BOX CREEK VEGETATION AND TRAVEL MANAGEMENT PROJECT ENVIRONMENTAL ASSESSMENT FINAL 2005

USDA Forest Service
Pike and San Isabel National Forest
Comanche and Cimarron National Grasslands
Leadville Ranger District
Lake County, Colorado

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Acronyms

BE	biological evaluation
BLM	Bureau of Land Management
BMP	best management practices
ccf	100 cubic feet
CDNST	Colorado Divide National Scenic Trail
CDOW	Colorado Division of Wildlife
CFR	Code of Federal Regulation
CWD	coarse woody debris
dbh	diameter at breast height
DMR	dwarf mistletoe rating
EA	environmental assessment
EPA	Environmental Protection Agency
FDR	Forest Development Road
FRCC	fire regime condition class
FS	Forest Service
FWS	U S Fish and Wildlife Service
GMU	game management unit
HRV	historic range of variability
IDT	interdisciplinary team
LAU	Lynx Analysis Unit
LCAS	Lynx Conservation Assessment and Strategy
MA	management areas
MIS	management indicator species
MOU	Memorandum of Understanding
MPB	mountain pine beetle
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFP	National Fire Plan
PM	particulate matter
PSICC	Pike & San Isabel National Forests; Comanche & Cimarron National Grasslands
ROS	Recreational Opportunity Spectrum
TEPS	Threatened, Endangered, Proposed, and Sensitive
WUI	wildland urban interface

Chapter 1
Purpose and Need for Action

Introduction

The Box Creek Vegetation and Travel Management Project (Box Creek Project) was initiated to address concerns regarding vegetation conditions and forest health in the Box Creek Watershed. This Environmental Assessment (EA) documents the project area and the emphasis toward travel and vegetation management on FS lands in conjunction with the current Bureau of Land Management (BLM) decisions to manage adjacent lands in the Box Creek Watershed.

Description of Project Area

The Box Creek project area is on the eastern aspect of the Sawatch Range of the Rocky Mountains at an elevation that ranges from 9,300 to 11,000 feet and is approximately 8 miles southwest of Leadville and 115 miles west of Denver, Colorado (Map 1 – Project Location Map). The project area is approximately 5,000 acres, and provides for numerous activities that include local and regional recreational opportunities and removal of forest products.

Purpose and Need for Action

The purpose of the Box Creek project is to move the project area toward the desired conditions as described in the Land and Resource Management Plan: Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands (Forest Plan) by addressing forest health, dwarf mistletoe (mistletoe), travel management, and wildlife habitat concerns. In addition, the purpose is to address hazardous fuels adjacent to the wildland-urban interface (WUI), improve the fire regime condition class (FRCC) per the National Fire Plan (NFP), and provide cohesiveness in managing public lands between the FS and the BLM.

The need for the project is to increase forest diversity, reduce mistletoe infestations, reduce road density, improve habitat effectiveness and capability for wildlife, improve fire regime condition classes, reduce hazardous fuels near the WUI, and to complement the BLM travel management in the Box Creek Watershed (BLM, 2003).

Existing Conditions

Within the Box Creek Watershed, individual lodgepole pine stands are homogeneous, dense, and predominately even-aged. Many trees are deformed, have suppressed growth and are infected with mistletoe; approximately 70 percent of the forested area is heavily infected (more than ½ of the branches or stems infected), approximately 10 percent were viewed as having light infection (½ or less of the total number of branches infected), and approximately 20 percent of the forested area was viewed as having no visible infections (Forest Service, unpublished data, 1984-85).

Other vegetative species within the project area include ponderosa pine, Douglas-fir, aspen, sagebrush, forbs and grasses. The aspen stands are being encroached upon by

conifers, with very little regeneration. Grass and forb production has declined in sagebrush areas due to lack of disturbance. Evidence shows that ponderosa pine and Douglas-fir was once broadly distributed in the project area, but is now a small component of existing stands (FS unpublished data; 1984, 1985).

Current nonsystem roads are poorly located and contribute to accelerated soil loss, increase stream sedimentation, and wildlife habitat degradation.

Forest Plan Goals

This project would help achieve the following Forest Plan goals:

Implement an integrated pest management program emphasizing silvicultural management of timber stands to prevent and control insect infestations and disease (Forest Plan, pg.III-4)

Manage the transportation system for increased cost-effectiveness, efficiency and utility (Forest Plan, pg. III-5)

Increase diversity for wildlife and habitat improvement (Forest Plan, pg. III-4)

Improve habitat capability through direct treatments of vegetation (Forest Plan, pg. III-33)

Increase winter range habitat capacities for deer and elk (Forest Plan, pg. III-4)

Maintain wildlife habitat effectiveness (Forest Plan, pg. III-138)

Desired Conditions

The desired future condition for disease is to prevent or suppress epidemic insect and disease populations that threaten forest tree stands with an integrated pest management approach consistent with resource management objectives (Forest Plan, pg. III-82).

The desired future condition for transportation management is to keep existing roads open to public motorized use unless (a) the use causes unacceptable damage to soil and water uses; (b) they are located in areas closed to motorized use and are not “designated routes” in the Forest travel management direction or (c) the use conflicts with wildlife management objectives (Forest Plan, pg III-74).

The desired future condition for wildlife management is to (1) provide for habitat needs of one or more management indicator species (MIS) and optimize habitat capability (Forest Plan, pg III-134); (2) maintain wildlife effectiveness and capability and provide winter habitat (cover and forage) for deer and elk (Forest Plan, pg. III-128, III-152); (3) manage rangeland vegetation to provide needed vegetation species composition and interspersed grass, forb, and shrub sites and variety in age of browse plants (Forest Plan, pg. III-134); and (4) manage road use to provide for habitat needs of management indicator species, including road closures and area closures, and to maintain habitat effectiveness (Forest Plan, pg. III-143).

The desired future condition for fuels treatment is to use prescribed fire to accomplish resource management objectives such as reducing fuel load buildup, wildlife habitat improvement, and to comply with Federal and State Air Quality standards (Forest Plan, pg. III-82).

The desired future condition for fire regime condition class (FRCC) is to reduce areas in high departure from the central tendency of the natural (historical) regime (FRCC 3) to low (FRCC 1) and moderate (FRCC 2) departure (Hardy et al. 2001, Schmidt et al. 2002). Low departure is considered to be within the natural (historical) range of variability while moderate and high departures are outside.

Proposed Action

The proposed action was developed with consideration of FS policies, legislative mandates, and the approved Forest Plan.

The proposed action would treat/maintain approximately 2,300 acres of FS lands and restrict use on nearly 29 miles of roads in the Box Creek Watershed.

Vegetative treatments include regenerating aspen, regenerating lodgepole pine followed by interplanting Douglas-fir and ponderosa pine, precommercial thinning of previously regenerated lodgepole pine within the applicable lynx direction, grass and forb enhancement in sagebrush habitats, thinning for fuel break creation near the Pan Ark subdivision and the Mount Elbert Forebay, prescribed burning (broadcast and/or pile), and mechanical thinning. Following treatments, the project area would have a more diverse stand structure and species composition. Habitat conditions would improve and forage production should increase, as well as the amount of snags and down wood.

On FS lands, more than seven miles of roads would be closed seasonally, more than seven miles of roads would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned. Some of these treatments/actions would be coordinated with the BLM, which already has a decision document and management plan in place to conduct similar activities on their lands.

