternatives B and C, but would provide for flexibility in stocking control and species composition shifts in spruce-fir stands to allow for site-specific conditions. **VEG G8** is similar to **VEG S4**, but would provide flexibility regarding salvage of some areas smaller than 5 acres to allow for mitigating circumstances.

No major difference would result in general salvage program levels in lynx habitat compared to Alternative B. Effects on forest stands would be similar to those projected for Alternative B, although there would be no limitation on the amount of habitat changed to “unsuitable” within a 10-year period. This would have virtually no effect to the Forest Resource management program, since LAUs in the Southern Rockies are generally not limited by the 15 percent standard.

**VEG S5** as written for this alternative would allow precommercial thinning associated with research; to provide future lodgepole pine old growth characteristics; and to remove conifers within aspen clones under specific conditions. Precommercial thinning for specific fuels management and risk reduction purposes is also allowed.

**VEG G6** would be substantially the same as **VEG S6** in Alternative C

This alternative would substantially reduce precommercial thinning, particularly in lodgepole pine stands, compared to present levels. However, Alternative D would allow for precommercial thinning to occur in some stands. Due to a lack of site specificity and experience in how the parameters allowing precommercial thinning could be applied on-the-ground, it is estimated that one tenth the difference between the average annual acreage thinned and that thinned under Alternative B would be precommercially thinned in addition under Alternative D, for a program reduction of approximately 1,425 acres.

As in Alternatives B and C, the Grand Mesa, Uncompahgre and Gunnison National Forests, the Medicine Bow National Forest and the Routt National Forest precommercial thinning programs in lynx habitat have been concentrated in regenerating lodgepole pine stands, so volume reductions in the future from lack of precommercial thinning would have the most impact there. Using an average yield of 1,800 cubic feet of sawtimber per acre, based on recent timber sale volumes on the Medicine Bow and Routt National Forests, the reduction in annual sawtimber volume at the time of final harvest of the stands which could not be thinned and the percentage that volume accounts for of annualized Long Term Sustained Yield (LTSY) would be as follows:

| <b>Forest</b>                        | <b>Volume Reduction</b> | <b>% LTSY</b> |
|--------------------------------------|-------------------------|---------------|
| Grand Mesa, Uncompahgre,<br>Gunnison | 372,000 cubic feet      | 3.0 %         |
| Medicine Bow                         | 413,000 cubic feet      | 2.6 %         |
| Routt                                | 521,000 cubic feet      | 16.3 %        |

There would be reductions in sawtimber yield from unthinned lodgepole pine stands on the other Forests in the Southern Rockies Geographic area, but the reduction would be 1% or less of LTSY.

The effect of the sawtimber volume reduction on actual harvest volumes from these three National Forests approximately 60 years from now could be masked by additional regeneration harvest for snowshoe hare habitat.

### **Cumulative Effects**

The seven National Forest Plans analyzed in this document are part of larger landscapes that include other public lands, private and state lands. In addition, the White River National Forest has completed a revision to its Forest Plan that incorporates specific standards for lynx conservation tiered to the LCAS. Specific figures for lynx habitat in the Southern Rockies analysis area that include the White River National Forest, BLM and National Parks are in the wildlife cumulative effects narrative. Table 3-T5 includes the White River National Forest in the estimation of acres precommercially thinned for all alternatives.

**Table 3-T5 Effects to Timber Management by Alternative**

| <b>ACTIVITY/<br/>ADMINISTRATIVE<br/>UNIT</b>  | <b>Alternative A</b> | <b>Alternative B</b> | <b>Alternative C</b> | <b>Alternative D</b> |
|---|----------------------|----------------------|----------------------|----------------------|
| <b>Harvest - Long<br/>Term Sustained<br/>Yield</b>  |                      |                      |                      |                      |
| Grand Mesa,<br>Uncompahgre,<br>Gunnison NFs %<br>change                                       | 0                    | -3.3%                | -3.3%                | -3.0%                |
| Medicine Bow NF %<br>change   | 0                    | -2.9%                | -2.9%                | -2.6%                |
| Routt NF % change   | 0                    | -18.0%               | -18.0%               | -16.3%               |
| All Other Forests in<br>the Southern Rockies<br>Geographic Area<br>Units combined %<br>change | 0                    | <1%                  | <1%                  | <1%                  |
| <b>Salvage Harvest<br/>(amount change)</b>  | No change            | Negligible           | Negligible           | Negligible           |
| <b>Precommercial<br/>Thinning</b>   |                      |                      |                      |                      |
| All Units Total Acres   | 4,867                | 3,050                | 3,050                | 3,205                |
| e   |                      |                      |                      |                      |

Cumulatively, the precommercial thinning program would be reduced with corresponding reductions in growth, and ultimately, tree size in regenerating stands. Long Term Sustained Yield harvest would be reduced on the Grand Mesa, Uncompahgre, Gunnison, Medicine Bow and Routt National Forests under the action alternatives. The reductions in potential growth are related to delays in thinning of lodgepole pine. More stands that are presently not providing either foraging or denning habitat for the lynx would have regeneration harvests to provide additional snowshoe hare habitat for lynx foraging. Small disturbances by wind, insects or disease would increase the possibility of becoming more intense or extensive, with corresponding loss of live trees from the stands. No overall reduction in salvage practices are anticipated under any alternative.

# Livestock Grazing Management

## Affected Environment

This project area contains approximately 3.65 million acres of active livestock grazing allotments in lynx habitat. Active livestock grazing allotments are those where a Term Grazing Permit is in effect and where authorized livestock grazing use of the allotment is expected to occur during most years. Depending on the classification of the allotment and on the Term Grazing Permit language, this permitted use may consist of either cattle or sheep, with a few allotments being permitted for both kinds of livestock. Horses may also be permitted, and in a few circumstances, bison will also be authorized. In general, the season of use in areas identified as lynx habitat may occur between early June and late September, although this varies by allotment depending on elevation, plant communities, and management requirements.

Permitted livestock grazing is managed according to Forest Plan Objectives, Standards, and Guidelines. Objectives generally provide for ensuring that livestock grazing activities are conducted in a manner that will provide for the meeting or moving toward desired conditions that are normally focused on mid to later seral stages and historic ranges of variability. Standards and guidelines provide the constraints to livestock management to ensure that the short-term effects are within tolerances that will ensure meeting the long-term objectives. Examples of standards and guidelines for livestock management include allowable use standards, residual stubble height standards, and restrictions on season long grazing. Annual management, including appropriate standards and guidelines, is specified in the Annual Operating Instructions.

The Table 3 – GR1 shows the relationship (by acres) of livestock grazing activities on active allotments and lynx habitat.

**Table 3 – GR1 Acres, by Forest, of Lynx Habitat Type in Active Allotments by LAU**

| <b>National Forest</b>                   | <b>Lynx Denning NFS Acres in Active Allotments</b> | <b>Lynx Winter Forage Acres in Active Allotments</b> | <b>Other Lynx Habitat NFS Acres in Active Allotments</b> | <b>Total NFS Acres of Suitable Lynx Habitat in Active Allotments</b> | <b>Currently Unsuitable Lynx Habitat NFS Acres in Active Allotments</b> | <b>Non-Lynx Habitat NFS Acres in Active Allotments</b> | <b>Total NFS Acres in LAU</b> |
|--|--|--|--|--|---|--|-------------------------------|
| <b>Arapaho-Roosevelt</b>                 | 53,324   | 79,208   | 22,472   | 154,648  | 22,723  | 13,742   | 190,891                       |
| <b>Pike-San Isabel</b>                   | 230,799  | 218,558  | 159,074  | 411,631  | 3,888   | 251,632  | 667,151                       |
| <b>Grand Mesa, Uncompahgre, Gunnison</b> | 531,319  | 185,788  | 531,578  | 1,248,685  | 13,017  | 902,721  | 2,164,423                     |
| <b>Medicine Bow – Routt</b>              | 552,716  | 941,563  | 1,636,856  | 1,037,414  | 170,716   | 1,292,973  | 1,165,194                     |
| <b>Rio Grande</b>                        | 101,831  | 47,618   | 100,098  | 249,547  | 48,324  | 24,809   | 322,681                       |
| <b>San Juan</b>                          | 230,993  | 79,151   | 236,401  | 546,545  | 15,822  | 258,411  | 820,778                       |
| <b>TOTAL</b>                             | 1,700,982  | 1,551,886  | 2,686,479  | 3,648,470  | 274,490   | 2,744,288  | 5,331,118                     |

Of the total potential overlap acreage, approximately 1.7 million acres is considered to be lynx denning habitat. Lynx denning habitat is typified by relatively dense conifer stands that are generally neither suitable nor capable for livestock grazing and as a result, are little used or affected by livestock management activities. In addition, of the total potential overlap acreage, approximately 1.55 million acres is considered to be lynx winter forage habitat. Within this winter forage habitat acreage, there is a potential for livestock grazing to affect lynx habitat, primarily by affecting prey species' forage quality or quantity and shrub cover. However, livestock grazing is generally of relatively short duration and low intensity in these areas and is managed according to specified standards. The remaining portion of the total acreage overlap consists of "other" lynx habitat.

There is relatively limited potential for conflict between permitted livestock grazing and lynx or lynx habitat. For the most part, the two species prefer and utilize distinctly different parts of the environment. In general, lynx prefer the denser conifer types for denning, with hunting activity occurring primarily in conifer types of varying density and structure. Lynx foraging activities may also occur in the aspen/alder, willow, and sagebrush/grassland types with use of these areas occurring primarily as a search for alternate prey species. Within these cover types, livestock management that is designed to ensure that there is an adequate quantity and quality of residual forage species for the alternative prey species, e.g. grass species, forbs, and palatable shrub species such as willow, along with adequate shrub or tree cover, will meet the needs of both the lynx and its prey species. Forest Plans currently provide for such management through allowable use standards, residual vegetation standards, and objectives for managing riparian shrubs to meet certain seral stage mixes or canopy coverage. Not all Forest Plans specifically focus on the needs of lynx and lynx habitat although the objectives, standards, and guidelines do in fact generally meet the needs of lynx.

Cover types most likely to experience an interaction between livestock grazing activities and lynx habitat are shown in Table 3–GR2, below. Not all Forests have detailed mapping available regarding these specific cover types, so the information provided may actually be an under-representation for some types.

**Table 3–GR2 Acres of Cover Type within Lynx Habitat by National Forest**

| <b>National Forest</b>            | <b>Aspen/Alder</b> | <b>Willow</b>  | <b>Sagebrush</b> |
|-----------------------------------|--------------------|----------------|------------------|
| Arapaho- Roosevelt                | 25,944             | 7,363          | 259              |
| Pike-San Isabel                   | 143,096            | N/A            | N/A              |
| Grand Mesa, Uncompahgre, Gunnison | 343,078            | 59,889         | N/A              |
| Medicine Bow - Routt              | 265,008            | 17,956         | 27,163           |
| Rio Grande                        | 245,259            | 12,177         | 829              |
| San Juan                          | 239,638            | 3,214          | 1,590            |
| <b>TOTAL</b>                      | <b>1,262,023</b>   | <b>100,599</b> | <b>29,841</b>    |

## Environmental Consequences

For evaluation purposes associated with livestock grazing activities, all alternatives treat the LAUs and the Linkage Areas in the same manner with regard to objectives, standards and guidelines. Therefore, there is no difference in the effects of alternatives relative to designation as LAU or Linkage Area.

### Alternative A - No Action

The No Action Alternative for the planning area will have no direct or indirect effects on current livestock grazing management practices on NFS Lands. The no action alternative would continue to provide for current livestock grazing management practices, as specified in Forest Plans, to remain in effect with no change. All Forest Plans contain objectives, standards, and guidelines that address to varying degrees the inter-relationship between lynx and livestock grazing. For the most part, there is either adequate direction contained in the Forest Plans, or where such language is lacking or insufficient, existing management is such that there is minimal to no apparent conflict. However, it is clear that most of the Forest Plans would benefit from having clear objectives, standards, and guidelines that specifically address the lynx/livestock relationship. There are no cumulative effects on rangeland management resources under Alternative A.

### Action Alternatives B, C, and D

The proposed action alternative (B), and action Alternatives C and D are similar with regard to their relationship with livestock grazing. These alternatives have the potential for only minimal direct or indirect effects on current livestock grazing management practices on NFS lands. For the most part, existing direction and current practices already are implementing management that is equivalent to that provided in the three action alternatives. Effects to

livestock management practices from any of the three alternatives would be expected to occur only in specific localized situations where current management is not meeting standards or where a change in current management would be needed to resolve a site specific concern.

The proposed action will have only minimal effect on livestock grazing operations, consisting primarily of better defining objectives and management practices that are required to ensure maintenance or enhancement of lynx and their habitats. In specific instances where there is a potential for negative interactions with livestock, this may result in the need to intensify livestock management. In most instances, this would likely consist of alterations in the timing, intensity, duration, or frequency of livestock use in the specific area. In a very few instances, structural improvements such as fencing may be required to ensure proper livestock management.

There are no known cumulative effects on rangeland management resources under the three action alternatives.

# Fuels, Fire and Fire Ecology

## Background

In April 1999, the General Accounting Office (GAO) published a report entitled *Western National Forests: a Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats* (GAO/RCED-99-65). In the report, the GAO asserts, "The most extensive and serious problem related to the health of national forests in the interior West is the over-accumulation of vegetation."

The Forest Service responded to the GAO report by developing, "Protecting People and Sustaining Resources in Fire-adapted Ecosystems: a Cohesive Strategy to Reduce Over-Accumulated Vegetation". Approved on October 13, 2000, the Cohesive Strategy provides an approach to achieve improved forest and grassland resilience by reducing fuel loadings in fire-prone forests in order to protect people and sustain resources. The strategy focuses treatment on high-risk areas, rather than least-cost acres.

The cohesive strategy establishes a framework that restores and maintains ecosystem health in fire-adapted ecosystems for priority areas across the interior West. In accomplishing this, it is intended to:

- Improve the resilience and sustainability of forests and grasslands at risk,
- Conserve priority watersheds, species and biodiversity,
- Reduce wildland fire costs, losses, and damages, and
- Better ensure public and firefighter safety.

The priorities established in the cohesive strategy are:

- **Wildland-urban interface.** Wildland-urban interface areas include those areas where flammable wildland fuels are adjacent to homes and communities.
- **Readily accessible municipal watersheds.** Water is the most critical resource in many western states. Watersheds impacted by uncharacteristic wildfire effects are less resilient to disturbance and unable to recover as quickly as those that remain within the range of ecological conditions characteristic of the fire regime under which they developed.
- **Threatened and endangered species habitat.** Dwindling habitat for many threatened and endangered species will eventually be impacted by wildland fire. The severity and extent of fire could eventually push declining populations beyond recovery.
- **Maintenance of existing low risk Condition Class 1 areas.**

Treatments discussed in the Cohesive Strategy include thinning, some harvest, other mechanical biomass removal treatments and prescribed burning. It also recognizes that reducing risk on a scale that makes a difference is potentially expensive and will take time and collaborative planning to implement.

## Affected Environment

The National Forests of the Central and Southern Rocky Mountains (Arapaho Roosevelt National Forests, Medicine Bow –Routt National Forests, Grand Mesa, Uncompahgre and Gunnison National Forests, Pike San Isabel National Forests, San Juan National Forest and Rio Grande National Forest) are dominated by rugged mountains, with broad valleys and remnants of high plateaus. They have variable geologic history, soil parent material, topography, and elevations ranging from 7,590 feet to 14,590 feet result in numerous habitat types, plant associations and tree cover-types.

There are five primary forest cover types in the Central and Southern Rocky Mountains, four of which are of concern related to Lynx habitat. The four are:

- Aspen
- Engelmann Spruce – Subalpine fir
- Mixed Conifer
- Lodgepole pine

### **Fire Regimes (Adapted from Brown and Smith, 2000)**

"Fire regime" 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 and broad because of the enormous variability of fire over time and space (Whelan, 1995). The fire regime concept brings a degree of order to a complicated body of fire behavior and fire ecology knowledge. It provides a simplifying means of communicating about the role of fire. (Brown and Smith, 2000).

Classifications of fire regimes can be based on the characteristics of the fire itself or on the effects produced by the fire (Agee, 1993). 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 (Kilgore, 1987). The natural role of fire can be understood and communicated through the concept of fire regimes. Additionally, 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.

The fire regime classifications utilized in this analysis are based upon fire severity as detailed in Brown and Smith (2000) and are as follows.

1. *Understory fire regime* (applies to forests and woodlands)--Fires are generally nonlethal to the dominant vegetation and do not substantially change the structure of the dominant vegetation. Approximately 80 percent or more of the aboveground dominant vegetation survives fires. This includes Fire Regime I from the Cohesive Strategy
2. *Stand-replacement fire regime* (applies to forests, woodlands, shrublands, and grasslands)-Fires kill aboveground parts of the dominant vegetation, changing the aboveground structure substantially. Approximately 80 percent or more of the aboveground dominant vegetation either is consumed or dies as a result of fires. This includes Fire Regime II, IV and V from the Cohesive Strategy
3. *Mixed severity fire regime* (applies to forests and woodlands)--Severity of fire either causes selective mortality in dominant vegetation, depending on different tree species' susceptibility to fire, or varies between understory and stand-replacement. This includes Fire Regime III from the Cohesive Strategy

#### 4. *Nonfire regime*--Little or no occurrence of natural fire.

The understory and mixed severity fire regimes apply only to forest and woodland vegetation types. The mixed severity fire regime can arise in three ways:

- Many trees are killed by mostly surface fire but many survive, usually of fire resistant species and relatively large size.
- Severity within individual fires varies between understory burning and stand-replacement, which creates a fine-grained pattern of young and older trees. It occurs because of fluctuations in weather during fires, diurnal changes in burning conditions, and variation in topography, fuels, and stand structure within burns. Highly dissected terrain is conducive to this fire regime.
- Fire severity varies over time with individual fires alternating between understory burns and stand-replacement.

### **Fire Regime Characteristics**

Fire regime characteristics (fire severity, fire frequency, fire size and pattern, and fuels and fire behavior) are described as follows.

#### Understory

The Understory fire regime is characterized by frequent (mean intervals between 5 and 30 years), low intensity fires that perpetuated open stands of trees whose lower branches were killed by fire. In gentle topography these fires may have been quite large, while in rugged mountainous terrain, the understory regime was often confined to the more open, drier south facing slopes.

#### Mixed Severity

Mean fire intervals for mixed severity fire regimes were generally longer than those of understory fire regimes and shorter than those in stand-replacement fire regimes. However, some individual fire intervals were short (<30 years), while the maximum intervals could be quite long (>100 years) (Brown and Smith (2000).

Mixed fire regimes may consist of a combination of understory and stand-replacement fires that reflect a temporal change in the character of the fire. Understory fires at short intervals between stand replacing events occurring at much longer intervals.

Mixed severity fire regimes may also be characterized by fires that killed a large proportion of fire-susceptible species in the overstory), but spared many of the fire-resistant trees. Any given location within a mixed fire regime could experience some stand-replacement fires and some non-lethal fires along with a number of fires that burned at mixed severities.

Pre-1900 fires often covered large areas. The uneven burning pattern in mixed fire regimes was probably enhanced by mosaic patterns of stand structure and fuels resulting from previous mixed burning. Thus, past burn mosaics tended to increase the probability that subsequent fires would also burn in a mixed pattern. Complex mountainous topography also contributed to variable fuels and burning conditions, which favored non-uniform fire behavior.

#### Stand Replacement

Stand-replacing fires kill most overstory trees, although the pattern of these fires on the landscape varies with topography, fuels, and burning conditions. Wind-driven crown fires may burn extensive areas uniformly in stand-replacement fire events. However, a major proportion of stand-replacement can be caused by lethal surface fire. Under different conditions, a complex landscape mosaic of replacement burning from crown fire and lethal surface fire is interwoven with areas of lighter burning or no burning. Patchy burning patterns may be accentuated by rugged mountainous topography containing contrasting site types, microclimates, and vegetation. On gentle topography and more uniform landscapes, such as high plateaus, stand-replacement fires tend to be more uniform or at least to burn in large-scale patches.

Stand-replacement fires generally occur at long average intervals, ranging from about 70 years in some lower elevation Rocky Mountain lodgepole pine forests subject to extreme winds, to 300 to 400 years in some inland subalpine types. Often the range of actual intervals is broad since the fires themselves depend on combinations of chance factors such as drought, ignitions, and high winds.