Decisions to be Made

The Leadville District Ranger is the responsible official for deciding what actions will be taken on FS lands within the Leadville Ranger District. This EA is not a decision document. It discloses the environmental consequences of implementing the alternatives. The District Ranger will make a number of decisions to address the issues identified during the scoping, and public involvement process. The decisions made by the District Ranger will be to improve the overall health of the forest and public lands. The chosen alternative will be documented in a signed Decision Notice. The decision maker may select any alternative, or a combination of the alternatives. The selected alternative will address:

1. Should vegetation be maintained or altered with mechanical treatments and/or prescribed fire?
2. Should the roads system be maintained or modified to address resource concerns?

Incorporation of the Forest Plan

This document is tiered to and repeatedly references the Forest Plan, which sets forth the direction for managing the resources of the Pike and San Isabel National Forests (Forest).

Planning for activities on FS lands involves two levels of decisions. The first level is developing a Forest Plan that provides direction for all resource management programs, practices, uses, and protection measures. The Forest Plan consists of both Forest-wide

and area-specific standards and guidelines that provide for land uses with anticipated resource outputs under a given set of management constraints. The outputs are not fixed decisions by the Forest Plan, because all conditions required to produce the outputs are not controlled by the agency and because environmental conditions may change. These plans also contain general cumulative effects of the anticipated actions, i.e., effect of regional roadless values, regional wildlife populations, and the water quality of major drainage systems.

The second level of planning occurs during Forest Plan implementation. It usually involves analyzing and implementing site-specific management practices designed to achieve the goals and objectives of the Forest Plan.

Forest Goals and Objectives

The Forest Plan's goals and objectives provide broad, overall direction regarding the type and amount of goods and services that the Forest will provide. The goals are concise statements describing a desired condition to be achieved sometime in the future, and are expressed in broad, general terms and are timeless in that they have no specific date by which they are to be completed. The goal statements are the principal basis for the objectives. Goals are also in response to appropriate laws, regulations, and policies. The objectives are concise, time-specific, measurable results that respond to the Forest Plan goals. These objectives are the basis for the management requirements listed in the Forest Plan and Management Area (MA) Directions.

Forest-wide Direction, Standards and Guidelines

The Forest-wide management requirements set the baseline conditions that must be maintained throughout the Forest to implement the Forest Plan as it was intended. They establish the environmental quality and natural resource requirements and mitigating measures that apply to all areas of the Forest. Individual MA (see below) may have additional requirements that must be followed. The Forest Plan provides direction, and standards and guidelines that are specific to individual resources.

Management Areas

The Forest Plan divides the Forest into individual MAs, each of which has an emphasis that directs management activities within the MA borders. The Forest Plan also designates specific direction, goals, and standards and guidelines to be used to manage these areas to more completely meet the MA emphasis (called management area prescriptions). Each MA is described by its management emphasis, or general direction and goals, and specific standards and guidelines to help achieve those goals for the MA. There are 4 MAs in the project area: 3A (Semiprimitive Nonmotorized Recreation in Roaded or Nonroaded Areas), 4B (Habitat for Management Indicator Species), 5B (Big Game Winter Range), and 9A (Riparian Area Management (included within the other MAs). Each MA is briefly described below.

Management Area 3A: Management Emphasis - Semiprimitive Nonmotorized Recreation in Roaded or Nonroaded Areas

The management emphasis is for semiprimitive nonmotorized recreation in both roaded and unroaded areas. Recreation opportunities such as hiking, horseback riding, hunting, and cross country skiing are available.

Management Area 4B: Management Emphasis - Habitat for Management Indicator Species
The management emphasis is on the habitat needs of one or more MIS. Species with compatible habitat needs are selected for an area. The goal is to optimize habitat capability and thus numbers of the species. The prescription can be applied to emphasize groups of species, such as those that are early succession dependent, to increase species richness and diversity.

Vegetative characteristics and human activities are managed to provide optimum habitat for the selected species or to meet population goals jointly agreed to with the State Fish and Wildlife agencies. Forested stands are managed for specific size, shape, interspersion, crown closure, age structure, and edge contrast. Rangeland vegetation is managed to provide needed vegetative species composition and interspersed grass, forb, and shrub sites or variety in age of browse plants. Recreation and other human activities are regulated to favor the needs of designated species.

Management Area 5B: Management Emphasis - Big Game Winter Range
The management emphasis is on forage and cover on winter ranges. Winter habitat for deer, elk, bighorn sheep, and mountain goats is emphasized. Treatments to increase forage production or to create and maintain thermal and hiding cover for big game are applied. Livestock grazing is compatible but managed to favor wildlife habitat.

New roads, other than short-term temporary roads are located outside of the MA. Short-term roads are obliterated within one season after intended use. Existing local roads are closed and new motorized recreational use is managed to prevent unacceptable stress on big game animals during the primary big game use season.

Management Area 9A: Management Emphasis - Riparian Area Management
The emphasis of this MA is on managing all the component ecosystems of riparian areas. These components include the aquatic ecosystem, the riparian ecosystem (characterized by distinct vegetation), and adjacent ecosystems that remain within approximately 100 feet (measured horizontally) from both edges of all perennial streams and from the shores of lakes and other still water bodies. All of the components are managed together as a land unit comprising an integrated riparian area, not as separate components. The accomplishment of the MA 9A emphasis requires integration with other MAs.

The goals of management are to provide healthy, self-perpetuating plant communities, meet water quality standards, provide habitats for viable populations of wildlife and fish, and provide stable stream channels and still waterbody shorelines. The aquatic ecosystem may contain fisheries habitat improvement and channel stabilizing facilities that harmonize with the visual setting and maintain or improve wildlife or fish habitat requirements. Forested riparian ecosystems are treated to improve wildlife and fish habitat diversity with specified silvicultural objectives. Fish habitat improvement treatments are applied to lakes and streams to enhance habitats and increase fish populations.

Documents Tiered to and Incorporated by Reference

This EA is tiered to the 1984 Forest Plan as amended (40 CFR 1502.20), the Upper Arkansas Assessment (Forest Service, 1999), the Box Creek Road Analysis (unpublished report), and the BLM Vegetation and Travel Management in Box Creek Watershed

(2003). Tiering is done to eliminate duplication and reduce excessive paperwork as required by policy.

Chapter 2
Scoping, Issues and Alternatives

Introduction

This chapter describes the public involvement process, scoping, issues identification, and alternative development. Issues that were developed from the scoping process are discussed in terms of their incorporation into the alternatives. The No Action Alternative is discussed and used as a baseline for the other alternatives, and the two action alternatives respond to identified issues, resulting in a slightly different approach to achieving the purpose and need. The elements of the alternatives are described, followed by a detailed discussion of each alternative. Finally, alternatives are briefly compared by the major issues that were part of alternative development.

Public Involvement, Scoping, and Issue Identification

Public Involvement

Public involvement for this project began during preparation of the Upper Arkansas Assessment (Forest Service, 1999a) and the Lodgepole Flats Categorical Exclusion (Forest Service, 1999b). This project has appeared quarterly in the Forest's Schedule of Proposed Actions under the names of Lodgepole Flats Restoration, Box Creek Restoration Project, and Vegetation Management and Travel Management in the Box Creek Watershed EA, since the project began. An interdisplinary team (IDT) of resource specialists from the FS and BLM was formed in 2000 to begin analysis of the Box Creek Watershed.

The public scoping process was initiated with distribution of a scoping notice to local newspapers, and individuals, organizations, and government agencies on the project mailing list. Public scoping began February 14, 2000, with a letter mailed to 75 individuals. A second public mailing occurred on October 30, 2000. This list included adjacent landowners (complied from Court House records) and was mailed to 748 parties. Public notices were placed in local newspapers including *The Herald Democrat* (November 16, 2000), *The Leadville Chronicle* (November 16 & 30, 2000), and the *Pueblo Chieftain* (November 9, 2000). The notice described the project, presented the purpose and need for the proposal, and provided information on how to participate in the scoping process. Interested parties were invited to comment on the proposal.