### **Cover Types** (Adapted from Brown and Smith, 2000)

As wildland fire historically played a major role in determining forest structure and composition, and landscape patterns in the Central and Southern Rocky Mountains, each of the forest types in the following sections will be characterized by fire regime (understory, mixed, stand-replacement), post fire plant communities with emphasis on temporal changes in vegetation and fuels (pre-1900 and post-1900) and general description of fuel conditions.

Fire-adapted strategies provide competitive advantage to many tree species in lynx habitat. Early successional species such, lodgepole pine (Lotan, Brown and Neuenschwander 1984), and quaking aspen (Beetle 1974; DeByle 1976; Loope and Gruell 1973), have adapted to fire as a major disturbance agent in lynx habitat.

The primary causative factors behind fire regime changes are effective fire prevention and suppression strategies, selection and regeneration harvests, domestic livestock grazing, and the introduction of exotic plants” (Quigley, Haynes and Graham 1996). Additionally, changing land use patterns and attempts to exclude fire have succeeded in greatly reducing the scope of fire on the landscape (Agee 1993).

### *Aspen*

#### Fire Regime Classification

Quaking aspen is widely distributed throughout the Central and Southern Rockies. It is best developed in the central and southwestern areas of Colorado and southern Wyoming. It is found most frequently as pure stands or in association with conifers such as Engelmann spruce, lodgepole pine, ponderosa pine and Douglas-fir.

Fire has been the most important disturbance factor influencing change in structural stages and composition, and minimizing competition by conifer species. Pure aspen stands are susceptible to mortality of above ground stems from low intensity surface fires. However,

aspen stands do not ignite easily and specific fuel, weather and site conditions are necessary before a fire can ignite and spread.

Generally, fires in young aspen stands are low intensity surface fires unless there is high fuel loading. Older stands are more susceptible to higher intensity fires due to increased fuel loadings and the presence of conifer invasion. Aspen stands are best characterized by the stand replacement fire regime.

### Post-fire Plant Communities

Aspen is well adapted to fire. Even though aspen is vulnerable to fire due to thin bark, it has the ability to regenerate vegetatively by adventitious shoots or suckers that arise on its long lateral roots.

Pre- 1900 Succession--Before settlement by Euro-Americans, large expanses of western aspen and aspen parkland existed in both the Canadian and American West. Aspen regenerated well after fire. Settlement of the West in the late 1800s and early 1900s increased fire frequency because of land clearing fires, slash burning, and railway traffic (Murphy 1985). In the Rocky Mountains, low intensity fires caused thinning and encouraged all-aged stands whereas high intensity fires resulted in new even-aged stands. In early postfire communities aspen may be dominant but replacement of seral aspen by conifers is gradual and may take 200 to 400 years or more (Bartos and others 1983), depending on the potential for establishment and growth of conifers.

Post 1900 Succession-- Following the implementation of rigorous fire protection programs, lack of fire has threatened the continued existence of aspen in the West (Brown and DeByle 1987, 1989; Peterson and Peterson 1992) changing fire frequencies. Without the occurrence of disturbance, aspen clones mature in about 80 to 100 years. The dying back of the stands favors the establishment of shade-tolerant conifers. Aspen stands may be replaced by conifers in the absence of high intensity fires that would kill the conifer regeneration.

### *Engelmann Spruce – Subalpine Fir Forests*

#### Fire Regime Classification

Engelmann spruce and Subalpine fir are widely distributed in Colorado and Wyoming and generally occur as the highest elevation forest type, normally extending to timberline. Spruce-fir forests include bristlecone pine, lodgepole pine, Douglas-fir, corkbark fir and aspen, but the forest environment is dominated by Engelmann spruce and Subalpine fir.

Engelmann spruce and Subalpine fir appear in the lower, drier temperate zones as well as the Subalpine regions. The forests are associated with fescue grasslands, aspen, lodgepole pine, Douglas-fir, and ponderosa pine at lower elevations and the various alpine series at higher elevations. These species tend to maintain themselves in stable communities until changed by an external force, such as fire. After fire, spruce and fir are replaced by lodgepole pine, aspen, or grassy parks, which slowly trend towards climax spruce-fir if left undisturbed.

In general spruce-fir forests are best characterized by the Stand Replacement fire regime. Mean fire return intervals range from 100-400 years. In some limited geographic locations

the spruce fir forest may be considered to be included in the non-fire regime due to topographic location and local climatic conditions.

### Postfire Plant Communities

Pre-1900 Succession-- In the Central and Southern Rocky Mountains, spruce is often the dominant subalpine forest cover and other major disturbances--spruce beetle epidemics, extensive snow avalanches, and areas of wind-thrown forest--interact with stand-replacement fires in complex temporal and spatial patterns (Baker and Veblen 1990; Veblen and others 1994).

Pre-1900 fires added structural and compositional diversity to the spruce-fir forest. Burned areas often remained unforested for extended periods due to the harsh microclimate (Arno and Hammerly 1984).

Post-1900 Succession--Little is known about possible human-induced changes in successional patterns throughout this high-elevation type. Logging has occurred in some sizeable areas of the type and has to a limited extent been a substitute for stand-replacement fire. In other areas fire suppression may have effectively reduced the landscape component made up of young postfire communities. For example, Gruell (1980) published many photographs taken at subalpine sites in northwestern Wyoming in the late 1800s and early 1900s and compared them with modern retakes. Most of these comparisons show that mature forest is noticeably more extensive today. Presumably the slow postfire recovery period resulted in large areas being unforested at any given time. However given the long fire return intervals it is unlikely that suppression actions has had a significant impact on the current conditions.

In some areas large outbreaks of spruce bark beetle and root rot in subalpine fir have also resulted in heavy loadings of large woody fuels, which will support future stand-replacement fires (Veblen and others 1994). Data presented by Brown and others (1994) suggest that maintaining natural fire cycles in these high-elevation forests is difficult because the forests only burn when fire danger elsewhere is unacceptably high as a result of extreme drought.

### *Mixed Conifer*

#### Fire Regime Classification

The mixed conifer forests are composed of Douglas-fir and limber pine. Major associated species are ponderosa pine, lodgepole pine, and Engelmann spruce-Subalpine fir. Occasionally, Douglas-fir forms the lowest coniferous zone adjacent to pinion-juniper, grasslands and big sagebrush. Most often, however, it tends to form a belt at mid-elevations between Ponderosa pine, and lodgepole pine or Engelmann spruce – Subalpine fir. Although Douglas-fir is the dominant overstory species, it may be far from uniform, often occurring intermixed with other conifers such as Ponderosa pine, lodgepole pine, and Engelmann spruce-Subalpine fir. Quaking aspen may be a significant component in some stands. White fir is a large component in the southern portion of the amendment area. In northern Colorado, Douglas-fir exists in pure or nearly pure stands.

These forests commonly develop dense stands with accumulations of ladder fuels and they often occupy steep slopes on cool aspects. The forest floor fuels are primarily a compact duff layer that does not support low intensity surface fires. However, when down woody or ladder fuels accumulates and severe burning conditions arise, they can support a stand-replacing surface or crown fire. Such fires occurred at intervals averaging between 70 and 200 years.

In the amendment area mixed conifer can be characterized by both the Mixed and Stand Replacement fire regimes. The relative amounts of these types in mixed and stand-replacement fire regimes is unknown (Brown and others 1994)

#### Postfire Plant Communities

Pre-1900 Succession-- The factors that determine whether one of these forests will have a mixed or stand-replacement regime is not well known. Relatively frequent stand-replacement fires kept much of the landscape in open areas (seral grasslands or shrublands) and favored seral shrub species (such as serviceberry, willow, and bitterbrush) and aspen.

Post-1900 Succession --Photo comparison and fire history studies suggest that fire exclusion has allowed a greater proportion of these forests to develop as dense stands. The spatial continuity of these stands may allow insect and disease epidemics and stand-replacement fires to become larger than in the past (Arno and Brown 1991; Byler and Zimmer-Grove 1991; Gruel 1983). In the southern portion of the amendment area increases in white fir have added a significant ladder fuel component to stand that historically had a low susceptibility to crown fire initiation due to low surface fuel loading.

## *Lodgepole pine*

### Fire Regime Classification

Lodgepole pine is typically an early-seral tree species. Most lodgepole pine forests in the Rocky Mountains were established as a result of fire (Lotan, Brown, and Neuenschwander 1984).

Lodgepole pine is well-adapted to fire. It is an aggressive seral species that readily establishes itself on disturbed areas, including burn areas (Mason 1915; Smithers 1961). Stocking can be as high as 10,000-40,000 stems per acres. Although thin-barked, lodgepole pine is fairly susceptible to fire. Serotinous (closed) cone habit enables it to regenerate large areas after disturbance. Cone serotiny is common in the Rocky Mountains.

Frequent low-intensity fires may thin lodgepole pine stands without doing serious damage (Lotan, Brown, Neuenschwander 1984). These low-intensity fires not only removed much of the fire-intolerant species, but also reduced lodgepole pine stocking, thus influencing the structure of the forest.

In the amendment area lodgepole pine can be characterized by both the Mixed and Stand Replacement fire regimes. Mean return intervals can range from 35 to greater than 200 years.

### Postfire Plant Communities

Pre-1900 Succession-- In parts of its geographic distribution, lodgepole pine forests burned in a mixed fire regime, primarily where fine surface fuels and dry climate allowed lower intensity fires to occur. Much of the lodgepole pine type, however, is resistant to crown fire initiation except when there is an accumulation of down woody, ladder, and crown fuels. When fuel loadings are sufficient, the resulting fire intensity can support either a stand-replacing surface or crown fire.

Brown (1975) illustrated how fuel loadings are indirectly linked to stand age. Young dense stands containing ladder fuels of associated spruce and fir and accumulated downfall from a former, beetle killed or fire-killed overstory have high potential to support a stand-replacement fire. Conversely, young pole-size stands of pure lodgepole pine (with sparse lower limbs) arising after a burn that removed most large fuels have low potential to initiate crown fire but can sustain crown fire spread. When a lodgepole pine stand becomes mature or overmature, tree growth and vigor declines markedly, and the likelihood of a mountain pine beetle epidemic increases. Such epidemics kill many trees that begin falling in a few years, and within 10 to 15 years large amounts of dead woody fuels accumulate that greatly adds to the potential of stand-replacement fire.

Post-1900 Succession -- Although some studies indicate that attempts to exclude fire have had relatively little effect in this fire regime, especially in areas with long mean return intervals (Barrett and others 1991; Johnson and others 1990; Kilgore 1987), the possibility exists that suppression could have appreciable effects where fires have been largely excluded from areas with shorter mean fire return intervals.

Fires are critical to maintenance of biological diversity in this type. Many early seral species, including herbs, shrubs, and aspen, depend on occasional fires to remain as components of the

lodgepole pine type (Habeck and Mutch 1973; Kay 1993). Black-backed Woodpeckers, many invertebrates, herbivores, small mammals, birds, and even some aquatic organisms depend upon fires for creation of seral communities, snag patches, and beneficial nutrient cycling (Agee 1993; Despain 1990).

Stand-replacement fire regimes in lodgepole pine forests can be influenced by management actions. For example, fuel breaks can be developed near critical property boundaries and to protect resorts and other facilities (Anderson and Brown 1988; Kalabokidis and Omi 1998; Schmidt and Wakimoto 1988). Wildland fire use programs coupled with prescribed stand-replacement fires could help develop landscape fuel mosaics that limit the ultimate size of wildfires (Weber and Taylor 1992; Zimmerman and others 1990).

### **Fuels** (Adapted from Brown and Smith, 2000)

The word "fuels" refers to live and dead vegetation that can potentially contribute to combustion. Fuel quantities can vary from a small portion to all of the aboveground biomass depending on a number of fuel properties especially particle size, moisture content, and arrangement. Although vegetation biomass increases predictably with time because of perpetual photosynthesis, changes in fuel biomass over time can be highly irregular due to the trade off between annual increment and decay and properties affecting fuel availability

In the Understory fire regime during periods of high fire frequency, fuels were primarily herbaceous material and forest floor litter. After fire suppression became effective, forest floor duff and live fuels such as shrubs and conifer regeneration accumulated. Measurements in recent decades (Brown 1970; Brown and Bevins 1986; Sackett 1979) show that litter typically ranges from 0.6 to 1.4 tons/acre (1.3 to 3.1 t/ha) and the entire forest floor of litter and duff averages about 12 tons/acre (27 t/ha) in both Arizona and Northern Rocky Mountain areas.

With fire suppression, accumulated fuels support higher intensity fire including torching and crowning behavior and longer periods of burnout. The increased burn severity results in greater mortality to plants and soil organisms. Heavy surface fuels accumulations can result in higher surface fire intensities that contribute to a increased potential for crown fire initiation.

Aspen stands are generally only flammable in the spring, late summer, and fall when they are leafless due to the drying effect of sun and wind on the leaf litter. Furthermore, in the fall the herbaceous plant and shrub component of the understory is dead and dried out, forming a continuous layer of loosely organized fine fuel.

In the Mixed Severity fire regime, during the presettlement period fuels were probably quite variable spatially and temporally. At a given time, some segments of the vegetative mosaic would be patches of postfire regeneration that had arisen where the last fire killed much of the overstory. Fuel loadings in these patches might increase dramatically as dead trees and limbs fell into a developing patch of saplings. If these regenerated patches burned again, the resulting "double burn" might be an area cleared of most living and dead fuel and thereafter more likely to support non-lethal underburning in the next fire.

Average fuel loadings determined from extensive forest surveys in the Northern Rocky Mountain National Forests (Brown and Bevins 1986; Brown and See 1981) indicate that quantities of duff and downed woody material differ between mixed and stand-re-placement fire regimes.

Unlike understory and mixed fire regimes, fuels play a critical role in limiting the spread of fire in stand-replacement fire regimes. Accumulation of duff and down woody fuels increases the persistence of burning. This is important for keeping smoldering on a site until a wind event occurs (Brown and See 1981). Typically a certain level of fuel is required to allow fire to spread. This may be the result of dead and down fuels--from insect epidemics, windstorms, or a previous fire--or of extensive ladder fuels. In contrast, stands with few down or ladder fuels often fail to support fire (Brown 1975; Despain 1990). In lodgepole pine, dead and down woody fuel loadings of 15 to 20 tons/acre (34 to 45 t/ha) are generally near the lower threshold of what will support a stand-replacement through moderate-intensity surface fire (Fischer 1981). Ladder fuels and heavier loadings of down and dead woody fuels contribute to torching, and with winds a running crown fire may evolve.

## **Crown Fire Hazard**

The primary stand attributes that influence crown fire initiation and spread are surface fuel loading, canopy base height and canopy bulk density. These attributes can be directly managed by vegetation treatments. Silvicultural systems can be designed to manage stands to reduce crown fire hazard but if desired stand attributes are not stated the desired stand structure or species composition may not be achieved (Graham and others 1999).

Initiation and sustained spread of crown fires is dependent on surface fuels and crown fuels. Rothermel (1972 and 1991) presents separate method for surface fire behavior and crown fire behavior but not a transition between them. Rothermel's (1991) crown fire model does not include the effect of canopy bulk density on fire spread and is based upon observations of seven fires that he believed to have been wind driven. Van Wagner's (1977) model of transition to crown fire provides the links between surface and crown fire models. It requires estimates of crown base height and canopy bulk density (Reinhardt and others 1999).

Initiation and sustained spread of crown fires is dependent on surface fuels and crown fuels. The initiation of crown fire behavior is a function of the surface fire intensity and the canopy fuel characteristics of Canopy Base Height (CBH) and Foliar Moisture Content (FMC). When the surface fire intensity attains or exceeds the critical surface intensity for crown combustion fire can propagate vertically through the canopy. The ability of a crown fire to spread is a function of the surface rate of spread and the Canopy Bulk Density (CBD).

## **Environmental Consequences**

### **Introduction**

Standards and Guidelines in Alternatives B, C and D that have the potential to affect wildland fire management operations are **ALL S1, VEG S1, S2, S3, S4** (Alternative B and C only), **S5** (Alternative Band C only), **S5** (Alternative D only), **S6, G1, G2, G3, G4, G6** (Alternative D only), **G7** (Alternative C and D only), **G8** (Alternative D only).

In turn, the standards and guidelines presented in the alternatives, developed to address the risk factors, may affect the following components of the wildland fire management program:

1. Ability to conduct vegetation treatments to create defensible fuels profiles in the Wildland Urban Interface (WUI).

2. Ability to conduct vegetation treatments to create defensible fuels profiles in support of the Fire Use (wildland fire use and prescribed fire) Program.
3. Ability to implement fire use activities.
4. Suppression and Firefighter/Public Safety.

The indicators for these program elements are the degree of limitations the standards and guideline place on the program elements. The alternatives will be evaluated on the degree of limitations placed on:

1. Mechanical Fuels Treatments with product utilization both in the WUI and Non Wildland Urban Interface.
2. Mechanical Fuels Treatments without product utilization both in the WUI and Non Wildland Urban Interface.
3. Fire Hazard Reduction Thinning.
4. Fire Use Activities.

The ease of control of wildland fire is directly related to fire behavior. Fire behavior is a primary consideration for public and firefighter safety. Factors that contribute to fire behavior that are unchangeable include weather, topography, and vegetation. Factors that can be changed to ease the difficulty of control of a wildland fire are keeping fires on the ground rather than crown fires, opening up the canopy so that water and retardant can reach the ground fuels and provide for ease of fire-line construction.

Fire behavior alteration is accomplished through thinning by removing ladder fuels and reducing stand densities. For reducing hazardous fuels, the priorities are to reduce surface and ladder fuels, raise the bottom of the live canopy and reduce stand density. Hazardous Fuels reduction treatments alter the characteristics that influence crown fire initiation and spread.

Thinning is a technique for managing density and composition of stands. Fire hazard reduction thinning contributes to the primary purposes of fuels treatments: decreased probability of crown fires, reduced area burned by unwanted fires, decreased severity of impacts, enhanced fire suppression effectiveness and safety, reduced suppression cost and enhanced managers' ability to implement fire use (both hazard reduction and habitat improvement). Even if thinning contributed nothing in directly moderating fire behavior, it could indirectly contribute by providing better access and removing obstacles to safe or effective fire control and by providing a strategic base for fire-line construction

One objective of some fuel treatment projects is to efficiently and safely treat portions of the landscape to achieve desirable conditions at both specific locations and for the landscape as a whole. Depending on how treatments are placed on the landscape, there can be fire reduction benefits outside the treated areas on the subsequent spread rate, size and severity of wildfires and on the ease of suppression. The locations of treatments on the landscape can contribute to the development of a defensible fuels profile. A defensible fuels profile relies on strategically located strips or blocks of land where forest canopy and fuels, both living and dead, have been modified to affect fire behavior. Defensible fuels profile or components of the profile (fuel breaks) can be critical to reducing the threat of crown fires to communities at risk, or the successful implementation of fire use actions.

Certain principles are applied in the consideration of how these specific areas may contribute to improvement of conditions at the landscape level. These include the creation of fuel breaks at points in the landscape where fire control efforts can be conducted safely, decreasing areas of contiguous high hazard fuels; and providing buffers between area of high and low importance for avoiding high intensity fires. Some landscape settings can be critical to the development of defensible fuels profiles. If some vegetation management tools (fire use, biomass removal, salvage and other harvests) are limited some of these critical landscape settings may not be treated. This lack of treatment could eliminate wildland fire use options (fire can not be maintained within Maximum Manageable Area) or compromise firefighter safety through the inability to reduce the wildland fire threat adjacent to communities at risk.

There are multiple purposes for hazardous fuels treatment in the wildland urban interface, one of which is reducing the threat to structures. Fuel treatment projects around and within communities are performed to reduce fire hazard, and thus reduce the potential damage to community resources and increase the safety of the public and firefighters. Fires burning through a community can damage and destroy homes and other structures, and damage other public and private property, such as vehicles, fences, utility poles and wires and other urban infrastructure. Additional damage is done to the urban infrastructure by secondary fire impacts such as erosion moving soils into ditches, storm drainage systems, and on to roads. Finally, wildfires burning natural elements in and surrounding communities can cause the same kind of undesirable environmental impacts as in uninhabited natural areas: loss of habitat, damage to watershed conditions, negative aesthetic effects and damage to timber resources.

Fuel treatments in and near urban areas are performed to modify burning conditions using the same principles as applied to wildland areas. The goals of the treatments are to achieve some combination of (a) reducing flammability, (b) reducing fire intensity, (c) reduce the potential for creating firebrands and crown fires, and (d) increasing firefighter safety and effectiveness. The amount of land to be treated around communities to reduce the threat to communities depends on the current structure of the vegetation, fuel loadings, topographic location, fire regime type and firefighting concerns such as access.

In order 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. Treatments at some distance from the developed portion of a community (a few to several miles) can reduce the direct threat to communities by being located in areas where the topography, wind conditions, and fuels between there and the community create the potential for spread to the community, or where a large or intense fire may cause indirect damage to the community (water sources or erosion hazard).

Treatments near developed portions of a community can add to reducing the threat to community infrastructure or local environmental resources. They can increase the safety of escape routes for residents and access routes for firefighters. Reducing spotting potential and production of fire brands in this zone can reduce the risk to structures, especially if the zones

of treatment are wider than the spotting distances possible at critical weather levels (i.e. 97<sup>th</sup> percentile weather).

Fuels treatments in the WUI recognizes that its ultimate success is based on several factors outside the control of the national forests. These factors are as follows:

- clearance between the actual fuels and the residence or personal property is the responsibility of the property owner, in accordance with state law,
- design and choice of construction materials for the residence or structure is the owners responsibility, and
- even though all preventive measures to protect the structures are in place, the actual fire behavior under severe conditions that threaten the home or structure could still be outside the control of the Forest Service.

Finally, research by Cohen has shown that structures with typical ignition characteristics (wood sided, wood framed, asphalt composition roof) are at risk of catching on fire from one of three sources. First is the direct exposure to intense flames from a nearby source, which could be intensely burning vegetation or another structure. His research shows that the structures may be at risk if the flame front is no more than 100 feet away. Second, constructions may be ignited from less intense sources against or very near the side of the structure. This can occur if a ground fire or firebrands ignite firewood or other flammable material next to the structure. Third, firebrands falling directly on roofs can ignite the structure if the roof is flammable or if flammable debris is present.

Treatments of fuels within the structure ignition zone (with 200 feet of structures) only are not sufficient to reduce the threat to neighborhoods and individual structures. During fire events in mixed severity and stand replacement fire regimes, firebrands may be carried long distances, and fires that start in and around homes can ignite structures. As there is no mechanism 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 and Community Fire Safe Counsels are valuable tools in communicating to the public the need for clearing and maintaining fuels away residences and structures, assisting residences in coordinating local hazard reduction efforts, and educating individuals on less flammable building designs and construction materials.

As a measure of the potential effects in the wildland urban interface the communities at risk from wildland fire, as identified by the states of Wyoming and Colorado, and published in the Federal Register (Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire; August 17, 2001) were evaluated against lynx habitat within 1 and 3 miles. The results are shown in Tables 3-F1 and 3-F2. These results do not reflect the amount of lynx habitat adjacent to other communities of interest that were not included in the Federal Register listing. It would be expected that the amount of habitat adjacent to communities of interest would add between 10-20% to the acreage shown.

**Table 3-F1 Acres of Lynx Habitat within One Mile of Listed Communities at Risk**

| Within One Mile | Lynx Denning NFS Acres | Lynx Winter Forage NFS Acres | Other Lynx Habitat NFS Acres | Currently Unsuitable Lynx Habitat NFS Acres | Total   |
|-----------------|------------------------|------------------------------|------------------------------|---|---------|
| A-R             | 7,595                  | 23,597                       | 2,997                        | 3,490                                       | 37,679  |
| GMUG            | 32,203                 | 9,907                        | 57                           | 43,586                                      | 85,753  |
| MedBow          | 506                    | 784                          | 2,784                        | 3,644                                       | 7,718   |
| PSICC           | 32,443                 | 20,773                       | 32,258                       | 382   | 85,857  |
| Rio Grande      | 8,150                  | 6,961                        | 12,129                       | 2,616                                       | 29,857  |
| Routt           | 20                     | 109                          | 1,409                        | 1,529                                       | 3,067   |
| San Juan        | 7,526                  | 3,064                        | 9,042                        | 208   | 19,841  |
| Total           | 88,444                 | 65,195                       | 60,677                       | 55,456                                      | 269,771 |

The Pike San Isabel National Forest contains the most Lynx habitat within 1 mile of Communities at Risk, followed closely by the Grand Mesa Uncompahgre and Gunnison. The Routt National Forest has the least amount of Lynx Habitat within 1 mile of Communities at Risk.

**Table 3-F2 Acres of Lynx Habitat within Three Miles of Listed Communities at Risk**

| Within Three Miles | Lynx Denning NFS Acres | Lynx Winter Forage NFS Acres | Other Lynx Habitat NFS Acres | Currently Unsuitable Lynx Habitat NFS Acres | Total     |
|--------------------|------------------------|------------------------------|------------------------------|---|-----------|
| A-R                | 74,386                 | 194,433                      | 27,613                       | 24,136                                      | 320,569   |
| GMUG               | 192,391                | 49,157                       | 218,282                      | 277   | 460,108   |
| MedBow             | 9,368                  | 15,363                       | 34,156                       | 50,680                                      | 109,566   |
| PSICC              | 265,157                | 171,322                      | 263,470                      | 2,812                                       | 702,762   |
| Rio Grande         | 83,110                 | 44,550                       | 93,363                       | 18,891                                      | 237,915   |
| Routt              | 4,838                  | 8,040                        | 55,508                       | 65,923                                      | 134,309   |
| San Juan           | 74,248                 | 33,878                       | 83,474                       | 4,347                                       | 195,947   |
| Total              | 703,499                | 516,743                      | 775,867                      | 167,065                                     | 2,161,175 |

When the analysis zone is increased to three miles the amount of lynx habitat adjacent to communities at risk increases almost ten (10) fold. Again the Pike San Isabel National Forest contains the most Lynx habitat within 1 mile of Communities at Risk, followed by the Grand Mesa Uncompahgre and Gunnison. The Medicine Bow has the least amount of lynx habitat within 3 mile of communities at risk. The amount of lynx habitat within 3 miles of Communities at Risk is significant considering that lynx habitat is primarily in stand replacing fire regimes that are capable of supporting high intensity fires which are capable of single day spread greatly in excess of 3 miles.

Lynx habitat within 3 miles of listed communities at risk is over 25 percent of the total lynx habitat (6,343,647 acres) within the amendment area. Linkage areas within the lower montane zones were not evaluated in this analysis.

Due to the nature of the project planning process it is difficult to estimate the long-term impact of the alternatives on project implementation. To partially quantify this effect an

analysis was conducted on fuels reduction planning and implementation projects identified by the affected forests<sup>1</sup>. The analysis identified 117 projects that contained lynx habitat within the identified project boundaries. The results displayed in Table 3-F3 do not include projects where fuels reduction may be a secondary objective.

**Table 3-F3 Acres of Lynx Habitat within Identified Fuels Reduction Project Areas**

|                                      | <b>Lynx Denning NFS Acres</b> | <b>Lynx Winter Forage NFS Acres</b> | <b>Other Lynx Habitat NFS Acres</b> | <b>Currently Unsuitable Lynx Habitat NFS Acres</b> | <b>Total</b> |
|--------------------------------------|-------------------------------|-------------------------------------|-------------------------------------|--|--------------|
| Arapaho Roosevelt                    | 26,146                        | 68,776                              | 13,506                              | 14,574   | 123,001      |
| Grand Mesa, Uncompahgre and Gunnison | 17,010                        | 10,652                              | 27,722                              | 16   | 55,400       |
| Medicine Bow and Routt               | 10,304                        | 11,586                              | 16,465                              | 29,030   | 67,386       |
| Pike San Isabel                      | 49,687                        | 33,720                              | 49,687                              | 1,186  | 134,279      |
| Rio Grande                           | 2,499                         | 4,567                               | 2,156                               | 1,925  | 11,147       |
| San Juan                             | 26,951                        | 29,454                              | 56,312                              | 94,043   | 206,760      |
|                                      |                               |                                     |                                     |  |              |
| <b>Total</b>                         | 136,335                       | 162,384                             | 171,469                             | 140,963  | 611,152      |

This “snapshot” of hazardous fuels reduction projects indicates that just over 6% of identified lynx habitat was being evaluated for treatment. If all these projects continued through the planning process, an estimated 80,000 acres (5:1 planning: treatment ratio) of actual treatments would be expected. This would impact just slightly more than 1 % of identified lynx habitat.

Further extrapolation of the planning:treatment ratio to all 6,343,647 acres of identified lynx habitat indicates that approximately 1.3MM acres could be expected to be impacted given unlimited funds and resources. This is based upon the rather unlikely assumption that funding would be unlimited and treatments in the non-wildland urban interface would be conducted before treatments in the wildland urban interface.

Finney (2001) has demonstrated that fuels treatment effectiveness can be “optimized” while treating approximately 20% of the landscape in a strategically placed pattern of overlapping treatments. Randomly placed treatments required treating a significantly larger percentage (2 to 3 times) of the landscape to achieve the same degree of alteration in landscape fire behavior.

Historically the forests within the amendment area have treated less than 50, 000 acres per year for hazardous fuels reduction activities. If one assumes a four fold increase in treatments

<sup>1</sup> The projects were identified in September 2001. It represented a “snapshot” of the planning hazardous fuels reduction planning process. The projects used in this analysis may not currently represent the affected forests current plans as the forests adjust their plans on a regular basis..

to 200,000 acres per year to address high priority areas, it would take over 30 years to treat every acre of identified lynx habitat. Given the facts that the priorities for hazardous fuels treatments contained in “A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan” are communities and their associated values, and that most communities exist in non-lynx habitat it is highly unlikely that this level of treatment would be targeted exclusively to lynx habitat. A more likely scenario is that less than an estimated 0.1% of lynx habitat (<63,000 acres) would be impacted by mechanical and prescribed fire activities within a 10-year period. Most treatments will be targeted towards lower elevation ponderosa pine, Gamble oak, Douglas-fir and dry type lodgepole pine (Wildland Urban Interface and Fire Regime I, II and III, condition class 2 and 3). Treatments in lynx habitat will most likely occur adjacent to communities at risk, communities of interest or in locations critical for the development of defensible fuels profiles that are necessary to reduce the threat to communities.

Consistent with firefighter and public safety and protection of property and other resources, all wildland fires receive an appropriate management response. Appropriate management response is based on objectives; environmental and fuel conditions; constraints; safety; and ability to accomplish objectives. The range of management responses available varies by forest. At current time the only forests within the SRMGA with fire management plans that allow wildland fire use are the Arapaho Roosevelt, Routt, San Juan and Rio Grande National Forests.

Wildfire suppression strategy and tactics are not directly influenced by the proposed standards in any of the alternatives. However, the degree to which vegetation management is limited by the standards will indirectly influence suppression strategies and tactics by their influence on the extent and intensity of wildfires.

**Environmental Effects**

**Direct and Indirect Effects**

As the main effect of the alternatives relates to the limitations placed on activities, the alternatives were compared based upon the degree of limitations (Table 3-F4). Alternative B is the most restrictive and Alternative D is the least restrictive regarding hazardous fuels reduction activities. The effects on Wildland Fire Use for all alternatives are contingent on whether wildland fire use is allowed on a forest.

**Table 3-F4 Comparison of Alternatives – Degree of Activity Limitation**

| Alternative                | Mechanical Fuels Treatment with Utilization  |  | Mechanical Fuels Treatment Without Utilization |   | Fire Hazard Reduction Thinning  | Fire Use Restricted                       |                   |
|----------------------------|--|--|--|---|---|---|-------------------|
|                            | WUI  | Non-WUI  | WUI  | Non-WUI                                   |   | Prescribed Fire                           | Wildland Fire Use |
| <b>A – No Action</b>       | Uncertain <sup>2</sup>   | Uncertain  | Uncertain                                      | Uncertain                                 | Uncertain   | Uncertain                                 | Uncertain         |
| <b>B – Proposed Action</b> | Conditional <sup>3</sup><br>ALL S1<br>VEG S1<br>VEG S2<br>VEG S3<br><br>Limited<br>VEGg S4 –<br>Salvage<br>Harvest Not allowed except within the structure ignition zone | Conditional<br>ALL S1<br>VEG S1<br>VEG S2<br>VEG S3<br><br>Limited<br>VEG S4 –<br>Salvage<br>Harvest Not allowed when affected area is smaller than 5 acres. | Conditional<br>ALL S1<br>VEG S1<br>VEG S3      | Conditional<br>ALL S1<br>VEG S1<br>VEG S3 | Full <sup>4</sup><br>VEG S5<br>Pre-commercial thinning and Fire Hazard Reduction Thinning is not permitted except within the structure ignition zone<br><br>Conditional<br>ALL S1 | Conditional<br>ALL S1<br>VEG S1<br>VEG S3 | None <sup>5</sup> |

<sup>2</sup> Uncertain – Under the no action alternative formal consultation on individual projects within LAUs may or may not result in restrictions depending on the status of inventories within the LAUs. Current management emphasis and direction for fire use and fuels reduction activities are maintained under current Forest Plan direction

<sup>3</sup> Conditional – Whether an activity is restricted or not depends upon whether the thresholds listed are met or exceeded within an LAU.

<sup>4</sup> Full - The activity is not permitted unless specifically allowed as a listed exception

<sup>5</sup> None – Activity is not limited by standards or guidelines

| Alternative | Mechanical Fuels Treatment with Utilization   |   | Mechanical Fuels Treatment Without Utilization  |   | Fire Hazard Reduction Thinning   | Fire Use Restricted  |   |
|-------------|---|---|---|---|--|--|---|
|             | WUI   | Non-WUI   | WUI   | Non-WUI   |  | Prescribed Fire  | Wildland Fire Use   |
| C           | Conditional<br>ALL S1<br>VEG S1<br>VEG S2<br>VEG S3   | Conditional<br>ALL I S1<br>VEG S1<br>VEG S2<br>VEG S3<br><br>Limited<br>VEG S4 –<br>Salvage<br>Harvest Not<br>allowed except<br>within the<br>structure<br>ignition zone,<br>critical<br>landscape<br>settings or to<br>facilitate fire<br>use practices. | Conditional<br>ALL I S1<br>VEG S1<br>VEG S3   | Conditional<br>ALL I S1<br>VEG S1<br>VEG S3   | Conditional<br>ALL I S1<br><br>Limited <sup>6</sup><br>VEG S5<br>Pre-<br>commercial<br>thinning is<br>restricted<br>Fire Hazard<br>Reduction<br>Thinning is<br>not<br>permitted<br>except<br>within the<br>structure<br>ignition<br>zone critical<br>landscape<br>settings or to<br>facilitate fire<br>use practices | Conditional<br>ALL S1<br>VEG S3  | None  |
|             | None<br>Hazardous<br>fuels<br>reduction<br>activities<br>identified<br>are<br>permitted<br>by<br>exception. | None<br>Hazardous fuels<br>reduction<br>activities<br>identified are<br>permitted by<br>exception.  | None<br>Hazardous<br>fuels<br>reduction<br>activities<br>identified<br>are<br>permitted<br>by<br>exception. | None<br>Hazardous<br>fuels<br>reduction<br>activities<br>identified<br>are<br>permitted<br>by<br>exception. | None<br>Hazardous<br>fuels<br>reduction<br>activities<br>identified<br>are<br>permitted<br>by<br>exception.  | None<br>VEG S5<br>Vegetation<br>Management<br>Practices<br>that reduce<br>snowshoe<br>hare habitat<br>are<br>restricted.<br>Thinning<br>and other<br>vegetation<br>management<br>practices<br>that are a<br>hazardous<br>fuels<br>reduction<br>activity<br>identified<br>through a<br>collaborative<br>process are | Conditional<br>VEG S3<br>VEG S5<br>Prescribed<br>fire that is<br>a<br>hazardous<br>fuels<br>reduction<br>activity<br>identified<br>or restores<br>ecological<br>processes<br>is<br>permitted.<br>Prescribed<br>fire for<br>other<br>resource<br>objectives<br>may be<br>restricted. |

<sup>6</sup> Limited – Although allowed the activity is restricted in either intensity or extent.

| Alternative | Mechanical Fuels Treatment with Utilization   |  | Mechanical Fuels Treatment Without Utilization |                              | Fire Hazard Reduction Thinning   | Fire Use Restricted |                   |
|-------------|---|--|--|------------------------------|--|---------------------|-------------------|
|             | WUI   | Non-WUI  | WUI  | Non-WUI                      |  | Prescribed Fire     | Wildland Fire Use |
|             |   |  |  |                              | permitted.   |                     |                   |
| <b>D</b>    | Conditional VEG S1<br>VEG S2<br>VEG S3<br>Limited VEG g S4 – Salvage Harvest allowed only within 200 feet of dwellings and open roads | Conditional VEG S1<br>VEG S2<br>VEG S3<br>Limited VEG G8. Salvage harvest allowed as documented in NEPA decisions. | Conditional VEG S1<br>VEG S3                   | Conditional VEG S1<br>VEG S3 | None VEG S5<br>Pre-commercial thinning is restricted. Fire Hazard Reduction Thinning within the structure ignition zone and landscape settings critical for the creation of defensible fuels profiles is permitted by exception. | Conditional VEG S3  | None              |

**Alternative A**

Under the no action alternative the impacts on mechanical fuels treatments and fire use applications is uncertain. Formal consultation on individual projects within LAUs may or may not result in restrictions depending on the status of inventories within the LAUs. Current management emphasis and direction for fire use and fuels reduction activities are maintained under current Forest Plan direction.

**Alternative B**

Under Alternative B all hazardous fuels reduction activities except for wildland fire use may be restricted or limited.

All vegetation management activities, except for wildland fire use, may be restricted in linkage areas (**ALL S1**). All practices and activities must maintain habitat connectivity regardless of hazardous fuels reduction goals, including the reduction of threat to communities. This may be problematic as the linkage areas include some lower elevation areas including dry type lodgepole pine, Douglas-fir, and Ponderosa Pine/gambles oak. These cover types would normally not be effected by the other standards and guidelines as they are generally not considered suitable lynx habitat. These lower elevation cover types are also

more likely to receive a hazardous fuels reduction treatment rather than higher elevation moist lodgepole pine and Engelmann spruce-subalpine fir.

Standard **VEG S1** can directly limit vegetation management activities if the threshold of 30 percent unsuitable habitat within an LAU is reached or exceeded and a broad scale assessment was not completed. Mechanical fuels treatments and prescribed fire may be restricted by this standard. Wildland Fire Use Activities are excepted.

Timber management practices, including those with hazardous fuels reduction goals may be restricted if more than 15% of lynx habitat is changed from unsuitable condition within a 10 year period (**VEG S2**).

Salvage (< 5 acre affected areas) and precommercial thinning is allowed only within the structure ignition zone. Salvage of small affected areas outside the structure ignition zone may be restricted if denning habitat has been mapped and is less than 10% (**VEG S3 and S4**). Precommercial thinning, for fire hazard reduction and in support of wildland fire use is not allowed unless the stands no longer provide snowshoe hare cover (**VEG S5**). Other vegetation management practices may be restricted in areas with high potential to become denning habitat if denning habitat is less than 10 percent of a LAU (**VEG S3**).

All management practices are limited in mature and late successional, multi-layered Engelmann spruce-subalpine fir stands except for practices and activities within the structure ignition zone and wildland fire use actions (**VEG S6**). This may have an effect on hazardous fuels reduction activities to a limited degree. Only a limited amount of mechanical treatments are anticipated in Engelmann spruce-subalpine fir (most hazardous fuels treatments are anticipated in dry type lodgepole pine, Douglas-fir, ponderosa pine, and brush habitat types). However prescribed fire applications, even those in support of wildland fire use could be restricted under this standard.

### **Alternative C**

Under **Alternative C** all hazardous fuels reduction activities except for wildland fire use may be restricted or limited. The level of restrictions are reduced significantly for most activities over those in **Alternative B**.

However as in Alternative B, all vegetation management activities, except for wildland fire use, may be restricted in linkage areas (**ALL S1**). All practices and activities must maintain habitat connectivity regardless of hazardous fuels reduction goals, including the reduction of threat to communities. This may be problematic as the linkage areas include some lower elevation areas including dry type lodgepole pine, Douglas-fir, and Ponderosa Pine/Gamble oak. These cover types would normally not be effected by the other standards and guidelines as they are generally not considered suitable lynx habitat. These lower elevation cover types are also more likely to be a higher priority for hazardous fuels reduction treatment rather than higher elevation moist lodgepole pine and Engelmann spruce-subalpine fir.

Standard **VEG S1** can directly limit vegetation management activities if the threshold of 30 percent unsuitable habitat within an LAU is reached or exceeded and a broad scale assessment was not completed. Mechanical fuels treatments may be restricted by this standard. Fire Use Activities are allowed.