Presentations were made internally to FS leadership and District employees, Lake County Commissioners, Lake County Soil Conservation District (LCSCD), Environmental Protection Agency (EPA) and Water Advisory Council. A field trip to Box Creek Watershed was made on June 23, 2000 with LCSCD members to examine forest health conditions in the Lodgepole Flats area. Prior field trips were made with representatives of environmental organizations, including Colorado Wild.

Issue Identification

Scoping identified four issues for alternative development. These issues and the objectives of the actions proposed by this EA to address the issues are presented in Table 2-1.

Table 2-1. Issues and Management Objectives for the Action Alternatives

Issue	Objectives for proposed actions
Forest Health Dwarf Mistletoe Management	Increase diversity in age, stand structure, and species composition. Improve the current forest health trend in lodgepole pine stands in the project area by minimizing the spatial extent of dwarf mistletoe.
Travel Management	Improve travel management and reduce road densities to minimize resource impacts.
Wildlife Habitat	Increase diversity in stand structure, spatial patterns, and effective habitat components for a variety of wildlife species. Increase forb and grass production for elk and deer.
Fire Regime Condition Class	Improve the fire regime condition class of the project area, by reducing the number of acres in condition classes 2 and 3.

Issues Dismissed from Further Analysis

If an issue was considered to be outside the scope of this EA, or if the best available information indicated that effects would be negligible, it was eliminated from further analysis, as per National Environmental Policy Act (NEPA) requirements. The issues considered but not carried forward in the analysis are as follows:

Inventoried Roadless Area Management

All action alternatives are consistent with the interim direction on roadless area management. There are no new roads proposed for the Inventoried Roadless Areas in this project. Any decision selected on either roads or timber harvest will be consistent with the roadless policy. Therefore, this issue was dismissed.

Alternatives Introduction

This section describes the action alternatives that meet the purpose and need for action. The No Action Alternative was also evaluated to provide a baseline and to comply with NEPA direction (40CFR1508.25 (b)). The action alternatives were developed in response to identified issues, resulting in different approaches to achieving the purpose of the project. Three alternatives were developed including: Alternative A - No Action, Alternative B - Proposed Action, and Alternative C. The action alternatives are consistent with the Forest Plan, National Forest Management Act (NFMA) and are consistent with Federal, state, and local laws and requirements.

Alternatives Considered in Detail

Alternative A: No Action

Alternative A is the No Action Alternative (Map 2). Under Alternative A, present management activities would continue. Noncommercial sale of fire wood, post and poles, and areas with prescription 3 would continue to be maintained to facilitate healthy regeneration. Annual noncommercial sales occur on about 50 to 70 acres in the Lodgepole Flats area, with an annual volume of approximately 192 ccf (150 cords) of firewood and 117 ccf post and pole material. The most common treatment for slash in noncommercial sales and regeneration units is the use of prescribed fire, although mechanical chipping is used in areas where fire is not desired.

There are approximately 27 miles of FS system and nonsystem roads used by motorized vehicles within the project area (Map 6). Three FS roads, totaling approximately seven miles are closed with locked gates and the closures are effective yearlong. These road closures have been in effect for more than 10 years and are expected to remain closed in the future except for approved activities. The road closures are on Forest Development Road (FDR) 130 near the crossing with Box Creek; FDR 160A; and FDR 160B (Map 6).

Alternative B: Proposed Action

The proposed action would treat/maintain approximately 2,300 acres of FS lands (Map 3) and allow motorized use on nearly 13 miles of FS roads in the Box Creek Watershed. Vegetative treatments include regeneration of aspen, regeneration of lodgepole pine followed by interplanting Douglas-fir and ponderosa pine, precommercial thinning of previously regenerated lodgepole pine within applicable lynx direction, grass and forb enhancement in sagebrush habitats, thinning for fuel break creation near the Pan Ark subdivision and the Mount Elbert Forebay, prescribed burning (broadcast and/or pile), and mechanical thinning. Following treatments, the area will have a more diverse stand structure and species composition. Habitat conditions would improve and forage production should increase, as would the amount of snags and down wood.

On FS lands, more than 7 miles of roads would be seasonally closed, more than 7 miles of roads would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned. Some of these treatments/actions will be coordinated with the BLM, which has a decision in place to conduct similar activities on their lands.

Containment features for prescribed fire may include using existing roads, trails, open areas of vegetation and hand constructed fireline. Mechanical treatment, including cutting and stacking, or spreading of fuels, may be needed, either to reduce fuel loadings or to create sufficient fuels to carry a ground fire. Ignition methods may include helicopters equipped with fire ignition devices, all terrain vehicles with rear mounted power torch, and hand held drip ignition devices.

Alternative C

Alternative C would treat/maintain approximately 4,000 acres of FS system lands (Map 4) and allow motorized use on nearly 13 miles of FS roads in the Box Creek Watershed. Vegetative treatments include regenerating aspen, regenerating lodgepole pine followed by interplanting Douglas-fir and ponderosa pine, precommercial thinning of previously regenerated lodgepole pine within applicable lynx direction, grass and forb enhancement in sagebrush habitats, thinning for fuel break creation near the Pan Ark subdivision and

the Mount Elbert Forebay, prescribed burning (broadcast and/or pile), and mechanical thinning. Following treatments, the area would have a more diverse stand structure and species composition. Habitat conditions would improve; forage production should increase, as would the amount of snags and down wood.

On FS lands, more than seven miles of roads would be seasonally closed, more than seven miles of roads would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned. Some of these treatments/actions will be coordinated with the BLM, which has a decision in place to conduct similar activities on their lands.

Containment features for prescribed fire may include using existing features such as roads, trails, open areas of vegetation and hand constructed fireline. Mechanical treatment including cutting and stacking, or spreading of fuels may be needed, either to reduce fuel loadings or to create sufficient fuels to carry a ground fire. Ignition methods may include helicopters equipped with fire ignition devices, all terrain vehicles with rear mounted power torch, and hand held drip ignition devices.

Prescriptions

Prescription 3: Maintain existing regeneration.

Maintain existing lodgepole pine regenerated clear cuts in accordance with desired future conditions and applicable lynx direction. Trees infected with mistletoe within 66 feet of old clear cut unit boundaries would be pruned and/or girdled for wildlife, or removed. Existing snags and coarse woody debris would be maintained and/or created.

Prescription 8: Aspen regeneration.

Regenerate aspen where the lodgepole pine is encroaching and/or crowding out clones. Treatments would include a mixture of prescribed fire and mechanical treatments. The largest diameter healthy trees, existing snags and course woody debris would be retained. Natural regeneration is expected in areas where aspen root systems occur. Desired future condition is early seral aspen communities.

Prescription 10: Lodgepole pine regeneration.

Regenerate lodgepole pine and mixed conifer in lodgepole pine stands that have high levels of mistletoe infestation. Treatment would involve removing trees in areas equal to or greater than 20 acres to encourage lodgepole regeneration absent of mistletoe. Existing snags and coarse woody debris would be retained and/or created. Interplanting ponderosa pine and Douglas-fir seedlings would be used to increase species diversity.

Prescription 12: Density reduction (Proposed Action).

Reduce tree density using a combination of mechanical and prescribed fire treatments in lodgepole pine stands to increase grass and wildlife forage. Trees with mistletoe infestation rating (DMR) greater than 2 would be removed unless considered a snag recruitment tree or coarse woody debris (CWD). Prescribed fire may be used every 10 to 20 years to maintain understory vegetation. Existing snags would be retained with additional snags created by leaving the largest size class trees available regardless of DMR. One to five acre snag patches would be created throughout the treatment areas to benefit wildlife. Mortality would be stimulated by post treatment prescribed burning.