In **Alternative C**, the limitations of **VEG S2** are not included. **VEG G7** addresses the limitation on timber management practices. As a guideline, exceptions can be proposed and approved in the appropriate environmental analysis document. Use of timber management practices that would result in more than 15 percent unsuitable habitat being created within an LAU within a 10 year period can be approved in the environmental documentation. This guideline allows for manager latitude in utilizing timber management practices for fire hazard reduction including activities in the structure ignition zone and landscape settings critical for the development of defensible fuels profiles even if the 15 percent threshold is exceeded after analysis and consultation.

Under **Alternative C** the limitations on salvage harvest and precommercial thinning (**VEG S4 and VEG S5**) are significantly reduced as they relate to hazardous fuels reduction activities. Salvage and precommercial thinning are permitted in landscape settings critical for the creation of **defensible fuels profiles** to reduce the wildland fire threat to communities and associated infrastructure, developments and municipal watersheds; or to facilitate fire use practices and activities that restore ecological processes, or that maintain or improve lynx habitat. This allows hazardous fuels treatments in areas outside of the structure ignition zone. Fire Use activities are not restricted by these standards. Other vegetation management practices may be restricted in areas with high potential to become denning habitat if denning habitat is less than 10 percent of a LAU (**VEG S3**).

All hazardous fuels reduction management practices are permitted in late successional, multi-layered Engelmann spruce-subalpine fir stands (**VEG S6**). Under this alternative landscape settings critical for the creation of **defensible fuels profiles** to reduce the wildland fire threat to communities and associated infrastructure, developments and municipal watersheds; or to facilitate fire use practices and activities that restore ecological processes, or that maintain or improve lynx habitat are included in the exception in addition to the structure ignition zone. This includes prescribed fire applications, even though not explicitly stated in the standard.

### **Alternative D**

Under **Alternative D** all hazardous fuels reduction activities are permitted by exception. This is the least restrictive to hazardous fuels reduction activities of the action alternatives.

In contrast to **Alternatives B and C**, fire use activities and hazardous fuels reduction activities are not restricted in linkage areas. The exceptions to **ALL S1** are expanded to include prescribed fire applications and all hazardous fuels reduction activities, when the activity has been identified through a process such as described in [A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan](#). This allows managers the most flexibility in addressing the threats to communities and associated values.

Under **Alternative D** exceptions to **VEG S1, VEG S3 and VEG S5** have also been expanded to include all hazardous fuels reduction activities, when the activity has been identified through a process such as described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan.

The restrictions on salvage harvest in **VEG S4** are not included in Alternative D. **VEG G8** addresses salvage harvest of area smaller than 5 acres. As a guideline exceptions can be proposed and approved in the appropriate environmental analysis document. This guideline allows for manager latitude in utilizing salvage harvest for fire hazard reduction including activities in the structure ignition zone and landscape settings critical for the development of defensible fuels profiles.

In **Alternative D** the restrictions on management in late successional Engelmann spruce-fir in **VEG S6** are not included. **VEG G6** addresses management activities in late successional Engelmann spruce-fir. As a guideline exceptions can be proposed and approved in the appropriate environmental analysis document.

### **Comparison of Individual Standards and Guidelines:**

Standard **ALL S1** only varies under **Alternative D**. In **Alternatives B and C** all vegetation management practices and activities, including those with hazardous fuels reduction goals may be restricted if habitat connectivity cannot be maintained. Wildland Fire Use is not restricted in **Alternatives B and C**. **Alternative D** includes an exception that permits prescribed fire applications and hazardous fuels reduction activities, when the activity has been identified through a process such as described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan. As the linkage areas include lower elevation dry type lodgepole pine, Douglas-fir and ponderosa pine, **Alternative D** allows managers the most flexibility in addressing the threats to communities and associated values.

Standard **VEG S1** varies significantly between alternatives. It can directly limit vegetation management activities if the threshold of 30 percent unsuitable habitat within an LAU is reached or exceeded and a broad scale assessment was not completed. Only mechanical fuels treatments may be restricted by this standard. Wildland Fire Use Activities are allowed in all alternatives. Prescribed fire activities are allowed only in **Alternatives C and D**. All hazardous fuels reduction activities identified through a process such as described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan are permitted in **Alternative D**. If the thresholds specified are reached fuels reduction efforts will be curtailed in **Alternatives B and C**, regardless of the critical nature of the work (wildland urban interface) or location. This can compromise firefighter and public safety. At the current time no LAUs are close to exceeding the 30 percent threshold so the probability of this standard

having a significant impact on fuels treatments is small. Additionally, if a broad scale assessment of historic levels of habitat is conducted, this standard will no longer apply.

Standard **VEG S2** only applies to timber management practices such as timber harvest and salvage sales. It can directly limit timber management activities if the threshold of 15 percent unsuitable habitat created within an LAU within a 10-year period is reached or exceeded. However, this standard does not limit the use of mechanical fuels treatment methods that do not involve the recovery of economic value (product removal). Mechanical fuels treatments such as piling and burning, mastication, chipping and crushing and fire use activities could still be utilized to accomplish fuels reduction objectives. Limiting the ability to use timber harvest has a non-quantified effect on the treasury as appropriated funds would have to be utilized to conduct all fuels reduction projects, rather than allowing for a partial offset of costs. At the current time no LAUs are close to exceeding the 15 percent threshold so the probability of this standard having a significant impact on fuels treatments is small. In **Alternatives C and D**, the limitations of **VEG S2** are not included. The limitations on timber management practices are addressed by **VEG G7**. As a guideline, exceptions can be proposed and approved in the appropriate environmental analysis document. Use of timber management practices that would result in more than 15 percent unsuitable habitat being created within an LAU within a 10 year period can approved in the environmental documentation would allow for a non-quantified return of funds to the treasury. This guideline allows for manager latitude in utilizing timber management practices for fire hazard reduction including activities in the structure ignition zone and landscape settings critical for the development of defensible fuels profiles even if the 15 percent threshold is exceeded after analysis and consultation.

Under **Alternatives B and C**, Standard **VEG S3** limits all vegetation management activities except for wildland fire use in LAUs with less than 10 percent denning habitat in stands that have the highest potential for developing denning habitat structure. If the thresholds specified are reached, fuels reduction activities could be limited in stands with characteristics that are or would soon be conducive to crown fire initiation. This could affect the ability to conduct fuels treatments in the wildland urban interface, create defensible fuels profiles or it could result in constraints on prescribed fire applications that will increase costs or even the ability to conduct the prescribed fire due to safety concerns or operational infeasibility. At the current time denning habitat in all LAUs within the amendment area greatly exceeds the 10 percent threshold and the probability of this standard limiting fuels treatment activities is low. All hazardous fuels reduction activities identified through a process such as described in [A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan](#) are permitted in **Alternative D**.

Standard **VEG S4** limits the use of salvage harvest of areas smaller than 5 acres under alternatives B and C. Concentrations of mortality and wind thrown can create conditions favorable to crown fire initiation. The size of the area of high fuel loading is not as critical to crown fire initiation as is the ability to generate sufficient surface fire intensity for transition into the canopy. Location of fuels concentrations in the wildland urban interface would be of primary concern with landscape settings critical to the creation of defensible fuels profiles.

However this standard does not limit the use of mechanical fuels treatment methods that do not involve the recovery of economic value (product removal). Mechanical fuels treatments such as piling and burning, mastication, chipping and crushing and fire use activities could still be utilized to accomplish fuels reduction objectives. Limiting the ability to use commercial salvage harvest has a non-quantified effect on the treasury as appropriated funds would have to be utilized to conduct all fuels reduction projects, rather than allowing for a partial offset of costs.

**Alternative C** provides for an exception in **VEG S4** allowing salvage harvest within 200 feet of a dwelling and/or associated outbuildings. This allows for the use of commercial salvage harvest within the structure ignition zone but does not allow for salvage harvest in the remainder of the wildland urban interface zone. The fire regimes associated with lynx habitat are capable of supporting high intensity stand replacing fire events that are capable of extreme rates of spread and long range spotting. A distance of 200 feet includes much of the structure ignition zone and may contribute to a defensible space around the structure but it does not address the remainder of the hazard within the wildland urban interface. Additionally limiting treatments to a distance of 200 feet may not be sufficient to establish a defensible space around the structure. The distance required for a defensible space varies by site (slope, aspect) and vegetation (species, height) characteristics. Use of commercial salvage harvest within this limited area would allow for a non-quantified return of funds to the treasury however appropriated funds would still have to be utilized in the remainder of the wild lands.

Although there are almost infinite combinations of potential fuels, weather and topographic conditions that could be modeled for fire behavior within the amendment area, several examples can be used to illustrate the magnitude of the fire use issues. Using a single group of lodgepole pine trees on relatively flat terrain as a spotting source and a 90<sup>th</sup> percentile weather data, Behave calculates a spotting distance of 0.2 miles (1056 feet) (Hood, 2001). This spotting distance far exceeds the 200-foot distance proposed in the standards and guidelines.

Under wildfire conditions the fire intensity and spotting distances can be extreme. On the Bobcat fire (2000), on the Arapaho Roosevelt National Forest, fire spread rates in lodgepole pine, over one mile an hour, were reported. Flame lengths were reported to be from 100-150 feet above the treetops at the main fire front. Spotting was reported to be from    mile to 1 mile ahead of the fire front. Under these conditions, fire crews could do little to stop the advance of the fire. Safety of the firefighters and the public became the primary concern. (Close 2000). Other wildland fires in the mixed and stand replacement fire regimes, that comprise most lynx habitat, have exhibited greater rates of spread and spotting distances.

In **Alternative D VEG S4** is not included but **VEG G8** addresses salvage harvest of area smaller than 5 acres. As a guideline exceptions can be proposed and approved in the appropriate environmental analysis document. Use of commercial salvage harvest within limited areas approved in the environmental documentation would allow for a non-quantified return of funds to the treasury. This guideline allows for manager latitude in utilizing salvage harvest for fire hazard reduction including activities in the structure ignition zone and landscape settings critical for the development of defensible fuels profiles.

**VEG S5** as written for **Alternatives B and C**, limits the use of precommercial thinning. It is less restrictive under **Alternative D**. The degree of restriction varies between the alternatives. Although some units may refer to fire hazard reduction thinning as precommercial thinning when working with small diameter trees, the objectives of the thinning are quite different. Fire hazard reduction thinning is conducted to achieve objectives such as creating defensible space or defensible fuels profiles, decreasing the probability of crown fires, reducing the area burned by unwanted fires, decreasing the severity of impacts, enhancing fire suppression effectiveness and safety, reducing suppression cost and enhancing managers ability to implement fire use which includes prescribed fire for both hazard reduction and habitat improvement. Precommercial thinning is performed to concentrate growth on more desirable trees. Funding for fire hazard reduction thinning is from hazardous fuels appropriations.

**Alternative B** prohibits precommercial thinning unless the stands no longer provide snowshoe hare habitat. Fire Hazard Reduction Thinning is not permitted unless stands no longer provide snowshoe hare habitat. Only Fire hazard reduction thinning in the structure ignition zone (within 200 feet of dwellings or other structures) is permitted by exception. The inability to conduct thinning can affect the units' ability to create defensible space or defensible fuels profiles. This can have effects on both public and fire fighter safety, private property values and the ability to conduct fire use. Some landscape settings can be critical to the development of defensible fuels profiles. Precommercial thinning restrictions would preclude treating these critical landscape settings. This lack of treatment could eliminate wildland fire use options (fire can not be maintained within Maximum Manageable Area) or compromise firefighter safety though the inability to reduce the wildland fire threat adjacent to communities at risk. The impacts of this standard on wildland fire use are uncertain. The instances where wildland fire use or prescribed fire will be limited due to an inability to thin are very site specific and difficult to estimate at a programmatic level.

**Alternative D** permits Fire Hazard Reduction Thinning to be conducted within the structure ignition zone and in landscape setting critical for the development of defensible fuels profiles. This alternative allows for thinning to within 200 feet of dwellings and other structures, which will create defensible space to be tailored to the specific site conditions and vegetation and increase the effectiveness of the treatments. This alternative allows managers to conduct fire hazard reduction thinning to create defensible fuels profiles. Fire use activities will not be affected as thinning of critical landscape settings may occur. Firefighter and public safety is not adversely affected in this alternative.

Most fire hazard reduction thinning will occur in the mixed conifer cover types, which are found on the Southern forests (Pike San Isabel, Rio Grande, Arapaho Roosevelt and San Juan). There may be some needed in lodgepole but not as much as the mixed conifer type. It is estimated that only minor amounts would be needed in Engelmann spruce-subalpine fir cover types, for fuel breaks, structure ignition zone and some limited landscape settings critical to the development of defensible fuels profiles.

Limiting the exceptions to just fire hazard reduction thinning will reduce the amount of fire hazard reduction accomplished as secondary benefits of thinning for growth redistribution.

**Alternative C** provides additional exceptions to allow the use of precommercial thinning and vegetation management activities and practices that reduce snowshoe hare habitat under certain conditions. The exceptions in Alternative C will have no appreciable effect on the amount of thinning that provides secondary benefits of fire hazard reduction.

**VEG S5** as written for Alternative D affects vegetation management practices that reduce snowshoe hare habitat. The impact to hazardous fuels reduction activities is minimal as the standards includes exceptions for fire use practices and activities and all hazardous fuels reduction activities identified through a process such as described in A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan. Activities with secondary hazardous fuels reduction benefits will still be regulated by this standard under this alternative. In that regard this alternative is more restrictive than Alternatives B and C which only address precommercial thinning activities.

**VEG G1, G2, G3** and **G4** do not vary between alternatives. **VEG G1** and **G2** both can result in vegetation and fuels conditions on the grounds that are suitable for crown fire initiating and spread. **VEG G1** places an emphasis on recruiting high-density small diameter conifers. High-density conifer stands are more susceptible to crown fire spread. **VEG G2** promotes the retention of coarse woody debris for potential denning habitat. High surface fuel loadings contribute to surface fuels intensities. When the surface fire intensities equal or exceed the critical threshold, crown fire can initiate. However as guidelines, deviations are acceptable if documented in an environmental decision document following consultation with USFWS.

**VEG G3** encourages vegetation management activities that would provide for the retention or restoration of denning habitat on landscape setting with a low probability of loss from stand replacing fire events. The effects of this guideline on fire suppression actions and hazardous fuels reduction treatments are negligible.

**VEG G4** limits the construction of permanent firebreaks and permanent travel routes that would facilitate snow compacting activities. The effects of this alternative are negligible. Firebreaks are seldom constructed in the amendment area and fuel break construction is not limited. Permanent travel routes are seldom constructed under current suppression direction

**VEG G6** encourages the development of multi-layered Engelmann spruce-subalpine fir stands in LAUs without adequate winter snowshoe hare habitat. As a guideline most conflicts with hazardous fuels reduction actions can be mitigated within the project decision.

# Recreation

## Affected Environment

### Introduction

This section will discuss the on-going recreation use of the National Forests in the SRMGA and the effects of the proposed actions on that use and the users. Analysis focuses on recreation within Lynx habitat and Lynx Analysis Units (LAUs). Downhill ski areas are discussed separately. Seven National Forests will be included in this discussion. The amendments will apply to about 80 percent of the National Forests System lands within the seven National Forests (Table 3-REC1). The lynx habitat areas will be most affected and include about half of these NFS lands.

**Table 3-REC1 Percent National Forest and LAU Acres Affected**

| Forest                             | National Forest Acres | Lynx habitat Acres | Percent Affected | LAUs Acres       | Percent Affected |
|------------------------------------|-----------------------|--------------------|------------------|------------------|------------------|
| Arapaho/Roosevelt                  | 1,529,930             | 764,746            | 50               | 1,434,616        | 94               |
| Pike/San Isabel                    | 2,228,668             | 866,020            | 39               | 1,428,289        | 64               |
| Rio Grande National                | 1,859,444             | 1,058,400          | 56               | 1,634,047        | 88               |
| Routt National                     | 1,253,954             | 1,033,444          | 82               | 1,209,179        | 96               |
| Medicine Bow                       | 1,080,451             | 306,117            | 28               | 338,938          | 31               |
| San Juan National                  | 1,877,637             | 992,261            | 53               | 1,418,959        | 75               |
| Grand Mesa, Uncompahgre & Gunnison | 2,283,358             | 1,389,809          | 61               | 2,131,945        | 93               |
| Totals & Average Percent Affected  | <b>12,113,442</b>     | <b>6,410,797</b>   | <b>53</b>        | <b>9,595,973</b> | <b>80</b>        |

The recreation setting includes the forests of Colorado and southern Wyoming. These forests have outstanding recreation opportunities along with the most scenic wild lands in the United States. These forests provided for some 38 million-forest visits in 2001. Winter recreation is as popular as summer recreation in the Southern Rocky Mountains. The majority of winter recreation use on public lands is snowmobiling, cross-country skiing, and services provided by outfitters and guides.

### Recreation User Groups and Activities

Most visitors to the National Forests drive on forest roads and enjoy the scenery, stopping occasionally to enjoy specific views. The proposed actions are not expected to have much affect on this kind of recreation use. The activities that may be most affected by the Lynx Amendment are shown on Table 3-REC2. Each forest in the region provides a mix of recreation opportunities and, while the percent of participation in these activities varies between forests, there are strong similarities as well. By using the following limited sample as an estimate of existing use, potential forest visits that may be affected can be approximated. For example, winter recreation

activities without downhill skiing in the SRMGA accounted for 6 million National Forests visits in 2001.

**Table 3–REC2 Recreation Activity Participation,**  
(Percent of specific activity compared to total recreation use and total visits participating in the activity)

| Activity                          | Percent Participation San Juan NF. | Percent Participation Rio Grande | Percent Participation Arapaho-Roosevelt | Percent of Participation (Weighted Average) | National Forest Visits (Millions) |
|-----------------------------------|------------------------------------|----------------------------------|---|---|-----------------------------------|
| Snowmobile travel                 | 2                                  | 17                               | 3                                       | 4.73  | 1.89                              |
| Cross-country skiing, snowshoeing | 4                                  | 11                               | 14                                      | 11.56                                       | 4.33                              |

Outdoor recreation is a significant part of the quality of life for people living in the Southern Rocky Mountain Region. One quarter of the residents participate in winter recreation activities in the larger Rocky Mountain Region totaling some 3.6 million participants. The Rocky Mountain Region also receives a significant amount of outdoor recreation based tourism from across the country.

The actions proposed in the Lynx amendment for the southern Rockies will affect primary winter recreation participants and to a much lesser extent summer recreation participants. For the purposes of this analysis the winter recreation participants will be broken out into the following three groups: motorized (snowmobile riders), and non-motorized (cross-country skiers, snowshoe users), and outfitted and guided winter users.

### **Motorized Winter Recreation Use**

Snowmobile use is generally a family and club recreation activity with some more advanced participants involved in high risk “high marking” on very steep snow slopes and racing. Most snowmobile users go to a site on the National Forest within a few hours from home, park and unload the snowmobile and then ride on signed and groomed snowmobile trails until they find an open area to get off the trail and play.

A recent survey of snowmobile users found that 24 percent considered well-groomed trails to be very important to extremely important. However, it is important to note that 14 percent do not consider well-groomed trails to be important. Therefore, while groomed trails are a significant part of the recreation experience for the majority of users, some users do not place any significance on groomed trails. Also important is the ability to ride freely in open areas off trails. Most snowmobilers consider open play areas to be very important to extremely important. Over all this aspect was rated more important than well-groomed trails.

Most snowmobile users desire riding in areas that avoid conflict with other trail users. Opportunities to snowmobile in areas and trails that have few people on trails or open areas were considered as very important to 53 percent the snowmobile users surveyed. Crowding is an important consideration to the user group.

Grooming a system of trails provides easy high-speed access to adjacent forested areas suitable for dispersed snow play. Groomed trails concentrate use on the trails, and there is a constant high level of use on these trails on weekends. Groomed trails facilitate access to remote areas of the forests, including in some cases areas above timberline. If trails are not groomed, they become difficult to travel over and act as a barrier to use in remote areas.

In 2002, there were 32,741 registered snowmobiles in Colorado. Snowmobile use in Colorado is increasing and anticipated to continue to increase over the planning period. The growth rate of this use is very different in Wyoming. The resident total snowmobile registrations were 17,989 in 1999, and are considered to be static. However the growth rate of non-resident use from 1998 to 1999 grew 32 percent (Wyoming State Parks). This is a large increase and is not expected to be a sustained rate of growth over the planning horizon.