The DMR is based on the Hawksworth Scale. This is a simple scale to assess mistletoe infestation and has become the standard used by both Federal and state forestry professionals. The scale divides a tree into three sections: top, middle, and bottom. Each section is assigned a DMR of 0 to 2 (see below). The scale may range for 0 to 6 in total for a tree.

0 = no infestation

1 = less than half the branches are infested

2 = more than half the branches are infested.

Prescription 12: Density reduction (Alternative C Only).

Same as prescription 12 for the proposed action except general snag retention design criteria would be followed (average of 40 snags per 5 acres) rather than creating 1 to 5 acre snag patches throughout the treatment area.

Prescription 13: Snag patch (Alternative C Only).

In heavily mistletoe-infested units, mechanical removal combined with a moderate intensity fire would be used to create patches of snags to enhance wildlife habitat. Intermediate and suppressed trees would be removed, with very small diameter trees cut and left for prescribed fire treatment. Codominant/dominant trees would be left and burned with moderate intensity prescribed fire to induce snag recruitment throughout the treatment units. Monitoring would determine the success of natural regeneration after treatment.

Prescription 19: Spruce-fir patchy burn (Alternative C Only).

Prescribed fire would be used to create a mosaic of early to late seral conditions across the treatment area, mimicking a natural wildfire. A disturbance restoration prescription would be implemented in lodgepole pine and spruce fir using prescribed fire. Adjacent to private property, mechanical treatment (reduction of fuel ladders and thinning of intermediate and suppressed trees) will occur in a 500-foot buffer before implementing a burn. The desired future condition after the prescribed fire treatment is a mosaic of different sized patches of mortality that would be interspersed with existing stands.

Prescription 21: Sagebrush – grass regeneration.

In areas having a dominant sagebrush component or in lodgepole pine with sagebrush or grass understory, prescribed fire would be used to improve sagebrush and grass regeneration. A prescribed fire rotation of 15 to 20 years may be required to maintain the area. In areas with a forest overstory, existing snags would be maintained, with additional snag recruitment created from the largest size class trees.

Prescription 23: WUI fuels reduction.

Reduce fuels adjacent to the Mount Elbert Forebay. Treatments would include thinning from below, salvage, and sanitation strategies. Trees to be removed may include trees currently infested with insects, some intermediated and suppressed trees, as well as mistletoe infested trees that form a fuel ladder into larger trees. Slash treatments would

include either pile and burning or chipping. Existing snags would be retained with additional snag recruitment created form the largest size class of trees as long as fuel objectives are met. Prescribed fire may be used in open ponderosa pine forests to improve stand conditions.

Prescription 23A: Fuel break adjacent to Pan Ark Subdivision.

Create a fuel break adjacent to the Pan Ark Subdivision. Treatments will be similar to prescription 23, but areas would have a more open and thinner composition.

A comparison of the prescriptions is listed in Table 2-2, a comparison between the No Action and action alternatives of road mileages is listed in Table 2-3 by agency, and Table 2-4 list a comparison of alternatives.

Table 2-2. Treatment Acres Comparison of Box Creek Prescriptions by Alternative

Prescriptions		Alternative (acres)		
Number	**Description**	**A**	**B**	**C**
3	Maintain existing regeneration	430	430	430
8	Aspen regeneration	0	40	40
10	Lodgepole pine regeneration	0	170	270
12	Density reduction	0	1050	870
13	Snag patch	0	0	180
19	Spruce-fir patchy burn	0	0	1550
21	Sagebrush-grass regeneration	0	180	180
23	WUI fuels reduction	0	280	280
23A	Fuel break adjacent to Pan Ark Subdivision	0	180	180
Total Treatment Acres		***430***	***2330***	***3980***

Table 2-3. Comparison between No Action and Action Alternatives of Road Mileages, by Agency

Proposed	No Action Alternative			All Action Alternatives			Total Net Difference
	Total	BLM	FS	Total	BLM	FS	
Open all year	29.2	2.1	27.1	8.2	2.8	5.4	-21.0
Gated seasonal closure	0	1.2	0	10.5	2.6	7.9	10.5
Gated all yr, admin only	7.5	0	7.5	7.5	0	7.5	0
Closed & restored	0	17.6	0	28.3	15.1	13.2	28.3
TOTALS	36.7	20.9	34.6	54.7	20.9	33.8	

Design Criteria

The following are actions common to all the action alternatives, regardless of the treatments.

1. All nonsystem roads, on FS lands, following this decision would be permanently closed and rehabilitated. Newly created routes would be closed as soon as possible after discovery.
2. Nonmotorized uses would be allowed on closed roads, unless the use causes negative impacts to rehabilitation efforts. If this occurs, these routes would be closed to all uses until the rehabilitation efforts are no longer in jeopardy.
3. Roads would be closed seasonally (May 15 – June 30) if they are in elk calving and mule deer fawning areas. See transportation map for locations.
4. Treatments would occur outside the water influence zone as delineated by a Fisheries Biologist or Hydrologist. If the area has not been delineated, then treatments would occur outside a 100-foot buffer from all perennial and intermittent streams.
5. Roads crossing on perennial and intermittent streams would be evaluated by a Fisheries Biologist to assure fish passage is provided.
6. No operations would occur in mapped elk calving and mule deer fawning areas May 15 – June 30. This area would be generally defined as west of the Mt. Elbert pipeline in the project area.
7. To protect potential sensitive plant and animal populations, prescribed fire operations would only occur from September 1 through March 1, unless surveys show no sensitive plants and animals are in the area or further analysis determines a wider treatment window is acceptable.
8. No mechanical harvest would occur after prescribed fire treatments.
9. Applicable threatened, endangered, proposed and sensitive species and MIS direction would be followed.
10. The project will follow the best management practices referenced in the Guide to Noxious Weed Prevention.
11. Live mistletoe trees would not remain in prescriptions 8 and 10.
12. Existing CWD would not be removed in treatment units. Retain an average of 20 of the largest logs or tress per acre in prescriptions 8 and 10 for CWD recruitment. These would be a combination of down logs and live standing trees. The trees would be the largest available in the unit and greater than 8 inches DBH. Following treatment, the retention tree density will be evaluated by the Wildlife Biologist, and where treatment units do not contain trees large enough for CWD recruitment, treatment slash would be piled for wildlife habitat. Piles would average 10 feet long, 10 feet wide and 5 feet high and number 3 to 6 piles per acre.

13. In all treatment units, mechanical treatments would not remove any existing dead standing trees (snags) greater than 8 inches DBH, except where removal for safety is necessary.
14. In thinning treatment areas, facilitate snag recruitment by retaining no fewer than 40 standing green trees per 5 acres (average of 8 trees per acre, in addition to CWD recruitment trees). These trees would be the largest available in the unit and greater than 8 inches DBH, if possible. Leave trees with defects or features, such as broken tops, cankers, heart rot, or any existing cavities for snag recruitment. Following treatments, retention tree density would be evaluated by the Wildlife Biologist. These trees may be left in patches distributed across the treatment areas. Where snag recruitment has not been achieved, trees may be killed and left standing.
15. To avoid the spread of whirling disease during prescribed burns, fire equipment will be treated with a chlorine solution before and after drafting from area water sources.
16. To promote species diversity, Douglas-fir and ponderosa pine species would be left in all treatment areas except when their retention conflicts with mistletoe reduction strategies.
17. Stump heights along the main roads should be approximately 6 inches or below to limit visual impacts.
18. Cultural resources would be avoided or protected during project implementation. Significant resources would be flagged for avoidance by vehicles, heavy equipment and other ground disturbing activities.
19. Wood chips may be used on identified cultural sites to retard erosion and increase effective moisture, encouraging the growth of grasses and small forbs that act as stabilizing agents. The depth of the chips will be determined by the Zone Archeologist. The Zone Archeologist will supervise and monitor these activities.
20. While implementing this action, all listed archeological sites, including a minimum of 30 – 50 foot buffer (depending on slope and fuel loading), will be avoided and protected from damage by equipment traveling in the area and pile burning activities. The Zone Archeologist will determine the buffer and mark the area.
21. If heavy fuel loads exist on any of the archeological sites for which avoidance is stipulated, then those fuels may be removed with an archeologist present.
22. If artifacts, features, or other indications of previously unrecorded heritage resources are identified in the course of ground-disturbing activities, all work in the vicinity of those materials is to cease and the Zone Archaeologist is to be notified immediately.
23. After treatments, flagging, markers and signage for the buffers will be removed to reduce disturbance by the public.
24. To reduce risk of spreading weed infestations, heavy equipment (i.e. tractors and skidders) would be cleaned and inspected prior to entering the project area. Begin project operations in uninfested areas before operating in weed infested areas.

25. Avoid staging equipment, supplies, vehicles or crews in weed-infested areas.
26. Avoid creating soil conditions that promote weed germination and establishment. Use weed-free project staging areas. Avoid or minimize all travel through weed-infested areas, or restrict to those periods when spread of weed sources are least likely.
27. Inspect and document ground disturbing operations, in all treatment areas, for noxious weeds for at least three growing seasons following project completion. Provide for follow-up treatments based on inspection results.
28. Post signs in areas where roads are to be closed, explaining the purpose of the new road system, including safety features and resource protection measures.

Table 2-4. Comparison of Alternatives

	Alternative A (No Action)	**Alternative B (Proposed Action)**	**Alternative C**
Timber Management (approximate acres treated)	450	2,300	4,000
FS Open Roads (miles)	27.1	13.3	13.3

Additional Comparison of Vegetation Types by Alternative is listed in Table 2-5, and Table 2-6 is the Comparison of Alternative Effects.

Table 2-5. Comparison of Vegetation Types in the Box Creek Watershed by Alternative.

Aspen

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action			10	390	580		60	10		1050
Proposed			30	370	580		60	10		1050
Alt C			30	370	580		70			1050

Lodgepole pine

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action	270	290	70	3190	1100	40	200	10		5170
Proposed	420	290	710	2500	990	130	100	10		5150
Alt C	520	280	760	2790	560	130	110	10		5160

Mountain grassland

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action	530									530
Proposed	540									540
Alt C	530									530

Ponderosa pine

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action						30				30
Proposed						30				30
Alt C						30				30

Sagebrush

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action		250								250
Proposed		250								250
Alt C		250								250

Spruce-fir

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action			130	160		10	1200	40		1540
Proposed			130	160		10	1220	40		1560
Alt C			190	90		340	890	40		1550

Wet meadow

Alternative	STRUCTURAL STAGE (ACRES)									Subtotal
	1	2	3A	3B	3C	4A	4B	4C	5	
No Action	120	410								530
Proposed	120	410								530
Alt C	120	410								530

Table 2-6. Comparison of Alternative Effects

Issue	Alternative A – No Action	Alternative B – Proposed Action	Alternative C
Forest Health Dwarf Mistletoe Management	Forest stands would continue to be homogeneous, dense, deformed, and predominately even-aged. Increase in crown fires may occur. Less snags and down woody debris would occur. On going treatments would help reduce some dwarf mistletoe but not to the extent of the action alternatives.	Increase in diversity of age class and structure. Increase in acres of aspen stands. Decrease in fuel ladder conditions, and crown fires. Reduce amount of mistletoe in about 60% of lodgepole pine type. Reduce spread of mistletoe infections.	Similar to Alternative B. Greatest increase in diversity of age class and structure. Increase in acres of aspen stands.
Travel Management	Some reduction in soil erosion because of current road closures. Unclassified roads would still be open.	Produces least amount of sediment over the long term. Unclassified roads would be closed and/or obliterated.	Unclassified roads would be closed and/or obliterated as in Alternative B.
Wildlife Habitat For other effects on MIS or Sensitive species please turn to Chapter 3 section on Wildlife	Would maintain current diversity in stand structure, spatial patterns or effective habitat components. Would maintain current road densities. Wildlife disturbance and displacement would continue.	Would increase patches and distribution of snags and coarse woody debris. Would improve deer and elk forage quantity and quality. Overall reduction in motorized route miles. May affect, but not likely to adversely affect Canada lynx, bald eagle and No effect on boreal toad.	Similar to Alternative B – Designated snag patch (Prescription 13) and general snag retention guidelines rather than small snag patches throughout the treatment area. Greatest number of acres treated and associated effects.
Fire Regime Condition Class	Fire regime condition class would remain in condition classes 2 and 3.	Would improve fire regime condition class by reducing number of acres in condition classes 2 and 3.	Same as Alternative B.

Monitoring Plan

Pretreatment photo points were established in the summer of 2004 to document the current condition of the project area. Photo points would be monitored after the implementation of treatments.

Past, On-Going or Foreseeable Future Actions

The following projects are past, on-going, or foreseeable future actions within or near the project area. The need to include these actions in the individual resource analysis is dependent on the cumulative effects area and duration of effects for each resource. Additional watershed assessments will be occurring in the future.

Mining. Past and present small and large-scale mining activities occur on the District for a variety of minerals. In some areas large mining operations removed the majority of

vegetation, displacing both wildlife and plant species. Management activities, to address water contamination from past mining operations, are on going.

Recreation. Recreation activities have greatly influenced the travel system throughout the Forest. Increased use of off-highway vehicles for recreational use has resulted in an extensive "user-created" network of travel routes (i.e., non-system routes).

Special Use Permits. There are numerous small-scale recreational and nonrecreational special uses (e.g., single residence powerlines, waterlines, road access permits, etc.) within the analysis area.

Prescribed burns.

- Lodgepole Flats prescribed burn is on-going to treat slash from management activities including private fire wood, post and pole harvest and regeneration maintenance.
- Twin Lakes prescribed burn is expected to be implemented in 2006 and will burn 50 to 100 acres per year in the riparian area to improve wildlife habitat.

Noncommercial sale of firewood and post and poles. 30 to 40 acres are available per year for public fuel wood and 20 to 30 acres available per year for other wood products, such as post and poles for personal use. The annual volume sold is approximately 192 ccf (150 cords) and 117 ccf post and pole material.

Slash Treatment. Management units are treated for accumulated slash, as needed, following other management activities. While prescribed fire is the most common treatment, mechanical chipping is used in areas where fire is not desired.

Northwest Leadville Hazardous Fuel Project. This project is located approximately 10 miles north of the Box Creek project. Treatments include thinning and prescribed fire near the wildland urban interface.

Previous work completed on Lodgepole Flats. Treatments included patch cuts for reducing mistletoe and improving wildlife habitat. The majority of the areas included prescribed fire, either broadcast or pile burning.

BLM Projects. Past and present activities include: precommercial and commercial thinning, noncommercial fuelwood and post and pole areas.

Chapter 3
Affected Environment and Environmental Consequences

The affected environment discussion describes the physical and biological components of the environment that could be affected by implementation of the alternatives. The environment is described in terms of specific resources. This discussion sets the stage for a discussion of the environmental consequences and comparison of alternatives.