### **Non-motorized Winter Recreation Use**

Non-motorized winter users make up a large segment of winter recreation visitors. There is an estimated 4.4 million National Forest visits in which the primary activities were cross-country skiing, including track, touring and backcountry skiing and snowshoeing.

In general, these non-motorized participants drive to a site on the National Forest within a few hours from home, and ski or snowshoe on signed, groomed and un-groomed trails. Some seek an open area to get off the trail and play. Important requirements are adequate parking areas, signed and in some cases, groomed trails and unstructured open play areas. The groomed trail network allows users to disperse into the forest for off-trail opportunities or to enjoy ski skating and traditional techniques without having to cope with the irregularities in the trail. Without grooming these snow trails become rough and difficult to travel. For some users these ungroomed trails provide an unsatisfactory recreation experience. Designated trails concentrate use onto the trails instead of each user finding their own routes. Most trails presently experience moderate levels of use on weekends. Presently the backcountry trail system in SRMGA is fairly limited with adequate parking areas which result in concentration of use at popular locations.

### **Relationship Issues between the motorized and non-motorized User Groups**

Many snowshoers and skiers find a machine packed trail attractive, although the use of snow machines on those trails may be a hazard to both the skier and the rider. Conflicts may arise between user groups beyond that of potential hazard. Many nonmotorized users find the sound and smell of snow machines and in some cases even their presence as detracting from the quality of their recreation experience. There can also be some conflict between snowshoe users and skiers because of the very different speeds involved and the negative impacts that snow shoes can have on ski trails. This can also result in the need for separate trail systems.

Snowmobile clubs have been very well organized in Colorado and Wyoming. They have worked with State Government and the Federal land managers to develop extensive system of groomed and signed trail networks and associated parking areas. Backcountry or Nordic skiers have not been as well organized and have not developed extensive systems of backcountry trails. Privately

run Nordic centers have grown in numbers, providing abundant opportunities for very well groomed cross-country skiing.

### Groomed or Designated Routes

The data in Table 3-REC3 are estimates of the total groomed or designated winter routes in and out of lynx habitat for all the National Forests in the analysis area. This table does not indicate areas specifically identified and designated for winter use activities such as tubing or snowmobiling or other winter recreation activities. This table provides an estimate of the baseline mileage of groomed or designated over-the-snow routes, presently totaling 4,631 miles.

**Table 3–REC3 Southern Rockies Lynx Amendment Estimated Designated and Groomed Winter Routes**

| National Forest                    | Total Groomed Routes (Miles) | Total Designated Routes (Miles) | Total Groomed or Designated Routes In Lynx Habitat (miles) | Total Groomed or Designated Routes in LAUs (miles) |
|------------------------------------|------------------------------|---------------------------------|--|--|
| Arapaho Roosevelt                  | 145                          | 652                             | 117  | 145  |
| Pike and San Isabel                | 163                          | 1239                            | 707  | 1,062  |
| Rio Grande                         | 167                          | 314                             | 196  | 319  |
| Routt National Forest              | 160                          | 527                             | 313  | 387  |
| Medicine Bow National Forest       | 244                          | 578                             | 142  | 161  |
| San Juan                           | 353                          | 1431                            | 682  | 1045   |
| Grand Mesa, Uncompahgre & Gunnison | 511                          | 1,001                           | 795  | 1,512  |
| <b>TOTAL</b>                       | <b>1,743</b>                 | <b>5,742</b>                    | <b>2,952</b>   | <b>4,631</b>                                       |

### Outfitted and Guided Winter Recreation Use

Outfitter and Guides provide an important service to the public seeking a wide variety of recreational opportunities on public lands. Special use permits authorize recreation services provided by outfitters. A majority of permits issued are for summer activities although there are many permits issued to outfitters who operate during the winter. Winter outfitter and guides provide an important service to those visitors lacking the skills and equipment to participate in winter activities and provide jobs and income to many small rural western communities. Some of the winter services provided by outfitters are snowmobiling, cross-country or helicopter skiing, and late winter/early spring big game hunting.

Table 3–REC4 displays the total number of recreation special use permits and agreements issued by each of the National Forests in the SRMGA. There are a total of 949 permits and agreements in the Southern Rockies. A total of 14 snow play areas and a total of 912 outfitter and guide permits with in the SRMGA are authorized during winter in lynx habitat.

Across the region the number of overall outfitter and guide permits and level of outfitter guide use has remained relatively steady over the past ten years. Most forests have reached the total allowable allocation for summer use and in some cases winter use as well. As a result, new permits or more service days have only been issued when existing permits ceased to exist or when permitted outfitters decreased their service days.

Winter use, particularly in Colorado, has also had a great amount of outfitted user activities, such as snowmobiling, cross-country skiing, snowshoeing and dog sledding. These uses have grown over the past ten years. The category of winter trips provided by outfitters and guides is also reaching capacity limits and not expected to result in significant increases in overall outfitter and guide use across the region.

**Table 3–REC4 Forest recreation special use permits and agreements**

| Forest  | Resort Permits | Outfitter & Guide Permits | Snow Play | Total      |
|---|----------------|---------------------------|-----------|------------|
| Arapaho Roosevelt National Forest                   | 3              | 100                       | 0         | 103        |
| Pike and San Isabel National Forests                | 1              | 136                       | 2         | 139        |
| Rio Grande National Forest                          | 4              | 61                        | 4         | 69         |
| Medicine Bow  | 2              | 75                        | 1         | 156        |
| Routt National Forests                              | 2              | 75                        | 1         |            |
| San Juan National Forest                            | 0              | 140                       | 1         | 141        |
| Grand Mesa, Uncompahgre & Gunnison National Forests | 4              | 165                       | 5         | 174        |
| White River National Forest                         | 7              | 160                       | 0         | 167        |
| Totals  | <b>23</b>      | <b>912</b>                | <b>14</b> | <b>949</b> |

### Projections of Future Use

The recreation use occurring in the Southern Rockies are strongly affected by the changing demographics of the region. Population growth is the greatest indicator of future growth in the participation of these user groups. Colorado is expected to grow over the next twenty-five years by over two million inhabitants, an increase of 50 percent of today's population. Wyoming is expected to grow by 183,000 inhabitants, a growth of 35 percent of today's population. Growth in winter and summer outdoor recreation is expected to grow by at least this amount.

Participation rates in some activities are growing at rates faster than population growth rates (See Table 3–REC5, below). Below uses the projected index provided by the recreation researchers.

**Table 3–REC5 Projected Winter Sports Growth In the Rocky Mountain Region**

| Activities           | Percent change from base year (2000). |      |      |
|----------------------|---------------------------------------|------|------|
|                      | 2010                                  | 2015 | 2025 |
| Cross Country Skiing | 31                                    | 41   | 88   |
| Snowmobiling         | 6                                     | 10   | 16   |

Data (Source: Outdoor Recreation in American Life, Ken Cordell Principal Investigator, Sagamore Publishing, 1999 Table V1.3, V1.4, V1.5, pages 236-328)

## Environmental Consequences

Standards and Guidelines in Alternatives B, C and D that have the potential to affect recreation activities are HU S1, HU G3, HU G6,

The recreation issue is that the proposed amendment may negatively impact the quality or quantity of recreation opportunities and the subsequent recreation experiences of the visitors to the National Forests, particularly in the winter. To describe the effects of the proposed action in a way that addresses the issues the following measures will be used: recreation opportunities being provided in miles of designated or groomed trails, recreation participation by winter recreation activity in the number of forests visits, total forest recreation visits, the quality of the recreation experience especially focusing on the negative effects of crowding and conflicts between user group.

### Direct and Indirect Affects

#### Alternative A - No Action

Under the No Action Alternative, winter access and use, and expansions of outfitting and guide operations on National Forest would be managed under existing Forest Plans. Decisions related to access and issuance of outfitter permits would continue to be made at the local level through forest, resource and project land management planning. Current trends for winter trail grooming, winter recreation use, and expansion and outfitter operations would continue.

Grooming of winter trails would continue and increase as demand and funding provide the means to maintain and expand the system. This means that the amount of groomed or designated routes in lynx habitat could increase above current levels. Groomed trails will facilitate access to open areas in presently remote parts of the forests that maybe used for snow play.

Table 3-REC6 displays the predicted growth rates of groomed and designated trails and recreation use that results in snow compaction for Colorado, Wyoming and the Southern Rockies. Different sources were used to estimate rates of growth, each with their own measures. In some cases, households were use and in other estimated actual use collected on the National Forest as measured in Recreation Visits or Recreation Visitor Days. The most significant factor in anticipating future use is population growth. In summary, snowmobile use is anticipated to increase by 50 percent, cross-country skiing and snowshoe use by 80 percent and groomed trails use by 50 percent. The quality of the recreation experience would remain high, as new facilities are developed to provide for the increased use. The total miles of new groomed and designated trails are projected to increase by 2,871 miles to a total system of 8,613 miles.

**Table 3–REC6 Projections of future recreation use and expansion of groomed and designated trails**

|  | 2000    | 2010    | 2015    | 2025    |
|--|---------|---------|---------|---------|
| <b>COLORADO</b>  |         |         |         |         |
| Residents who Snowmobile<br>Growth rate in percent                 | 0       | 20      | 30      | 50      |
| Households   | 13,636  | 16,363  | 17,727  | 20,454  |
| Non-Residents who Snowmobile<br>Growth rate in percent             | 0       | 6       | 10      | 16      |
| Households   | 7,400   | 7,844   | 8,140   | 8,584   |
| Cross country skiing   | 0       | 15      | 25      | 35      |
| <b>WYOMING</b>   |         |         |         |         |
| Forest Snowmobile RVDs   | 216,000 | 248,400 | 248,400 | 291,600 |
|  |         |         |         |         |
| <b>Southern Rockies Totals</b>                                     |         |         |         |         |
| National Forest Visits<br>Growth rate in percent                   | 0       | 20      | 30      | 50      |
| Visits (Million)   | 37.7    | 45.24   | 49.01   | 56.55   |
| Snowmobile visits<br>Growth rate in percent                        | 0       | 20      | 30      | 50      |
| Visits (Million)   | 1.89    | 2.268   | 2.457   | 2.835   |
| Cross country Ski Visits<br>Growth Rate in percent                 | 0       | 31      | 41      | 88      |
| Visits (Millions)  | 4.33    | 5.629   | 6.495   | 7.794   |
| Expected Groomed Trails in Lynx Habitat<br>Growth rate in percent) | 0       | 20      | 30      | 50      |
| Total expected growth in designated Routes<br>(miles)              | 5,742   | 6,890   | 7,464   | 8,613   |

Public demand for winter outfitter services would continue. Growth in outfitter business and the number of permittees would follow current rates of slowed growth due to capacity issues.

Forest Plan standards and guidelines would continue to guide and limit recreation both in summer and in winter. At present time no forests have reached a total carry capacity limit for winter and summer recreation in areas outside of Wilderness, so for the planning period no restrictions in recreation growth is expected from the existing Forest Plans.

#### Alternative B - Proposed Action

Under the Proposed Action winter access and use and outfitter/guides operations on NFS lands would be managed under amended resource management plans. New standards would affect the availability and amount of winter trail access in lynx habitat. Expansion of groomed or designated routes would be restricted.

About 5,742 miles (See Table 3-REC3) of designated and groomed winter routes would be available for use. The opportunity to increase the total groomed and designated over-the-snow routes that consolidate recreation use and improve lynx habitat could occur by LAU or in a combination of immediately adjacent LAUs. This provides the flexibility for land management agencies trying to accommodate increasing demands for winter recreation opportunities.

Limiting increases in groomed and designated over the snow trails will be to keep the trail system at its present size and reduce the natural growth of the system as it responds to increased use. This would result in the decrease of about 2,871 miles of new designated trails over the planning period. Grooming will expand into the existing ungroomed designated trail system. The present system will need to accommodate the expected increase in use. This would result in approximately 50 percent more interactions between users. Increased use and interactions may result in crowding and consequently decrease the quality of the recreation experience as well as increase the probability of accidents occurring on the more crowded trail systems. This decrease in the quality of the recreation opportunity is not expected to reduce overall participation in the activity.

Winter recreational non-motorized users will encounter even greater conflicts with motorized users as overall participation increases. The non-motorized users will have little opportunities to develop new systems of groomed or designated trails and the existing trail systems which in some areas are already crowded will become even more crowded as the number of users increases. This will result in a decrease in the quality of the recreation experience but not the participation in this activity.

New authorizations, expansion of existing outfitter operations, issuance of permits, or other agreement instruments would be limited to existing authorized groomed and designated routes and areas. Individuals and families would not be restricted from using new areas or routes open to winter motorized use, but grooming or designation of new routes would be restricted as previously described. Some areas will reach capacity and this use will be capped at some point.

Summer recreation will for the most part be unaffected, except for driving for pleasure. As traffic volume increase by 50 percent, not upgrading existing roads in lynx habitat may result in some congestion and increased risk of accidents. This may cause a decrease in the quality of the driving recreation experience.

### Alternative C

Winter access and use and outfitter/guide operations on NFS lands would be managed under amended resource management plans. New standards would affect the availability and amount of winter trail access in lynx habitat. Expansion of groomed and designated routes would be restricted.

About 5,742 miles (See Table 3-REC3) of designated and groomed winter routes would be available for use.

The effects of the limitation to increase groomed and designated over the snow trails will be similar to Alternative B.

#### Alternative D

Summer recreation will be unaffected. Winter recreation affects will be somewhat less than Alternative C, with direction provided as guidelines versus standards.

#### **Cumulative effects Alternatives A, B, C, and D,**

The following summarizes past, present and reasonably foreseeable programmatic actions that may cumulatively affect winter recreation.

#### Colorado Interstate 70 expansion

In Colorado traffic congestion is discouraging urban Front Range population centers from using the National Forests for recreation both in the winter and the summer. The planned expansion of I-70 will make it easier to visit the National Forests and will increase recreation use on the National Forests. While not discussed in the projections of future use section the effect of this major project was considered to the extent that transportation systems will not be a limiting factor to use in the future.

#### Yellowstone and Rocky Mountain National Parks

A decrease or ban in snowmobiles access will increase the use on along the travel corridor to the National Parks and affect the Medicine-bow Routt National Forests. Increased visitation by displaced snowmobilers could result in crowding on existing trail systems, with a decrease in visitor satisfaction with their recreation experience, and increased conflict with non-motorized users.

# Ski Areas

## Affected Environment

Due to a variety of factors, the Southern Rocky Mountains Geographic Area is uniquely well suited to the development of ski areas. Due to its continental climate and relatively high elevations, this area experiences long, cold winters accompanied by reliable snow that is relatively dry and remains soft due to the infrequency of freeze-thaw and rain events. Additionally, due to their expanse, these mountains contain numerous sites that possess the terrain features, such as slope, aspect, and vertical relief that make them well suited for ski area development. Historic settlement patterns have created the basic infrastructure and population base to support the development and successful operation of ski based resorts.

The region's unique history provided the final ingredient for ski area development in the Southern Rocky Mountains, entrepreneurial expertise. Camp Hale, the World War II training base for the U.S. Army's 10th Mountain Division, is located in the center of this area. Several soldiers in the 10<sup>th</sup> Mountain Division had a keen interest in skiing and knowledge ski area development. These individuals recognized how well suited the Southern Rocky Mountains were for the development of ski areas. Following the end of the war, they returned to this area and provided the entrepreneurial effort and expertise needed to capitalize on this area's characteristics favoring ski area development.

As a result of the combination of factors discussed above, numerous ski areas were developed and operated in the Southern Rocky Mountains. At this time, 14 ski areas are permitted to operate on 33,189 acres of NFS lands on the Arapaho, Roosevelt, Grand Mesa, Uncompahgre, Gunnison, Routt, Medicine Bow, Rio Grande and San Juan National Forests. They include world-renowned resorts such as Steamboat and Winter Park as well as smaller locally important ski areas like Wolf Creek and Ski Cooper. In the 1999-00-ski season, these 14 ski areas generated almost four million skier visits and paid \$2.4 million in land use fees to the U.S. Treasury. Table 3-REC7 displays the number of acres of NFS lands under permit, skier visits, and land use fees paid by individual ski areas during the 1999/00 ski season.

**Table 3–REC7 1990-2002 Ski Season Information by Ski Area**

| <b>National Forest</b>        | <b>Ski Area</b>          | <b>Permitted Acres</b> | <b>99/00 Skier Visits</b> | <b>99/00 Land Use Fee (x1000)</b> |
|-------------------------------|--------------------------|------------------------|---------------------------|-----------------------------------|
| <b>Arapaho/<br/>Roosevelt</b> | Berthoud Pass            | 1,708                  | 16,870                    | \$8.6                             |
|                               | Eldora                   | 480                    | 229,785                   | \$35.0                            |
|                               | Loveland                 | 3,620                  | 264,532                   | \$165.3                           |
|                               | Winter Park<br>Mary Jane | 7,107                  | 902,827                   | \$605.9                           |
| <b>Gunnison</b>               | Crested Butte            | 4,908                  | 414,642                   | \$207.1                           |
| <b>Grand Mesa</b>             | Powderhorn               | 1,430                  | 71,941                    | \$14.9                            |
| <b>Uncompahgre</b>            | Telluride                | 3,460                  | 309,737                   | \$135.6                           |
| <b>Medicine Bow</b>           | Snowy Range              | 945                    | 20,000                    | \$19.3                            |
| <b>San Isabel</b>             | Cuchara                  | 342                    | 32,154                    | \$4.6                             |
|                               | Monarch                  | 670                    | 127,215                   | \$75.7                            |
|                               | Ski Cooper               | 920                    | 60,171                    | \$21.5                            |
| <b>Rio Grande</b>             | Wolf Creek               | 1,581                  | 114,802                   | \$89.8                            |
| <b>Routt</b>                  | Steamboat                | 3,486                  | 1,024,832                 | \$849.3                           |
| <b>San Juan</b>               | Durango Mtn.<br>Resort   | 2,432                  | 235,000                   | \$137.6                           |
| <b>TOTAL</b>                  | <b>14 ski areas</b>      | <b>33,189</b>          | <b>3,824,508</b>          | <b>\$2,400.2</b>                  |

There is considerable diversity in the ski areas and resorts on NFS lands in the Southern Rocky Mountain Geographic Area. Some are purely ski areas operating only in the late fall winter and early spring while others are four season resorts that operate most of the year.

Ski areas and resorts include developments such as ski trails, tramways, and ancillary facilities such as restaurants, maintenance buildings, snow making ponds, and parking lots.

Ski areas that operated only during the ski season are generally of smaller scale than four season resorts and development of private land at or adjacent to their base areas is less common and extensive.

Four season resorts are usually more highly developed with skiing and snowboarding occurring in the winter and spring and hiking and mountain biking occurring in the summer. These resorts are also associated with development on private land at or adjacent to their base areas. These developments frequently include commercial and private lodging, restaurants, bars, retail shops, golf courses, other recreational amenities and an associated road network.

Each Forest Plan for the National Forests in the Geographic Area include management area prescriptions specific to existing and potential ski based resorts. The 1B Management Area Prescription provides direction for the management of existing and potential winter sports sites on the GMUG, Medicine Bow and San Juan National Forests. On the Pike/San Isabel the 1B-1 Management Area Prescription provides direction for existing winter sports sites while the 1B-2

Management Area Prescription provides direction for potential winter sports sites. On the Arapaho/Roosevelt, Routt and Rio Grande National Forests the 8.22 Management Area Prescription provides direction for both existing and potential ski based resorts/winter sports sites. It should be noted that each of these management area prescriptions differ, but not in any significant manner.

## **Environmental Consequences**

### Alternative A - No Action

Existing and potential ski based resorts would continue to be managed according to the direction in existing Forest Plans.

### Alternatives B, C, and D

Standards and guidelines would add to, but would not conflict with, the management direction for potential ski based resorts and winter sports sites that is currently in the Forest Plans. This new direction, with minor exceptions, would only apply to the development of new ski areas and to expansions of existing ski areas and would not affect existing ski area facilities or constrain ski area activities that are consistent with historic operations. Winter recreation affects will be somewhat less under Alternative D, with direction provided as guidelines versus standards.

Under Alternative B standard **HU S2** would require that when developing or expanding ski areas, trails, access roads and lift termini to maintain and provide lynx diurnal security habitat if it is identified as a need. Similar direction is provided for Alternatives C and D with guideline **HU G11**. The effect of these requirements may be to reduce the potential efficiency of how these developments function as compared with developments designed to optimize efficiency focusing on ski operations. The costs of constructing developments to protect potential diurnal security habitat and maintaining connectivity, as well as associated operational costs, may be greater than for developments designed to optimize the efficiency of skiing operations.