Historical Condition

In 1860, gold was discovered in California Gulch and the area population continued to swell during the silver rush, which began in 1877 and ended when the U.S. Government quit buying silver in 1893. During this time, almost all accessible trees were cut to support Leadville and other nearby mining towns. They were needed for mine structure supports, smelters, building material, and heating during the winters. Either the wood was burned directly, or it was used to make charcoal. After a time, wood became so scarce that local residents tell stories of their grandfathers and fathers digging out tree stumps to use for fuel in the early 1900s.

Evidence in the project area from old stumps and fire scars, indicates a historical system different than what currently exits. Charcoal near or at the surface has also been found in these stands from other tree species. The charcoal evidence is one factor in determining, that before the late 1800s, the area was considerately different in vegetation structure, species mixture, and fire frequency. Based on old dead and down ponderosa pine snags, bark from ponderosa pines laying on the ground under the down snags, and fire scars collected in the area, it is believed the historical fire regimes were more frequent.

Historically, the forest was more open with fewer trees, greater age diversity between stands, and larger openings than the area displays today. The forest would have been characterized by low intensity fires, which were the primary disturbance factor. At times, large fires would move into the crowns, which maintained the open stand structure. These high intensity crown fires likely occurred following wet periods when understory vegetation flourished and provided a ladder effect moving the fire from the ground into the canopy. In these types of events, the fire would have burned intensely in some locations, killing all trees in that area, while in other areas of the same fire event, the burning would have been limited to the surface, killing only some trees, and may have missed other areas completely due to natural fire breaks. Fires would have limited the growth of saplings, which are less tolerant to fire than mature ponderosa pine and Douglas-fir, to sites where fires were infrequent, particularly wetter, north-facing slopes. The smaller fires would also have kept the forest more open by limiting growth of understory trees.

Frequency and fire patterns created a varied burn mosaic that in turn created a sustained vegetative pattern across the landscape. This mosaic pattern was maintained as the patch-like variations of age classes, densities, and openings causing fires to skip around rather than kill all trees over several thousand acres. Some stands had a multitude of age classes

from seedlings to trees more than 400 years old, and there were probably more snags and cavities in live trees. Other stands would have been nearly even-aged due to stand-replacing fires followed by even-aged regeneration.

There is no direct documentation of the historic levels of dwarf mistletoe before European settlement at Lodgepole Flats. These parasites have been in North America at least 25 million years (Hawksworth, 1978). The co-evolution of host and parasite, under the influence of factors such as fire and plant community dynamics, has resulted in a highly specialized relationship. Evidence suggests that, until settlement, the disease was widespread geographically but in limited patches on the landscape and not generally severe (J. Worrall, pers comm. 2001).

Forest Health and Vegetation—Affected Environment

Forest species composition in the project area has shown an increase in disturbance dependent species such as lodgepole pine due to activities that include mining, human caused fires, and logging practices. Other vegetative species include ponderosa pine, Douglas-fir, aspen, sagebrush, and a variety of forbs and grasses all of which have declined throughout the project area due to the shift in disturbance described above.

Individual lodgepole pine stands are homogeneous, dense, and predominantly even-aged. Many trees are deformed, have suppressed growth and are infected with mistletoe. The forest consists of small diameter (8.9 inches dbh and less) with scattered medium diameter (9.0 inches dbh and greater) trees. Stand exams of the project area indicate the average live tree basal area ranges from 60 square feet per acre to 180 square feet per acre. Snags large enough to provide wildlife needs are rare throughout the project area. Understory vegetation is limited in the number of species, quality, and quantity (FS unpublished data, 1984, 1985; Worrall, pers comm., 2001).

Conifers are encroaching on aspen stands, which are exhibiting little successful regeneration. Grass and forb production has decreased in sagebrush habitats due to lack of disturbance. Evidence shows that ponderosa pine and Douglas-fir historically occurred primarily on the southern end of the project area, but is a small component of current stands.

Mountain pine beetle (MPB) activity is increasing in the project area and reaching an epidemic level along the southern project boundary near Twin Lakes and the Mt. Elbert Forebay. Although literature suggest risk of tree mortality is lower in higher elevations, areas on the White River and Arapaho National Forests, north of the project area, at similar elevations are experiencing a high tree mortality in lodgepole pine stands. Reducing stress on forested stands with various treatments and changing stand composition may aid in achieving healthier forest conditions.

Forest Health and Vegetation—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

Forest stand structure would continue to develop, but would not reach the desired conditions. Tree growth would continue to be suppressed in dense stands, and the development of mature-old growth forest characteristics (large trees, snags, and down

logs) would be limited. Dense stands would become increasingly susceptible to mortality from insects and disease, and the area would remain a relatively homogeneous lodgepole pine community, with very little species diversity. Aspen age class and diversity would change very little over the short term and would continue to be encroached upon by conifers. In the southeastern portion of the watershed, it is likely the forest would continue to become less diverse as lodgepole pine would continue to invade open ponderosa pine stands. Areas with dominant ponderosa pine would be increasingly susceptible to mountain pine beetle mortality, and lodgepole would become the dominant species.

High levels of mistletoe suppress tree growth and leads to deformity, top kill and premature mortality (Hawksworth and Johnson, 1989). These impacts of mistletoe make it less likely that true old-growth condition would be reached in the watershed, and in turn, reduce development of large, old trees.

Mistletoe and insect infestations may lead to patch mortality, which would provide some structural diversity and opportunities for other species. However, it may take hundreds of years before such a system stabilizes. Present forest conditions are especially suitable for development of high infestation levels of mountain pine beetle and mistletoe.

Cumulative Effects

Minor changes in stand composition would occur from maintenance of stand regeneration and noncommercial sales of fuelwood and post and poles. Resource disturbance would continue from the use of roads, dispersed recreation sites, as well as, continued infestation of mistletoe and MPB in forested stands.

Action Alternatives

Direct and Indirect Effects

The action alternatives would result in a mosaic of size class, structure, and species from various prescriptions. Some prescriptions would result in early seral forest stands and habitat conditions that would develop as natural lodgepole regeneration occurs. Species diversity would be improved through interplanting of ponderosa pine and Douglas-fir in specified areas.

Tree vigor and health would be improved; however, tree growth could be suppressed if the natural regeneration is not monitored and evaluated for thinning in the first few years of seedling establishment. The development of different stand structures and age classes would be a mosaic across the landscape depending on the intensity of the treatment applied.

The action alternatives would reduce mistletoe in most of the treated lodgepole pine stands. Wildfire is one of the primary factors governing the distribution and abundance of mistletoe. Relatively complete burns tend to reduce mistletoe in the infested stands because trees usually reinvade burned areas faster than the mistletoe (Jones 1974). Although the project should reduce the amount of mistletoe in about 60 percent of the lodgepole pine type, most of the mistletoe infested lodgepole acreages would still have some mistletoe after the project.

Placing borders of regeneration units where there is little or no infestation outside the unit will help prevent re-infection of regeneration. Clear-cut regeneration units will be large enough (>20 acres) so that the rate of re-infestation is low.

Where abundance of mistletoe infection is low, mistletoe reduction thinning can be considered. It is nearly impossible to eliminate mistletoe from a stand because recent infections may remain undetectable for several years. However, stand condition could be improved.

In those areas where there is an adequate supply of cones, clear-cutting followed by prescribed burning to dispose of the slash is probably the most practical method to keep many of these stands healthy and productive (Lotan, 1975).

Fire or mechanical treatments will be used to treat heavily infested stands. Both treatments mimic natural fires that regulated mistletoe in the past. The new stands would have mistletoe diminished to more historic conditions. The treatments would also increase tree growth by removing suppressed trees that use up moisture and nutrients, which would improve the growth of larger trees. Natural regeneration of lodgepole pine would increase with fire treatments, as lodgepole is an early seral disturbance species.

Grasses and forbs would initially increase, until the overstory began to dominate the area.

In all of the partial treatments (not stand-replacement) involving fire, some surviving trees will have fire scars. Fire scars may serve as entry points for decay fungi that colonize stems, roots, or the butt of the trees. This defect will reduce the timber value, but will provide habitat for cavity-nesting birds, denning sites for small mammals, and habitat for a variety of fungi and insects. All treatments that leave dead material on site would contribute to CWD accumulation. Although, in some circumstances it contributes to the fire hazard, CWD enhances soil stability, contributes to moisture and nutrient retention, provides habitat for mycorrhizae, denning habitat for small mammals, and resources for many other organisms (Bull et al., 1997; Harmon et al., 1986; Harvey et al., 1976; 1978).

Treatments in sagebrush would result in the reestablishment of grasses and forbs. Maintenance burning would be required to maintain the establishment of grasses and forbs, as sagebrush would eventually reestablish in the area. Prescribed burning the sagebrush will provide for improved nutrient cycling. Past prescribed fire treatments, on adjacent BLM areas, resulted in good establishment of grasses and forbs.

Aspen stands are experiencing conifer encroachment and declining in size due to the lack of disturbance. The action alternatives would move towards rejuvenation of pure aspen stands, as well as increase the size of those stands.

Implementing prescriptions would result in resource objectives being met. As with any disturbance event, effects on soil, water, and vegetation would depend on the intensity of prescribed fire or wet season equipment use.

Cumulative Effects

The action alternatives, combined with past and current management in the project area, would increase the acres of healthy forest, improve vegetation, and increase aspen vigor. Improved forest health, along with future maintenance treatments, would maintain a healthier stand better able to withstand catastrophic disturbance.

Fire and Fuels—Affected Environment

A natural fire regime is a general classification of the role fire would play across a landscape. The five natural fire regimes are classified based on the average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. The fire regimes for the Box Creek project area vary by vegetation type. The significant fire regimes for the project area include:

- III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced) – Examples include: ponderosa pine and lodgepole pine;
- IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced) – Examples include: lodgepole pine, spruce/fir, and sagebrush;
- V – 200+ year frequency and high (stand replacement) severity – Examples include spruce/fir forest.

Fire regime condition class (FRCC) is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and diseased mortality, grazing and drought).

There are three level of fire regime condition class (FRCC 1 – 3). A simplified description of each level is listed below. For more detailed information on FRCC, see www.frcc.gov.

- Condition Class 1: Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.
- Condition Class 2: Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.
- Condition Class 3: High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.

In the project area, other associated disturbances include high incidence of dwarf mistletoe in lodgepole pine and extensive logging in the late 1800's that removed the majority of trees from the area, including stumps and down logs that would have naturally built soils.

A Fire Regime Condition Class analysis for the project area was conducted using the Fire Regime Condition Class and Associated Data for Fire and Fuels Planning: Methods and Applications, (Hann et al., 2001). The majority of the Box Creek Watershed is rated as condition classes 2 and 3 (approximately 3,600 and 6,300 acres, respectively).

Areas of the wildland urban interface include the Pan Ark Subdivision, located on the southwest boundary of the project area, and the Mt. Elbert Forebay located within the project area. The Forebay is part of the Frying Pan-Arkansas project that provides water to the Front Range. Lodgepole and ponderosa pine stands, with intermixed aspen and sagebrush are located adjacent to the subdivision and the Mt. Elbert Forebay.

In 2004 – 2005, there were three wildland fire starts within the project area. All three starts were suppressed at less than one-tenth acre.

Fire and Fuels—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

Under this alternative, ongoing or previously approved management activities in the area would continue, such as recreation, personal use fuel wood gathering, and routine road maintenance.

Forest stand structure would continue to develop, but would not reach the desired conditions. Stands already susceptible to mortality from crown fire hazard would not be treated to lessen their susceptibility. Changing the homogeneous characteristics of the lodgepole pine community to create diversity in stand structure, spatial patterns and an overall reduction in crown fire hazard would not occur. Eventually, wildfires would create early seral stage development in aspen and lodgepole stands.

Mistletoe and MPB would continue to affect the forest until a disturbance event occurs. Through time, tree mortality, stunted trees, witches brooms, resin-infiltrated stem cankers, and accumulated dead fuels would continue to increase potential fire behavior and flammability. Mistletoe also tends to increase fire predisposition, rate of spread, intensity, crowning, spotting and duration (Alexander and Hawksworth, 1975). Thus, heavy mistletoe and MPB infestations would lead to high fuel loading, and more intense and continuous fires.

Portions of the project area in condition class 2 would move toward condition class 3. Areas in condition class 1 may start to move towards condition class 2. As more of the project area becomes condition classes 2 and 3, fires begin to burn more intense. At these intensities, wildland fires have a greater potential to kill all of the trees, including the larger ones that, at lower fire intensities, would normally survive. (National Fire Plan – Cohesive Strategy (Forest Service, 2001).

Current areas that have been thinned, along with patch cuts, allow for human impacts (OHV use, disperse camping) and increase the associated risk of human caused wildland fire.

Cumulative Effects

Under the No Action Alternative, the probability of wildfire would be slightly reduced due to treatments currently taking place on BLM lands combined with past and present treatments (fuelwood and post and pole sales) that have occurred on FS lands. Overall, the project area would remain at risk from a high intensity crown fire.

Action Alternatives

Direct and Indirect Effects

Under Action Alternatives B and C, treatments would result in a mosaic of size classes, structure, and species from varying treatment intensities. Harvest treatments would, in the short term, increase surface fuels created by the slash from thinning activities. The hazard associated with those fuels would be reduced after prescribed fire treatments are implemented. Thinning, biomass removal, and prescribed fire would result in reduced fuel loading and fuel ladder conditions.

Patch cuts combined with prescribed fire will encourage grass growth and regeneration of lodgepole pine seedlings. Grass, when cured, is fuel for a wildland fire. Thinned forests and the removal of ladder fuels will help to maintain a wildland fire on the surface and reduce the likelihood that a fire would spread to the crown of trees.

Under these alternatives, small, slow moving fires would be most common because understory fuels have been reduced; fire spread into the crowns would be difficult because lower tree branches are elevated well above the forest floor. These stands will become more flammable as they age because dead woody fuels accumulate on the forest floor. In the project area, large fuels are scattered and would likely result from insect and disease outbreaks, which are common.

Thinning, along with patch cuts, may increase the likelihood of human impacts (OHV use, disperse camping) and increase the associated risk of human caused wildland fire.

Implementing prescriptions would result in resource objectives being met, including improved fire regime condition class. As with any disturbance event, effects on soil, water, and vegetation would depend on the intensity of prescribed fire or wet season equipment use.

Alternative C

Direct and Indirect Effects

Under Alternative C, prescribed fire used under prescription 19 would be used to mimic a wildfire to create a mosaic type landscape. A wildfire in this fuel type consists of moderate to high intensity fire behavior. Potential holding problems may occur by trying to mimic this type of fire behavior, which may result in a significantly larger area being burned than intended.

Cumulative Effects

All action alternatives, combined with past and present vegetation treatments and the treatments on BLM lands would result in lower intensity wildfires within the project area and would be easier to suppress. The action alternatives would improve the fire regime condition class.