Standard **ALL S1** would require ski area operations that may be within lynx linkage areas to maintain the connectivity of lynx habitat. It should be noted that this is the only instance where historic operations at existing ski areas may be affected by this alternative. Implementing this standard may result in limiting use of some currently developed skiing terrain and the need to develop additional terrain in order to achieve desired trail capacity with associated increases in development and operational costs.

Guideline **HU G1** would encourage that adequately sized inter-trail islands, including retention of coarse woody material to maintain snowshoe hare habitat, be provided in new ski areas and expanded portions of existing ski areas. The effect of this may be to reduce the trail capacity that might be provided from an area as compared to a trail system designed to optimize the potential skiing opportunities of the area. This may also result in increasing the cost of developing trail capacity since more terrain would need to be included in the development to provide a given amount of trail capacity.

Guideline **HU G2** would encourage that in new ski areas or in expanded portions of existing ski areas nocturnal foraging opportunities for lynx are provided, consistent with ski area operational needs. This may be achieved through operational constraints designed to provide foraging opportunities as well as reasonable opportunities for ski area management activities such as grooming and snowmaking. These constraints may complicate the coordination and scheduling of these operations with corresponding increases in their cost. Constraints on nighttime grooming may require more daytime grooming when ski areas are open. Due to safety and associated liability concerns, daytime grooming may limit the amount of developed terrain available for public use. As a result, additional terrain may need to be developed to achieve desired trail capacity with a corresponding increase in cost. Constraining nighttime snowmaking may limit the effectiveness of this activity early in the ski season when daytime temperatures may not cold enough to make snow efficiently. This could result in delaying the opening of new or expanded terrain for skiing beyond when it might be available if nighttime snowmaking were not constrained. This delay may result in lost revenues and increased costs due to inefficient snowmaking operations.

#### Alternative C

This alternative would have similar standards and guidelines as Alternatives B and D, but would also include guideline **HU G10** (as noted for Alternative C). This guideline directs that lynx habitat improvement projects be implemented when there is a permanent conversion of lynx foraging habitat, such as the development of ski area runs. This guideline would add to the costs of ski area expansions and development, but would not preclude those projects and activities.

#### Alternative D

Under Alternative D, direction pertaining to designated over-the-snow routes or play areas found in Alternatives B and C as HU S1, is provided as a guideline **HU G10** (note: HU G10 differs for Alternatives C and D). Standard **HU S3** for Alternative D clarifies that winter access for non-recreation special uses shall be limited to routes designated for those uses.

# Lands Activities

## Introduction

Lands activities and Forest Service authority to manage them depends on the types of activity and the legal status of the NFS lands on which they occur. A wide variety of authorized lands Special Use activities occur on NFS lands in the Southern Rockies region. The land ownership and adjustment program includes land exchanges, interchanges and purchases; the Small Tracts Act conveyance program; and road and trail right-of-way acquisition program. Other lands work includes encroachment resolution, title claim issues, boundary management, and appraisal services associated with many of these lands activities.

## Affected Environment

### Landownership Adjustment/Acquisition

Landownership adjustments include land exchanges, conveyance of NFS lands through Small Tracts Act or other programs, and acquisition of non-Federal lands through direct purchase. The program is active throughout the Southern Rockies Management Geographic Area (SRMGA). Regional figures for the preceding 10-year period include the acquisition of approximately 139,000 acres through land exchanges and 44,000 acres through purchase. The fundamental purpose of the real estate management program is to manage and conserve the public's real property within the boundaries of the NFS lands for the purposes for which they were reserved from the public domain, as well as enhance resources through the acquisition of critical inholdings. One of the purposes of the landownership adjustment program is to consolidate the NFS lands into a pattern that facilitates efficient administration of land and resource management. Lands within the proclaimed boundaries of National Forests, but outside the control of the Forest Service, constitute approximately 11 percent of the acreage within the covered in the SRMGA.

Road and trail right of way (ROW) acquisition on private, state, other federal and non-federal land is an integral part of the acquisition program. The SRMGRA acquires anywhere from 5 to 40 right-of-ways on an annual basis to gain necessary access to NFS lands.

### Lands Special Use Authorizations

Special uses are defined in 36 CFR 251.50(a) as: All uses of NFS land, improvement and resources, except those provided for in the regulations governing the disposal of timber (Part 223) and minerals (Part 228) and the grazing of livestock (Part 222), are designated as "Special Uses." A Special Use Authorization (SUA) can be a permit, a term permit, a lease, or an easement. There are over 100 different use types that can be authorized on NFS lands and on National Grasslands.

These lands special uses include but are not limited to electric transmission and distribution lines, telephone lines, fiber optic cables, railroads, reservoirs, ditches, roads, highways,

communication sites, oil and gas pipelines, transmission lines, seismic sites for research and military exercises. Authorizations can also be issued for smaller facilities including apiaries and fences. Hydropower projects, which require coordination with the Federal Regulatory Energy Commission (FERC) and compliance with the Federal Power Act are permitted with SUAs. These facilities require use and occupancy of NFS lands, clearing and road access. The SRMGA includes approximately 4,300 lands SUAs including permits, leases and easements. Approximately 30 percent of these are road rights of way. The majority of the other uses rely upon road access to accommodate construction, operation and maintenance. A relatively small percentage of SUAs can operate without road access.

There are a large number of requests each year for road access in the SRMGA. Many of these tracts to which access is requested are relatively small in acreage and are zoned by counties to allow development. A fair number of these requests are for “inholdings” defined as “nonfederally owned land surrounded by public lands managed by the Secretary under the Federal Land Policy and Management Act of 1976”. Under ANILCA (Alaska National Interests Lands Conservation Act of 1980), inholdings are guaranteed access. Title 36 of the Code of Federal Regulations 251 Subpart D (36 CFR 251. 110 (c)) says “as appropriate, landowners shall be authorized such access as the authorized officer deems adequate to secure them the reasonable use and enjoyment of their land.”

### **Other Lands Activities**

Boundary management, title claim resolutions and appraisal activities typically do not involve land-disturbing activities. Encroachment resolution may involve removal of trespass improvements, depending on the case.

## **Environmental Consequences**

### Alternative A - No Action

Under the No Action alternative there would be no change from current practices or processes that include the protection of wildlife (whether listed or not). All lands activities would continue to be evaluated and processed following the regulations and current Forest Plan direction. The No Action alternative does not address lynx and lands activities directly but protection of wildlife species and their habitat is provided through the application of the Forest Service regulations for Special Use authorization issuance and all adjustment/acquisition activity. Opportunities would still be sought to acquire lands important to Lynx and other threatened, endangered and sensitive species. Disposal of any lands within an LAU is evaluated in light of overall net benefits, i.e. giving simultaneous consideration to those lands to be acquired in exchange.

Currently, impacts to and protection requirements or mitigation for any TES species are identified in project level analysis, associated biological assessments and evaluations and decisions involving site-specific disturbance activities for all lands activities. This would not change under the No Action alternative.

At the project level, to ensure these mitigations are accomplished, the Forest Service may require monitoring plans, inspection during and post construction, and performance bonds. The authorized officer responsible for approving special use activities also has the discretion to limit public access without impacting the implementation or construction of the facility under permit. Under certain conditions, the authorized officer may consider imposition of a deed restriction on lands being conveyed out of Federal ownership.

### Action Alternatives

The action alternatives are similar and represent programmatic decisions. They may have an effect on land adjustment and acquisition activities and options for special use proposals. Direct effects could occur at the project level when site-specific decisions are made. Most of the effects identified in this analysis would be indirect effects, occurring later in time.

### **Landownership Adjustments/Acquisitions**

Lynx exemplify the need for landscape scale ecosystem management. Contiguous tracts of land in public ownership provide management opportunities to maintain lynx habitat connectivity and options to acquire non-public tracts provide additional opportunities to enhance lynx habitat connectivity. Coordination with public land management agencies, land conservation organizations and in some cases, non-Federal landowners, is important to providing the connectivity needed for the survival of the lynx in the SRMGA.

The action alternatives provide management objectives and guidelines (**LINK O1**, and **LINK G1**) that affect the adjustment and acquisition activities.

Guideline **LINK G1** provides for the retention of linkage areas in public ownership under most circumstances. Conveyance of lands in linkage areas could occur, particularly if it can be demonstrated that the resource values of lands to be received exceed those of the lands to be conveyed, including lynx values. Conveyances could also occur with deed restrictions placed on lands to protect lynx values.

The ROW acquisition program for road and trail access to NFS lands could change. If conditions warrant the need for crossings or reconsideration of upgrade options, line officers may choose not to obtain road or trail ROWs across other ownership that may be necessary for NFS access.

### **Lands Special Use Authorizations**

The action alternatives provide management objectives, and standards and guidelines that affect special use activities. Specifically the proposed action includes the following standards, objectives, and guidelines that pertain: **ALL O1**, **ALL S1**, **HU O1**, **HU O5**, **HU S3**, **HU G6** (Alternatives C and D differ slightly from B), **HU G7**, **HU G9**, and **HU G10** (Alternative C only).

Granting and administering of Special Use authorizations (SUA), particularly those associated with road access could potentially impact lynx movement, habitat connectivity and increase lynx mortality. The risk of all three appears relatively minor in the case of SUAs which provide access to inholdings, usually issued to an individual or a Homeowners Association, in comparison to highly developed, higher speed highways. Many of the non-Federal inholdings do not have year round residences on them. In Special Use right-of-way cases where project level analysis indicates that any of the above impacts would occur, mitigation measures could be considered and employed. Alternate locations of the proposed route(s) (in new construction cases) should be considered, however it is possible that no other route is physically feasible.

Road construction and use for larger projects like transmission and pipelines could also potentially affect movement, habitat connectivity and increase mortality. Again, it appears that with the new objectives, standards and guidelines, these effects would be minimal.

Development of oil and gas wells and their associated off lease Special Use and authorized facilities has the potential to impact lynx habitat. While the lynx amendment may increase cost of operation in lynx habitat it would not prohibit access to federal minerals, or prohibit the location of transmission pipelines. It may limit options for locations of facilities.

These activities would be analyzed for the effect on lynx on a case-by-case basis and the standards and guidelines applied at the project level.

### **Cumulative Impacts For the Action Alternatives**

**Land Adjustment/Acquisition:** All alternatives may limit parcels available for disposal, depending on habitat presence and condition. It may also limit the options for parcels to acquire.

**Lands Special Use Authorizations:** The Lynx amendment may increase costs for special use facility authorizations.

Under Alternative B this may limit options for location of access roads, and the authorized facilities. It may limit Forest service ability to authorize upgrades to roads in areas of private development.

Under Alternatives C and D, Guideline **HU G6** allows for use of methods such as fencing or crossings to be used in conjunction with upgrading, rather than guidance to avoid upgrades. More roads could be upgraded using other methods to reduce potential mortality of lynx.

Under Alternative C, Guideline **HU G10** may apply to large scale projects like transmission lines or pipelines, where permanent (life of the Land and Resource Management Plan) conversion to habitat may occur. Costs may increase due to the requirement to “treat” a comparable number of acres of habitat. There may be some adjustments in use or constraints on access roads for authorized facilities. There may be some limitations or constraints on options for location of facilities such as high voltage transmission lines or large

communication sites based on the guidelines on permanent conversion of winter foraging habitat.

**Other Lands Activities:** The action alternatives would have no effects on the boundary management, title claim resolution or appraisal activities. It may affect encroachment resolution depending on the degree of ground disturbing activity and access needs.

# Minerals

## Introduction

Exploration, development, and production of mineral and energy resources and reclamation of ground disturbing activities are part of the Forest Service ecosystem management responsibility. As such, the Forest Service administers its minerals program to provide commodities for current and future generations commensurate with the need to sustain the long-term health and biological diversity of ecosystems. In doing this, Forest Service policy is to:

1. Encourage and facilitate the orderly exploration, development, and production of mineral resources from NFS lands, and,
2. Ensure that exploration, development, and production of mineral resources are conducted in an environmentally sound manner and that these activities are integrated with planning and the management of other National Forest resources. (FSM 2802)

The proposed action provides management direction for mineral development. Specifically the proposed action includes, subject to valid existing rights, the following objectives, standards, and guidelines: **ALL O1, ALL S1, HU O1, HU O5, HU S3, HU G4, HU G5, HU G6, HU G7, and HU G9.**

## Affected Environment

**Locatable Minerals and Reserved and Outstanding Minerals:** The affected Forest areas have had a long history of locatable mineral activity. The “Colorado Mineral Belt” stretches across Colorado from the southwest corner to its north-central border and into the Medicine Bow and Laramie Range Mountains in southern Wyoming. During the 2000 fiscal year the affected forests processed approximately 34 Plans of Operations and received 220 Notices of Intent to Operate from mineral operators. Access to mineral activity is typically by motorized vehicles using established routes. Any new access required for mineral operations requires a project specific analysis and approval by the authorized officer.

Exploration and mining usually occurs in areas where past mining has occurred and where geologic conditions are conducive to the formation or deposition of mineral deposits. Most locatable mineral activity in the past involved hand prospecting and maintenance of existing facilities. With the recent modification of BLM regulations regarding assessment work for mining claims, mining claimants may now post a holding fee in lieu of doing the required \$100/claim assessment work, thus reducing the level of ground disturbance typically associated with exploration and access. In addition, most on-the-ground activities are usually conducted during the months of May to September because of the elevations and climatic conditions in the area.

**Leasable Minerals:** Portions of each of the forests lie in areas geologically predisposed to have potential for the occurrence of natural gas and oil. In all cases, development of natural gas and oil (fossil energy) resources is dependent on forest plan management direction for oil and gas leasing and development. Individual forest plans provide details about currently leased areas, unleased areas open for lease nominations, areas with leasing restrictions, and areas unavailable to leasing.

As of August 2001, there are approximately 1.0 million acres under lease for oil and gas, while 830,000 acres are pending for lease within the planning area. Approximately 89,800 acres have been forwarded to the BLM, where most are recommended for leasing. Current leases contain 1,100 oil & gas wells that produced approximately 5.7 million barrels of oil, 13.6 billion cubic feet of gas, and 3.9 million gallons of liquid natural gas. There are approximately 310 wells proposed for drilling on existing leases. The area also contains three underground coal mines, which produced over 61.9 million tons of coal during their 2000 operating year. Total Revenues to the U.S. Treasury for fiscal year 2000 attributed to the energy mineral resources within the project area for rents, royalties, and bonuses is \$59.9 million. Areas covered by leases range in elevation between 5,000 and 11,000 feet.

#### Medicine Bow National Forest

The geologic environment in which natural gas and oil resources can occur on the Medicine Bow National Forest exists on the western side of the Sierra Madre and the northern and eastern sides of the Medicine Bow Mountains. The area with natural gas and oil resource potential on the western side of the Sierra Madre is on the eastern edge of the Greater Green River Basin. The richness potential for this area for all hydrocarbon types (oil, natural gas, and natural gas liquids) is low (USDI AE 2003). The area with natural gas and oil resource potential on the northern and eastern sides of the Medicine Bow Mountains is on the southern edge of the Hanna basin and western edge of the Laramie Basin, respectively. The potential for natural gas and oil resource occurrence in these areas is low to moderate (Laramie Basin reference WOGRA, USGS). Some exploration for and development of natural gas and oil resources may occur in the future. Such activity would include wells, and, in the case of production, associated storage and processing facilities, roads, pipelines, and power lines.

#### Routt National Forest

The geologic environment in which natural gas and oil resources can occur on the Routt National Forest exists on the extreme western side of the forest in the area of the Elkhead Mountains west of Hahns Peak, west of the east boundary of Range 86 West. This area is on the southeastern flank of the Greater Green River Basin. The richness potential for this area for all hydrocarbon types (oil, natural gas, and natural gas liquids) is low (USDI AE 2003). Limited areas on the east side of the Park Range (that part of the forest in Range 82 West) also have some potential for occurrence of natural gas and oil (USGS 1995). Some exploration for and development of natural gas and oil resources may occur in the future, particularly in the Elkhead Mountains area. Such activity would include wells, and, in the case of production, associated storage and processing facilities, roads, pipelines, and power lines.

### Arapaho-Roosevelt National Forest

The geologic environment in which natural gas and oil resources can occur on the Arapaho-Roosevelt National Forest exists in limited areas along the eastern boundary of the forest and on those areas of the forest in North Park Basin. The eastern area is on the western flank of the Denver-Julesberg (DJ) Basin. The potential for natural gas and oil resource occurrence in this area is low (USGS 1995). Areas of the forest in North Park Basin have low to moderate potential for natural gas and oil resource occurrence (USGS 1995). Some exploration for and development of natural gas and oil resources on the Arapaho-Roosevelt National Forest may occur in the future. Such activity would include wells, and, in the case of production, associated storage and processing facilities, roads, pipelines, and power lines.

### Pike-San Isabel National Forest

The geologic environment in which natural gas and oil resources can occur on the Pike-San Isabel National Forest is limited to the following areas: A narrow strip 3-5 miles wide along the eastern edge of the Rampart Range (Townships 7-15 South); small portions of the Forest north and south of Fairplay (Townships 7-8 South, Ranges 76-77 West and Townships 10-13 South, Range 77 West); a narrow band 2-3 miles wide along the northeastern Wet Mountains from Greenwood to just south of Canon City; a small area west of Spanish Peak in Township 30-32 South, Range 69 East; and the east flank of the Sangre de Cristo Range.<sup>5</sup>

The area along the eastern Rampart Range is currently leased, and proposals for two exploratory wells have been submitted to the Bureau of Land Management and Forest. Other areas of the Forest with geologic potential for occurrence of hydrocarbons may have limited exploration activity in the future. Any development that may occur would include wells with associated storage and processing facilities, roads, pipelines, and power lines.

### Rio Grand National Forest

The geologic environment in which natural gas and oil resources can occur on the Rio Grande National Forest occurs across most of the Forest in the following areas: Middle third of the west flank of the Sangre de Cristo Range; northern arm of the Forest west of Bonanza in the Cochetopa Hills and south into the La Garita Mountains east of the La Garita Wilderness; and all of the forest in the Del Norte and Conejos Peak Ranger Districts. Even though most of these areas have rocks of volcanic origin at or near the surface, subsurface data indicate that hydrocarbon-bearing sedimentary rocks lie below the volcanic rocks.<sup>4</sup>

The area of the Rio Grande National Forest with highest potential for occurrence of natural gas and/or oil lies between Ranges 2-6 East and Townships 32-44 North. This area lies in an identified USGS oil and gas play (the San Juan Sag Play). Eighteen wells have been drilled in this area (some just outside the forest boundary), most of which had some shows of oil and/or gas, and one of which produced oil for a brief time. The area is open to leasing and may experience exploration activity and possible development in the future. Any development that might occur would include wells with associated storage and processing facilities, roads, pipelines, and power lines.

### San Juan National Forest

The geologic environment in which natural gas and oil resources can occur on the San Juan National Forest exists on the southern and western sides of the forest. That part of the forest generally within Townships 33-35 North and Ranges 2 East to 6 West is in the northern part

of the San Juan Basin. The richness potential for this area is low for oil and moderate to high for natural gas (USDI AE 2003). Much of the area is under lease, and the potential for development of natural gas is high, with some development already having occurred, and proposals for more development currently being analyzed. Development will include wells with associated storage and processing facilities, roads, pipelines, and power lines.

That part of the forest generally within Townships 36-42 North, Ranges 10-17 West is in the eastern part of the Paradox Basin. The richness potential for this area for all hydrocarbon types (oil, natural gas, and natural gas liquids) is low (USDI AE 2003). Some exploration for and development of natural gas and oil resources may occur in the future. Such activity would include wells, and, in the case of production, associated storage and processing facilities, roads, pipelines, and power lines.

#### Grand Mesa, Uncompahgre and Gunnison National Forests

The geologic environment in which natural gas and oil resources can occur on the Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forests is in the areas of the Grand Mesa and West Elk areas; the Uncompahgre Plateau; and the area west of Telluride and north of the San Miguel Mountains. The Grand Mesa/West Elk area is in the southern Piceance Basin. The richness potential for this area is low for oil and low to moderate for natural gas (USDI SE 2003). The extreme western side of the Uncompahgre Plateau and the area south and west of Telluride are in the Paradox Basin. The richness potential for these areas is low for all hydrocarbon types (USDI AE 2003). Some parts of the forest on the Grand Valley and Paonia Ranger Districts (Grand Valley/West Elk area) are under lease, and minor production of natural gas has been established. The potential for exploration for natural gas is high, with uncertain potential for discovery and development of economically producible resources. Any development that might occur in the future would include wells with associated storage and processing facilities, roads, pipelines, and power lines.

**Salable Minerals:** Over 2.16 million tons of mineral materials were disposed of from the affected area during 2000 and 1.51 million tons during 2001. Most of the disposals came from existing pits and disturbed areas located adjacent to existing roads. Pit size ranged up to about five acres. The disposals had a gross value in excess of \$980,000 in 2000 and \$1.07 million in 2001. By authority of the Act of May 23, 1908, 25 percent of the total yearly receipts go back to the State where the disposal occurred for distribution to local county budgets for schools and road construction and maintenance.

Activities typically associated with the removal of salable minerals may include hand collecting from the surface, excavating, crushing/processing, and transportation of the materials to the use area. On occasion, blasting may be used to fracture durable rock deposits for excavation. Collecting or permitted sites are generally less than one acre with very little ground disturbance, but may range up to five acres. On rare occasions sites may exceed five acres in size. They are usually existing or previously used sites, located adjacent to existing roads. Most rock collecting and sales occur during the summer months when construction activity in developed areas is at its highest. The largest users of salable mineral commodities in the region are the State Departments of Transportation through the Federal Highways Administration for use in highway maintenance and reconstruction.

## Environmental Consequences

Impacts of future mineral activities on lynx and lynx habitat cannot be specifically identified or evaluated at this level because future mineral activities are unknown. However, applying the identified standards and guidelines to future proposals is expected to result in little or no impact to the oil and gas resources.

### Effects Common to All Alternatives

All action alternatives emphasize the protection of lynx and lynx habitat by implementing additional standards and guidelines for mineral activities. Implementing these standards and guidelines would not prohibit mineral activity to occur, but may increase the operating cost for activities in lynx habitat or linkage areas by setting timing and access restrictions and possibly additional surface disturbances. Under Alternative D several standards related to risk factors that were found not to be a threat to lynx populations are provided as guidelines. In addition, **ALL S1** provides management flexibility for fossil fuel development.

Development of the mineral resources occurring in lynx habitat can alter small areas of lynx habitat. Of greater importance though may be the roads constructed to access mineralized areas during the exploration phase. Road construction and surface disturbance associated with mineral activities (exploration, development, and leasing) may impact lynx habitat, these impacts would be short term. Most mineral operations are exploratory activities which last one season or less. Reclamation of roads and other disturbances is required by regulation, and incorporated into approved reclamation plans for wells or mines at abandonment or closure (HU G5). Designing and constructing new roads off of ridge tops and out of saddles or important lynx habitat or linkage areas, when feasible, may affect the location or alignment of roads needed for access to mineral sites and increase the amount of disturbance by requiring additional miles of road construction to reach the target site (HU G7). This would also affect the economics of the mineral activity by increasing the cost of building and reclaiming the additional road.

The Forest Service will work with oil and gas operators to encourage the use of remote monitoring methods for facilities and production sites, where feasible, during the winter months, to minimize snow compaction impacts on the lynx (HU G4). Remote monitoring of a site could, however, increase the cost of operating the site by the operator due to the expensive equipment needed and use of satellite technology. Current leasing decisions would not need to be modified to implement this guideline.

### Alternative A- No Action

#### Direct Effects

Under the No Action Alternative, there would be no change from current practices or processes that include the protection of wildlife (Threatened or not). Mineral activities would continue to be evaluated and processed following the regulations and current Forest Plan

direction. The No Action Alternative does not address lynx and mineral activity directly but protection of wildlife species (whether listed or not) and their habitat is provided through the application of the Forest Service regulations for locatable minerals through the protection and rehabilitation of wildlife habitat (36CFR228, Subpart A, 228.8), or the regulations for Oil and Gas Resources (36CFR228, Subpart E, 228.108), requiring operators to comply with the Endangered Species Act (1973) while conducting their operations. Impacts to and protection requirements or mitigation for a concerned species is identified in project level analysis and decisions involving site-specific disturbance for all mineral operations. Additionally, these regulations require that roads and surface disturbances authorized for mineral operations be reshaped and revegetated at closure or abandonment. The authorized officer responsible for mineral activities has the discretion to close access routes to the public without impacting the mineral operator.

While not specific to lynx, most Forest Plan decisions incorporate Regional Standards and Guidelines that also provide emphasis and direction for reclaiming disturbances resulting from mineral operations by following existing landform and vegetation characteristics as much as feasible (HU G5).

**Locatable Minerals and Outstanding and Reserved Minerals:** The effects on locatable or reserved and outstanding mineral resources is directly related to the constraints placed on the development of those resources, e.g., the mitigation measures required to be incorporated into plans for locatable mineral development designed to protect habitat for the lynx and its prey.

**Leasable Minerals:** Leasing and development of minerals subject to the mineral leasing laws would continue under the guidance of the regulations and existing Forest Plans and leasing decisions approved. Existing standards and guidelines and lease stipulations would be applied to new leases issued under these decisions. Existing leases would continue in effect as issued, granting the lessee the right to explore for and develop resources within lease boundaries, subject to lease terms, conditions, stipulations, and applicable laws.

**Salable Minerals:** Mineral materials would continue to be disposed of under current Forest Plan direction and regulation. NEPA compliance would be completed for each disposal that addresses environmental issues, included impacts to threatened, endangered, and sensitive species and their habitats. Necessary mitigation would be included with each authorization/contract for disposal as needed.

### **Indirect Effects**

There are indirect effects on local communities' operating budgets based on the receipts to the United States from rentals and royalties of mineral leases and the sales of mineral materials produced. These receipts would be expected to continue at the same rates and amounts currently occurring.

## Alternatives B and C

### **Direct Effects**

**Locatable Minerals and Outstanding and Reserved Minerals:** Implementation of standards and guidelines are not expected to have much affect on the exercise of mineral rights under the 1872 Mining Law, as amended, or reserved or outstanding rights on federal lands.

Most exploration activities would not experience any additional restrictions, as drilling and trenching are typically not done in the winter when snow compaction would be a problem. These are typically short term in duration, using existing roads for access. If new mine development is proposed for an area in lynx habitat, it is possible that modifications or realignment of road locations or additional mitigation identified in a site-specific project analysis would be required to fully protect lynx and its habitat. This could have a resulting effect of higher project costs and may delay some activities, but would not preclude prospecting, exploration and development.

**Leasable Minerals:** Implementing the action alternatives may affect leasable mineral resources, particularly oil and gas operations, by requiring new or additional surface occupancy restrictions (i.e., no surface occupancy, timing restriction, or controlled surface use) on lands within lynx habitat and/or linkage areas available for leasing, and increase the cost of operations on a mineral lease.

The proposed standards and guidelines were analyzed to determine if lease stipulations were necessary to meet the protections defined in the standards and guidelines. Protection such as restrictions on road use, and encouraging remote monitoring could be applied as Conditions of Approval at the time an Application for Permit to Drill is processed. When lease proposals are received from the BLM, the Forest would conduct required reviews to determine if leasing of proposed areas is consistent with the Forest Plan and leasing decision and to determine if there is any significant new information that was not considered in this amendment or Oil and Gas Leasing FEIS.

If operations such as exploratory wells were proposed on an existing lease, additional NEPA analyses would be completed as required by 36 CFR §228.107 with additional mitigation measures, if necessary, for protection of the lynx and its habitat. Limiting winter use of roads in lynx habitat to designated or approved routes for access associated with oil and gas exploration and development may reduce potential impacts on lynx, but may not impact the operator unless the use were not allowed (HU S3).

Geophysical exploration for oil and gas typically precedes the drilling of wells to help define geologic structures and potential reservoir traps for hydrocarbons. The activities would be analyzed for the effect on lynx on a case-by-case basis as proposals are received, and the standards and guides applied at the project level. Development and production stages may experience some restrictions because winter access is usually required during these stages. In some cases, ease of movement across frozen ground makes winter exploration attractive. This

does not mean that the activity would not be approved. However, it is possible that if a proposed mineral area were in lynx habitat, modifications or realignment of location, or additional mitigation or stipulations to fully protect lynx and its habitat would be required. This could have a resulting effect of higher project costs and may delay activity, but would not preclude prospecting, exploration and development of the resource.

**Salable Minerals:** Effects on future disposals of salable mineral resources would be minimal because the majority of such disposals are from existing sites or pits, accessed by existing roads. Developments of new material sites less than five acres may not be impacted by the proposed action because these sites typically result in minimal disturbance. However, if a new site were proposed within lynx habitat that exceeds five acre in size, NEPA requirements would be completed together with any necessary consultation with the U.S. Fish and Wildlife Service. Activities associated with these mineral disposals are most often conducted during the summer months.

Although the decision to dispose of salable minerals is discretionary, decisions to not dispose of the materials would preclude development of the resource for public use projects such as highway reconstruction under the Federal Highways Administration. This would increase the costs to the States and local governments for maintenance and reconstruction because other material sources, usually from private sources located further from the project site, would be utilized. The costs of transportation and development may increase.

### **Indirect Effects**

There may be indirect effects on local communities' operating budgets based on the receipts to the United States from royalties from mineral leases and the sales of mineral materials produced. It is expected that less than five percent of the payments from mineral material disposals to local communities may be affected. Indirect effects on mineral leases cannot be determined at this level of analysis

### Alternative D

**Direct Effects:** Effects would be similar to those described under Alternative A for leaseable minerals. Effects would be similar to those described under Alternative B for locatable and salable mineral resources. Under Alternative D several standards related to risk factors that were found not to be a threat to lynx populations are provided as guidelines. In addition, **ALL S1** provides management flexibility for fossil fuel development.

**Indirect Effects:** Effects would be similar to those described under Alternative A for leaseable minerals. Effects would be similar to those described under Alternative B for locatable and salable mineral resources.

### **Cumulative Effects:**

Applying standards and guidelines that may discourage, if not prohibit mineral development over a number of areas would cumulatively affect and local communities by reducing the

number of jobs related to the mineral exploration and development (both directly and indirectly), increasing the prices paid for imported products, and reducing the currently available mineral reserves.

Effects on Federal lands, other than the National Forests, should be minimal since most of these lands are lower in elevation with little lynx habitat. The Bureau of Land Management is currently reviewing their land management planning authorizations to ensure they cover impacts to lynx and lynx habitat. They would continue to approve operations proposed under the US Mining Laws, as amended, but may modify decisions relevant to mineral leasing and mineral disposals under their jurisdiction.

# Transportation

## Introduction

The Road Management Policy (issued on January 12, 2001) defines specific requirements in Forest Service Manuals 7700 and 7710. Interim Directive to Forest Service Handbook 7709.59 adds direction that NEPA analysis and disclosure requirements, and applicable ESA procedures, apply to issuance of road use permits that authorize road reconstruction or that authorize use of a road that is closed or blocked to public traffic.

## Affected Environment

The Forest Service maintains and administers about 21 thousand miles of classified roads on these forests. New roads may be planned to support a specific purpose or use, such as access to a recreation area or a timber sale. There have been very few miles of new NFS roads constructed in these Forests in the last several years (19 miles in the last three years). Between the years 2000-2004 in Region 2, only sixteen miles of new classified road, and eighteen miles of temporary road, are planned for construction on these Forests. However, in the past three years road density has been reduced in these Forests by the decommissioning of 597 miles of road.

Road densities in LAUs give an indication of the extent of the roads system potentially affected by these new standards and guidelines. These Forests have a relatively small number of Maintenance Level 2 - 5 roads in LAUs (only about one-half mile of road per square mile of LAU). In addition, the miles of paved roads within LAUs ranges from 1 to 12 miles per forest.

### Highways

Table 3-T1 lists the highway routes that may impact the Lynx in terms of accident mortality and habitat fragmentation.

**Table 3–T1 Highways, By Route Number in LAUs**

| State    | Interstate Highways | U.S. Highways                    | State Highways   |
|----------|---------------------|----------------------------------|--|
| Colorado | I-70                | 6, 24, 34, 40, 50, 160, 285, 550 | 7, 9, 65, 82, 90, 91, 103, 114, 125, 127, 133, 134, 145, 149 |
| Wyoming  | N/A                 | N/A                              | 13, 70, 130  |

## Environmental Consequences

### Alternative A – No Action

This alternative would not impose additional costs related to Lynx crossings or locating new roads away from LAUs, or impose additional constraints (beyond those required in the Roads Management Policy) for improving or constructing roads.

### Alternative B – Proposed Action

Construction or reconstruction of roads in lynx habitat or linkage areas would be subject to specific standards and guidelines that address protection of lynx and lynx habitat. These standards and guidelines would expand and reinforce the recent policies aimed at generally increasing environmental considerations of the impacts of all roads.

Applicable proposed standards and guidelines are: **ALL S1, ALL G1, HU G6, HU G7, HU G8, HU G9, and LINK S1.**

### **Effects on NFS Roads**

Standard **ALL S1** would require new road and existing road plans to provide for lynx movement. This is not expected to prevent most road improvements; however, this would lead to increased costs to mitigate the negative effects on lynx habitat. This is also addressed by guideline HU G6.

Guideline **HU G6** direction to avoid the upgrading of unpaved roads could constrain NFS road projects from making needed safety and environmental improvements to roads in LAUs. This could adversely affect public through-traffic in the forests, recreational access, and commodity removal.

Guideline **HU G7** direction to locate any new permanent roads in lynx habitat would be subjected to considering alternatives to locating roads on ridge-tops and saddles, and through forested stringers. Any impacts would have to be evaluated to determine whether they could be avoided or mitigated. This could increase costs for alternate road locations.

Guideline **HU G8** road management considerations would include the location and extent of roadside brushing on low-speed and low-volume Forest Service roads. Once the affected locations are determined, appropriate standards for providing public safety and minimizing impacts on lynx could be developed and incorporated into the road maintenance standards for that road.

Guideline **HU G9** directs that new roads should include a plan for closure and obliteration. This should have no impacts for the roads. However, many recreational drivers may view new roads for project specific purposes as additional access routes. A plan for the construction, operation, and closure/obliteration of these roads could be required as part of the permit. This should have no impact on the intended use of these roads during the permitted period. However, this could present problems for enforcement after closure.

## Highways

The Colorado Department of Transportation (DOT) and Wyoming DOT are both coordinating with the U.S. Fish and Wildlife Service on Memorandums of Understanding (MOUs) to reduce Lynx mortality, and to improve Lynx crossing opportunities.

Guideline **ALL G1** directs that highway project proposals need to propose project features and techniques to reduce Lynx mortalities. Additional time and cost would be required, amounts would be site-specific.

Objective **HU O6** directs coordination with the Colorado DOT and Wyoming DOT on highway projects to evaluate providing or improving wildlife crossings to reduce lynx mortality and impacts to linkage areas. Additional time and cost would be required, amounts would be site-specific.

Standard **Link S1** would require the Federal Highway Administration (FHWA), Colorado DOT and Wyoming DOT to identify potential wildlife crossings to reduce the impacts of highway projects to lynx mortality and linkage areas on projects that affect NFS lands. Additional time and cost would be required, amounts would be site-specific.

### Alternatives C and D

Alternatives C and D are similar as Alternative B, except for **HU G6**.

These alternatives change the “should be avoided” philosophy to “apply techniques to avoid or reduce effects”.

Guideline **HU G6** would reduce the potential constraints on NFS road projects, and allow more flexibility in making needed safety and environmental improvements. Additional time and cost may be required, but less than Alternative B.

## Summary

Direct Effects: Minor effects to existing road system and resource programs served are anticipated.

Indirect Effects: Effects would be mainly on traveling public, especially if improvements for safety and capacity are constrained.

Cumulative Effects: The lynx amendment would only affect new road construction/reconstruction, changes in use of existing roads, and roadside maintenance. The impact on the road system would be relatively minor. There may be some adjustments in use or constraints on specific roads as a result of changes in management use allocations for various resources to better protect lynx and lynx habitat. These standards and guidelines, in conjunction with the recently updated Road Management Policy, could affect some specific roads, but site-

specific analysis (including Roads Analysis Process), would be required to determine whether it precludes the actual construction or improvement of an individual road, and the intended management action the road supports.

There would be some additional time and cost to evaluate and implement road features and locations to avoid or reduce effects on lynx and lynx habitat. However, the miles of affected roads would be relatively small, and the overall impact to road activities related to lynx conservation would be minimal as a result of the adoption of the standards and guidelines contained in this document. Most of the actions identified are already required under current Forest Service policies and procedures.

# Heritage Resources

As mandated by law (National Historic Preservation Act, 1966 and subsequent amendments) and practiced in the Rocky Mountain Region, project specific areas will be subject to survey, identification of resources, determination of eligibility, evaluation of effect, consultation, and resolution of adverse effects (if any) at the time that specific project areas have been identified. Under each alternative, a cultural inventory of some degree and measure would be necessary to prevent further damage, mitigate unforeseen damage, and prevent future impacts to sites.

Conservation of sensitive, threatened, or endangered species habitat, and reintroduction of endemic or native species into their historical habitats in ways that do not involve surface disturbance, does not have the potential to affect historic properties.

# Social and Economic

## Affected Environment

Social and economic analyses are conducted to determine what effect the agency's management decisions have on the people that live in the area. Many of the communities within the analysis areas are dependent upon natural resources from the National Forests. The analysis considers potential effects of the alternatives on employment, income, and financial effects.

### Analysis area

The proposed action provides management direction for affected lynx habitats on lands within six National Forests in Colorado and Wyoming. Based on the large area and the magnitude of potential impacts, two impact areas were identified. The first covers the area around the Medicine Bow-Routt National Forests in southern Wyoming and northern Colorado. Two counties in Wyoming (Albany and Carbon) and three in Colorado (Jackson, Moffat, and Routt) make up the first impact area. The second area includes counties in rural, western Colorado that have connections with the Arapaho-Roosevelt, Pike-San Isabel, Grand Mesa-Uncompahgre-Gunnison, Rio Grande, and San Juan National Forests. Metropolitan counties containing Front Range cities and Grand Junction were excluded so that small impacts would not be dwarfed by the sizable population and economies of those areas. Twenty-four counties were included in the area. They are:

|           |          |           |            |
|-----------|----------|-----------|------------|
| Alamosa   | Delta    | La Plata  | Park       |
| Archuleta | Dolores  | Lake      | Rio Grande |
| Chaffee   | Grand    | Mineral   | Saguache   |
| Conejos   | Gunnison | Montezuma | San Juan   |
| Costilla  | Hinsdale | Montrose  | San Miguel |
| Custer    | Huerfano | Ouray     | Teller     |

There are many small communities and local economies within this large area of western Colorado. The size and dispersion of potential impacts suggested that smaller areas would not result in more definitive impact results.

## Economic Environment

The two impact areas are different in culture and economics. The Medicine Bow-Routt area is very rural, strongly agricultural, and relies upon the National Forests for timber and forage. Although it is changing with the rest of the Rocky Mountain west, it continues the historic relationship between rural western communities and public lands. The twenty-four-county area in Colorado is by no means homogeneous in its makeup, but generally differs from the Medicine Bow-Routt area. Colorado has been affected significantly by migration from both the West and East Coasts. Portions of the impact area have had some of the highest population growth rates in the nation. Timber and agricultural economies have generally given way to second homes and

strong tourism orientations. Many have claimed western Colorado as their new residence while continuing with business in other parts of the country. Land prices have soared along with demands for local services. The cost and availability of housing for retail and service workers has become the leading social issue in many communities. A notable exception to this characterization is the San Luis Valley, which contains the Rio Grande National Forest. The Valley is dominated by agriculture and a Hispanic culture that dates from the early 1500's. In contrast to the wealth of many mountain resort towns in western Colorado, the San Luis Valley has some of the poorest communities in the state.

Table 3-SE1 includes some fundamental measures of the impact areas.

**Table 3-SE1 Selected Descriptors of the Impact Areas, 2000**

| Descriptor   | Medicine Bow-Routt NF Area | Western Colorado Area |
|--------------|----------------------------|-----------------------|
| Area (sq mi) | 20,888                     | 32,623                |
| Population   | 81,269                     | 295,548               |
| Households   | 32,995                     | 116,690               |

Source: Census Bureau

Table 3-SE2 summarizes the employment and income characteristics of the impact areas by industry. The two areas, while quite different culturally and economically, present a similar profile when viewed in the aggregate. Agriculture and mining constitute about 8 percent of all jobs, construction about 11 percent, manufacturing and transportation about 6 percent, trade and services make up about 28 percent, and government provides from 15 to 21 percent of total employment. These general characterizations cannot be applied to smaller locales in either of the impact areas.

**Table 3-SE2 Employment and Income by Industry in Impact Areas, 1999**

| Industry                           | Medicine Bow NF Area |                              | Western Colorado Area |                              |
|------------------------------------|----------------------|------------------------------|-----------------------|------------------------------|
|                                    | Employment<br>(Jobs) | Labor Income<br>(\$ Million) | Employment<br>(Jobs)  | Labor Income<br>(\$ Million) |
| Agriculture                        | 3,156                | 45.7                         | 12,815                | 203.2                        |
| Mining                             | 1,412                | 104.7                        | 2,103                 | 121.7                        |
| Construction                       | 6,012                | 226.4                        | 20,270                | 681.4                        |
| Manufacturing                      | 1,905                | 65.4                         | 6,207                 | 174.7                        |
| Transportation/utilities           | 1,731                | 86.0                         | 4,757                 | 190.6                        |
| Wholesale and retail trade         | 11,756               | 196.5                        | 35,978                | 627.9                        |
| Finance, insurance and real estate | 4,281                | 100.8                        | 14,770                | 409.4                        |
| Services                           | 14,985               | 318.4                        | 50,038                | 1100.1                       |
| Government                         | 11,855               | 361.3                        | 26,483                | 813.2                        |
| <b>Total</b>                       | <b>57,093</b>        | <b>1,505.2</b>               | <b>173,421</b>        | <b>4,322.2</b>               |

Source: IMPLAN, 1999 data set

## Social Environment

Concerns expressed by the public in response to scoping of the proposed action ranged from strong opposition to strong support. Some commenters felt that the proposal would reduce motorized recreation opportunities and be unfair to the elderly, disabled and families with young children. Others felt that the proposal might close family-oriented recreation opportunities such as mushrooming, cross country skiing and snowmobiling. Still others expressed concerns regarding loss of access to NFS lands.

Environmental Justice A specific consideration of equity and fairness in resource decision-making is encompassed in the issues of environmental justice and civil rights. As required by Executive Order 12898, all federal actions must consider potentially disproportionate effects on minority or low-income communities. Principles for considering environmental justice are outlined in Environmental Justice Guidance under the National Environmental Policy Act (Council on Environmental Quality 1997).

Table 3-SE3 provides demographic statistics for counties in both impact areas. Residents of Hispanic origin are the largest minority in both areas. They make up over 16 percent in western Colorado and 8 percent in the Medicine Bow Routt area. Hispanics have been the fastest growing minority in the Rocky Mountain West since 1990. Residents who are American Indian and Asian/Pacific Islander are twice as common in the Medicine Bow Routt area as they are western Colorado, but do not constitute large minority populations in either impact area. These general representations do not hold when examining details at the county level. The Ute Mountain and Southern Ute Reservations in southwestern Colorado (Montezuma and La Plata Counties) are home to the largest population of American Indians in the western Colorado area. Albany County is home to the largest population of American Indians in the Medicine Bow Routt area, most likely due to the University of Wyoming in Laramie.

**Table 3-SE3 Population by Race and Hispanic Origin, 2000**

| Impact Area/<br>County  | Total<br>Population | Single Race Only                    |  |                                    |   |                                    | Two<br>or<br>More<br>Races | Hispanic<br>Origin<br>(of any<br>race) |
|-------------------------|---------------------|-------------------------------------|--|------------------------------------|---|------------------------------------|----------------------------|--|
|                         |                     | White-<br>Other<br>Non-<br>Hispanic | White-<br>Other<br>Hispanic<br>Origin* | Black/<br>African<br>American<br>* | American<br>Indian &<br>Alaska<br>Native* | Asian/<br>Pacific<br>Islander<br>* |                            |  |
| Medicine Bow<br>Routt   | <b>81,269</b>       | <b>71,929</b>                       | <b>4,152</b>                           | <b>510</b>                         | <b>3,557</b>                              | <b>830</b>                         | <b>1,520</b>               | <b>6,472</b>                           |
| <b>Percent of Total</b> | <b>100.0%</b>       | <b>88.5%</b>                        | <b>5.1%</b>                            | <b>0.6%</b>                        | <b>4.4%</b>                               | <b>1.0%</b>                        | <b>1.9%</b>                | <b>8.0%</b>                            |
| Albany                  | 31,313              | 27,399                              | 1,190                                  | 344                                | 3,131                                     | 564                                | 689                        | 2,348                                  |
| Carbon                  | 15,505              | 12,776                              | 1,194                                  | 109                                | 202                                       | 124                                | 326                        | 2,140                                  |
| Jackson                 | 1,577               | 1,452                               | 88                                     | 4                                  | 12  | 1                                  | 20                         | 103                                    |
| Moffat                  | 13,184              | 11,628                              | 1,131                                  | 28                                 | 116                                       | 47                                 | 234                        | 1,247                                  |
| Routt                   | 19,690              | 18,674                              | 549                                    | 25                                 | 96  | 94                                 | 252                        | 634                                    |
| Western Colorado        | <b>295,548</b>      | <b>234,064</b>                      | <b>43,704</b>                          | <b>1,530</b>                       | <b>7,929</b>                              | <b>1,439</b>                       | <b>6,882</b>               | <b>48,491</b>                          |
| <b>Percent of Total</b> | <b>100.0%</b>       | <b>79.2%</b>                        | <b>14.8%</b>                           | <b>0.5%</b>                        | <b>2.7%</b>                               | <b>0.5%</b>                        | <b>2.3%</b>                | <b>16.4%</b>                           |
| Alamosa                 | 14,966              | 8,127                               | 5,571                                  | 145                                | 350                                       | 150                                | 623                        | 6,197                                  |
| Archuleta               | 9,898               | 7,946                               | 1,487                                  | 35                                 | 139                                       | 34                                 | 257                        | 1,659                                  |
| Chaffee                 | 16,242              | 14,191                              | 1,264                                  | 257                                | 177                                       | 79                                 | 274                        | 1,393                                  |
| Conejos                 | 8,400               | 3,297                               | 4,621                                  | 18                                 | 142                                       | 19                                 | 303                        | 4,949                                  |
| Costilla                | 3,663               | 1,038                               | 2,272                                  | 29                                 | 91  | 42                                 | 191                        | 2,476                                  |
| Custer                  | 3,503               | 3,302                               | 82                                     | 13                                 | 39  | 10                                 | 57                         | 88                                     |
| Delta                   | 27,834              | 23,969                              | 2,903                                  | 146                                | 211                                       | 96                                 | 509                        | 3,171                                  |
| Dolores                 | 1,844               | 1,712                               | 56                                     | 1                                  | 36  | 8                                  | 31                         | 71                                     |
| Grand                   | 12,442              | 11,592                              | 496                                    | 60                                 | 54  | 97                                 | 143                        | 543                                    |
| Gunnison                | 13,956              | 12,899                              | 571                                    | 68                                 | 98  | 80                                 | 240                        | 700                                    |
| Hinsdale                | 790                 | 764                                 | 8                                      | 0                                  | 12  | 2                                  | 4                          | 12                                     |
| Huerfano                | 7,862               | 4,604                               | 2,501                                  | 216                                | 212                                       | 37                                 | 292                        | 2,763                                  |
| Lake                    | 7,812               | 4,810                               | 2,657                                  | 14                                 | 98  | 28                                 | 205                        | 2,823                                  |
| La Plata                | 43,941              | 36,270                              | 3,806                                  | 136                                | 2,539                                     | 201                                | 989                        | 4,571                                  |
| Mineral                 | 831                 | 793                                 | 13                                     | 0                                  | 7   | 0                                  | 18                         | 17                                     |
| Montezuma               | 23,830              | 18,514                              | 1,976                                  | 33                                 | 2,676                                     | 63                                 | 568                        | 2,263                                  |
| Montrose                | 33,432              | 27,571                              | 4,423                                  | 102                                | 340                                       | 163                                | 833                        | 4,967                                  |
| Ouray                   | 3,742               | 3,488                               | 137                                    | 3                                  | 35  | 15                                 | 64                         | 152                                    |
| Park                    | 14,523              | 13,452                              | 534                                    | 72                                 | 134                                       | 64                                 | 267                        | 628                                    |
| Rio Grande              | 12,413              | 7,034                               | 4,805                                  | 43                                 | 157                                       | 31                                 | 343                        | 5,172                                  |
| Saguache                | 5,917               | 3,067                               | 2,512                                  | 7                                  | 122                                       | 27                                 | 182                        | 2,678                                  |
| San Juan                | 558                 | 510                                 | 36                                     | 0                                  | 4   | 3                                  | 5                          | 41                                     |
| San Miguel              | 6,594               | 5,984                               | 408                                    | 19                                 | 56  | 54                                 | 73                         | 439                                    |
| Teller                  | 20,555              | 19,130                              | 565                                    | 113                                | 200                                       | 136                                | 411                        | 718                                    |

\*Persons may be of Hispanic Origin

Low-income populations are more difficult to determine in the planning areas. Because of the high cost of living in resort communities, somewhat higher wages in these same areas, and many seasonal workers, normal poverty statistics are not as useful in identifying those with low incomes. Despite these conditions, the only common denominator for expressing low-income population is the Census measure of poverty level. Table 3-SE4 shows the number and percent of persons in each impact area that have income below the poverty level in 1998, the most recent year for which data is available. The average poverty rate in the Medicine Bow Routt impact area approximates that for the US. The average poverty rates in Colorado and Wyoming are 9.2 percent and 9.7 percent, respectively. The rates in parts of southern Colorado are quite a bit higher than any of these averages. As shown below, the five counties that make up the San Luis Valley have the highest rates in the state. Other counties to the west and east of the Valley also have relatively high rates of poverty. It should be noted that the impact area excludes many of the affluent communities found along the I-70 corridor, as well as Grand Junction (Mesa County). A characterization of the entire western slope of Colorado would include these areas.

**Table 3-SE4 Estimates for People of All Ages in Poverty: 1998**

| Impact Area/County        | Total Population | People of All Ages in Poverty |             |
|---------------------------|------------------|-------------------------------|-------------|
|                           |                  | Number                        | Percent     |
| <b>Medicine Bow Routt</b> | <b>74,272</b>    | <b>8,343</b>                  | <b>11.2</b> |
| -Routt County             | 17,955           | 1,203                         | 6.7         |
| -Moffat County            | 12,748           | 1,466                         | 11.5        |
| -Carbon County            | 14,661           | 1,730                         | 11.8        |
| -Albany County            | 27,338           | 3,718                         | 13.6        |
| -Jackson County           | 1,569            | 226                           | 14.4        |
| <b>Western Colorado</b>   | <b>277,353</b>   | <b>40,261</b>                 | <b>14.5</b> |
| -Park County              | 14,433           | 967                           | 6.7         |
| -Grand County             | 10,541           | 780                           | 7.4         |
| -Ouray County             | 3,525            | 282                           | 8.0         |
| -Teller County            | 21,463           | 1,717                         | 8.0         |
| -San Miguel County        | 5,591            | 492                           | 8.8         |
| -Lake County              | 6,567            | 637                           | 9.7         |
| -Mineral County           | 739              | 82                            | 11.1        |
| -Hinsdale County          | 759              | 85                            | 11.2        |
| -La Plata County          | 39,974           | 4,637                         | 11.6        |
| -Gunnison County          | 11,802           | 1,428                         | 12.1        |
| -Archuleta County         | 9,709            | 1,233                         | 12.7        |
| -Chaffee County           | 14,638           | 1,903                         | 13.0        |
| -Montrose County          | 31,492           | 4,157                         | 13.2        |
| -Custer County            | 3,647            | 507                           | 13.9        |
| -Dolores County           | 1,900            | 266                           | 14.0        |
| -Delta County             | 26,856           | 4,297                         | 16.0        |
| -Montezuma County         | 22,847           | 4,021                         | 17.6        |
| -San Juan County          | 545              | 114                           | 20.9        |
| -Huerfano County          | 6,792            | 1,501                         | 22.1        |
| -Alamosa County           | 13,987           | 3,189                         | 22.8        |

|                    |        | People of All Ages in Poverty |      |
|--------------------|--------|-------------------------------|------|
|                    |        |                               |      |
| -Saguache County   | 6,261  | 1,465                         | 23.4 |
| -Rio Grande County | 11,424 | 3,016                         | 26.4 |
| -Conejos County    | 8,198  | 2,320                         | 28.3 |
| -Costilla County   | 3,664  | 1,165                         | 31.8 |

*Estimates model 1998 income reported in the March 1999, Current Population Survey.  
Estimates released December 2001.*

## Environmental Consequences

### Employment and Income

Precommercial thinning carried out by independent contractors is the basis for estimating job and labor income effects. Economic effects can be categorized as direct, indirect, and induced, with indirect and induced sometimes categorized as secondary effects. Direct effects are those changes that are associated with the initial expenditures of the program. Secondary effects (indirect and induced) result from the subsequent rounds of spending within the economy by contractors, businesses that provide goods and services to thinning contractors, and employees of all such businesses.

The IMPLAN Pro software system and 1999 IMPLAN data were used to develop models of the economy for each of the impact areas (IMPLAN Professional, 1999). Estimates of thinning are found in the Timber and Vegetation section of this DEIS. The average cost of thinning one acre in the Rocky Mountain Region is \$175. Historically, half of all thinning contractors doing work for the Forest Service in this region are based outside Colorado and Wyoming. Some are based outside the Western US. Based on this information, the employment and income effects are estimated in Table 3-SE5.

**Table 3-SE5 Annual Employment and Income Effects by Impact Area, 2003-2008**

| Measure/Impact Area    | A     | B     | C     | D     | Change from A |       |       |
|------------------------|-------|-------|-------|-------|---------------|-------|-------|
|                        |       |       |       |       | B             | C     | D     |
| Employment (Jobs)      |       |       |       |       |               |       |       |
| Medicine Bow-Routt     | 14    | 10    | 10    | 11    | -4            | -4    | -3    |
| Western Colorado       | 15    | 9     | 9     | 10    | -6            | -6    | -5    |
| Rest of U.S.           | 28    | 19    | 19    | 19    | -9            | -9    | -9    |
| Labor income (\$1,000) |       |       |       |       |               |       |       |
| Medicine Bow-Routt     | \$118 | \$83  | \$83  | \$92  | -\$35         | -\$35 | -\$26 |
| Western Colorado       | \$146 | \$87  | \$87  | \$96  | -\$59         | -\$59 | -\$50 |
| Rest of U.S.           | \$255 | \$173 | \$173 | \$173 | -\$82         | -\$82 | -\$82 |

#### Alternative A - No Action Alternative

Under the No Action Alternative, about 14 jobs in the Medicine Bow-Routt area and another 15 in western Colorado would be sustained. Because half of the employment is expected to come

from outside the two impact areas, another 28 jobs would be sustained elsewhere in the US. This amounts to less than 3/100ths of a percent of all employment in each impact area. Compared with total employment in the impact areas, community economic consequences associated with precommercial thinning can be considered negligible.

### Action Alternatives B, C, and D

The effects of thinning are extremely small. The changes in employment and income associated with Alternatives B, C, and D constitute less than two percent of agriculture, forestry, and fishery service jobs in the Medicine Bow-Routt area, and less than 0.3 percent of similar jobs in western Colorado. There is no expectation that these potential job losses would be concentrated in a small number of communities.

In other parts of this DEIS, numerous references were made to increased costs for some businesses holding special use permits, such as ranches and ski areas. The likelihood and magnitude of these potential cost increases are impossible to assess at the scale of this EIS. The purpose of those qualitative estimates is to provide the reader with possible business effects. Only if and when project-level specifics are known could impacts to permit holders be quantitatively estimated. NEPA does not require the disclosure of impacts to individual firms, but does require disclosure when communities may be affected.

### **Social Effects**

Because economic effects of the alternatives are extremely small, it is estimated that social effects often driven by economic consequences will be zero or negligible. There is no expectation that these effects would be concentrated in a small number of communities. These social effects include such things as housing, commuting, social services, and local governments.

Based on average labor income per job derived from Table 3-SE5, many affected individuals probably have incomes that are below the area average. While the magnitude of effects is extremely small, it appears that low-income individuals could experience the effects more than the general population. On the other hand, the seasonality of forestry service jobs rather than low salaries could account for the low averages found in Table 3-SE5. The dispersion of these effects across impact area communities suggests that no single community would bear the effects disproportionately.

### **Cumulative Effects**

Cumulative effects analysis is designed to reveal the context of alternative impacts within the planning area. This is done by comparing total changes in the planning area *with* each alternative to total changes *without* any of them. While past actions have set the stage for current social and economic conditions, it is current and reasonably foreseeable actions that strongly influence conditions in the future.

Because the direct and indirect social and economic effects are extremely small, it is not likely that they would prompt cumulative effects of any significance in the planning area. No other public land management or private actions are known that would largely affect the same sectors or groups experiencing the direct and indirect effects disclosed above.

### **Financial/Economic Efficiency**

Both financial and economic efficiency are analyzed in this section. Financial efficiency examines revenue and cost implications from the perspective of the Forest Service. It could also be said that this is the perspective of the taxpayer. Only those revenues and costs that are recorded in agency financial records are included in this analysis.

Economic efficiency examines a broader definition of benefits by including values for national forest uses that are not captured in Forest Service revenues. Generally, the primary additions over a financial analysis include willingness-to-pay values for recreation use and estimated market value for meat gained by grazing livestock. Many non-market, non-use values that might be expected in this analysis are excluded and treated in another manner. Some outcomes or effects, such as biological diversity, visual amenities, and social impacts have no monetary values or costs that have been established by USDA or the Forest Service. While some research studies have explored the development of such values, it is also reasonable to disclose such values in a non-monetary fashion. This is done in other sections of this document.

Efficiency calculations can only be made when there are quantitative estimates of outputs or outcomes and agency work activities. When analyzing the alternatives, resource specialists were unable to provide quantitative estimates of consequences, except for timber-related activities. Therefore, the efficiency analyses are limited to timber consequences. Because timber revenues to the agency represent current market value, the financial analysis is identical with the economic analysis.

The main criterion used in assessing financial and economic efficiency is *present net value* (PNV), which is defined as the value of discounted benefits (or revenues) minus discounted costs. A PNV analysis includes all outputs to which monetary values are assigned. In the case of this proposal, timber outputs are the only ones that have been quantitatively estimated.

Table 3-SE6 displays the economic and financial PNV for each alternative. All monetary values are expressed in constant dollars with no allowance for inflation. A 4-percent discount rate was used over a 65-year period (2003 to 2068). This time period was used to capture the timber product consequences of precommercial thinning conducted over the next five years. Timber stumpage prices used for this analysis are \$59.94/CCF for lodgepole pine sawtimber and \$7.69/CCF for timber products other than sawlogs. Revenues are not reduced for payments made to states and counties.

The reduction of PNV in any alternative as compared to the most financially or economically efficient solution is the economic trade-off, or opportunity cost, of achieving the objectives embodied by that alternative.

**Table 3-SE6 Economic and financial efficiency  
(Present net value in thousands of 2002 dollars)**

| <b>Indicator</b>        | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-------------------------|----------|----------|----------|----------|
| Forest Service revenues | \$2,080  | \$1,562  | \$1,562  | \$1,614  |
| Public benefits         | \$2,080  | \$1,562  | \$1,562  | \$1,614  |
| Costs                   | \$7,332  | \$6,001  | \$6,001  | \$6,132  |
| Financial net revenues  | -\$5,252 | -\$4,439 | -\$4,439 | -\$4,518 |
| Economic net benefits   | -\$5,252 | -\$4,439 | -\$4,439 | -\$4,518 |

As shown in Table 3-SE6, present net value ranges from a low of -\$5.3 million for the no action alternative (A) to a high of -\$4.4 million for Alternatives B and C. What appears to make Alternatives B and C the highest PNV rather than the No Action alternative is the fewest acres of precommercial thinning. Discounted returns from increased sawtimber volume that is associated with precommercial thinning does not cover the discounted cost of the thinning activity. Alternative A has the highest number of acres that would be thinned. Sawtimber prices would have to increase to \$442/MBF from current prices of \$120/MBF for most alternatives to break even, all other costs and values held constant.

Economic return to the taxpayer is not the sole criterion for timber or other vegetative management, but it is rather one measure among many to assess the tradeoffs (opportunity cost) of alternative management of the public lands. Other benefits of thinning include such things as improvement to forest health. For a more detailed discussion of non-priced benefits, see Forest Resources and Timber Management.