Noxious Weeds—Affected Environment

In the summer of 2005, the area was thoroughly surveyed for noxious weeds. The Forest Service botany crew spent 10 – person days on the Box Creek project performing floristic surveys for both threatened, endangered and sensitive plant species as well as noxious weeds within the treatment units.

To date, *Cirsium arvense* (Canada thistle) is the only nonnative plant (noxious weed) found during the course of surveys in the project area. A population of yellow toadflax is known to occur near the boundary of the project area at Twin Lakes and is being treated annually with herbicides by the Chaffee County Weeds Department (Larry Walker pers. comm. 2002). Other nonnative species known to occur on FS land in the Upper Arkansas Valley include: oxeye daisy, dalmation toadflax, Houndstongue, leafy spurge, scentless chamomile, downy brome, perennial pepperweed, hoary cress, spotted knapweed, Russian knapweed, musk thistle, field bindweed, common tansy, shepard's purse, and musk thistle. The San Isabel National Forest is working cooperatively with BLM, state, and county agencies to eradicate, control, and prevent nonnative species throughout the Upper Arkansas River Valley.

Noxious Weeds—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

Without ground disturbing activities, such as prescribed fire and timber harvest, opportunities for spread or new infestation of nonnative species would be limited in the project area in the short term. In the long term, without proposed vegetation treatment, the risk of high intensity crown fire increases, and would result in large areas of severe ground disturbance creating opportunity for nonnative species to establish on a much larger scale, as they are able to out-compete native species when colonizing a site.

Cumulative Effects

As the human population increases, recreational impacts are likely to increase in the project area. Nonnative species have the potential to spread to new areas by transport on people, pets, and vehicles traveling on roads and trails. At this time, most of the known populations of nonnative species are restricted to roads and trails. With the limited personnel and noxious weed treatment funds, it is likely nonnative species would continue to spread at a slow but constant rate through the project area.

Action Alternatives

Direct and Indirect

Wildland fire is a natural process that often helps to maintain or improve health and productivity of native plant communities. However, when nonnative species are present, native plant communities can be threatened.

Various plants respond differently to fire. Nonnative species may rapidly infest burned areas as seedbeds are prepared, competition from native plants is reduced, and increased nutrients are released into the soil. For example, the spread of Canada thistle can be reduced or enhanced by fire as the response to fire is variable and may be affected by the season of burn, burn severity, site conditions, plant community composition, and phenology before and after the fire.

Pre-treatment for prescribed burns may include construction of control features such as dozer lines or handlines. Construction of these control features creates soil conditions favorable for seed germination, establishment, or spread of nonnative species.

Timber harvest activities may create areas of bare ground as the surface of the ground is disturbed and vegetation is removed. Equipment used for timber harvest may carry and distribute nonnative species seed into newly disturbed sites and promote the establishment of new populations or increase distribution of existing populations.

The use of design criteria and recommended measures in this EA should minimize the spread of nonnative species.

Cumulative Effects

The potential for nonnative species to spread would be maintained or decreased under Action Alternatives B and C, by reducing the number of road miles that provide a conduit for seed dispersal. Design criteria and noxious weed treatments would also help prevent the spread within the project area.

Botany—Affected Environment

During the course of botanical surveys one species tracked by the Colorado National Heritage Program was found. Mountain whitlow-grass (*Draba rectifructa*) is ranked G3/S2. This species was found in a small meadow within a treatment unit, but it did not occur in the dense lodgepole pine forest adjacent to it. The site will be flagged and avoided during implementation. This species will most likely benefit from opening the canopy and mild ground disturbance.

Habitat for 16 species from the Region 2 Regional Forester's sensitive species list exists within the Box Creek project area (Table 3-1). These species are typically found in one of the following five habitat types:

1. Aspen: Lesser yellow lady's slipper (*Cypripedium parviflorum*) and narrow-leaved moonwort (*Botrychium lineare*) are known to occur in aspen habitat. The lady's slipper would be at the upper end of its elevation range on the Leadville District and is unlikely within the Box Creek project area. Narrow-leaved moonwort is rare and the known occurrences are scattered. One occurrence is known on the Pike National Forest, but none have been found on the Leadville District of the San Isabel National Forest.
2. Disturbed areas and gravelly slopes: Iowa moonwort (*Botrychium campestre*) is found in disturbed areas or places with little vegetative cover (such as gravelly slopes). Two occurrences are known in Colorado, but neither is near Lake County.

3. Moist meadow: Park milkvetch (*Astragalus leptaleus*) is known to occur in moist swales and meadows from South Park to the Wet Mountain Valley. Little of this habitat exists within the Box Creek project area, but the species could potentially be found in small meadows within the project area.
4. Sagebrush: Dropleaf buckwheat (*Eriogonum exilifolium*) is known to occur in sagebrush flats of North and Middle Park. It has the potential to occur in South Park and sagebrush habitats near Leadville.
5. Riparian habitats and wet spruce forest: Slender cottongrass (*Eriophorum gracile*), Greenland primrose (*Primula egaliksensis*), and sageleaf willow (*Salix candida*) are all known to occur in riparian areas. These species are usually associated with areas that are quite moist, although they may also be found in narrow riparian zones. Club spikemoss (*Selaginella selaginoides*) has been found in wet spruce forests. Little potential habitat exists for these species within the Box Creek project area.

Some species from the Region 2 sensitive species list may inhabit several habitats, and could potentially occur within the Box Creek project area. These include:

1. Smith whitlow grass (*Draba smithii*) is found in the montane, subalpine, and alpine zones. It is often associated with rocky sites such as rock outcrops, boulderfields, and scree slopes.
2. Colorado tansy-aster (*Machaeranthera coloradoense*) is found in mountain parks, amongst sagebrush, on slopes, in rock outcrops and on alpine tundra. Two known occurrences are within 10 miles of the project area.
3. Weber's monkeyflower (*Mimulus gemmiparus*) is found on granitic seeps, slopes, and alluvium. It is known only from Colorado and few sites have been found. It occurs on the Pike National Forest, but has not been documented on the San Isabel National Forest.
4. Rock-loving aletes (*Neoparrya lithophila*) has been found on rock outcrops and montane meadows. The plant is known only to occur in Colorado and northern New Mexico; the Leadville District is to the north of the known sites.
5. Degener's penstemon (*Penstemon degeneri*) grows in pinyon-juniper forest and in montane grasslands. It is currently known only to occur in the lower and mid-Arkansas River Valley; the Leadville District is to the north of its known distribution.
6. Rocky Mountain cinquefoil (*Potentilla rupincola*) is known only to occur in Colorado. While it is mostly found along the Front Range it has potential habitat on the San Isabel National Forest. It is usually found growing in inaccessible rocky places on granitic substrates.
7. Selkirk violet (*Viola selkirkii*) inhabits moist woods and thickets. It is known to occur in only a few sites along the Front Range, but has potential habitat on the San Isabel National Forest.

The Box Creek project area was surveyed for threatened, endangered, proposed and sensitive (TEPS) plant species during the summer of 2005 by FS botanists. Although the above listed species have potential habitat within the project area, none were found

during site-specific botanical surveys. All habitats were surveyed, but those habitats with the most potential for TEPS plant species were given the most scrutiny, particularly sagebrush, meadows and forest openings, riparian areas, and rocky outcrops.

Botany - Environmental Consequences

Alternative A- No Action

Direct, Indirect, and Cumulative Effects

TEPS plant species in the treatment area may be impacted by a number of on-going activities, including recreation, wildfire, firewood and post and pole sales, canopy closure, and wildlife grazing and browsing. These effects are species-specific and may be either beneficial or detrimental, depending on the biology of the species and the level of activity involved.

Action Alternatives

Direct and Indirect Effects

Direct effects occur when TEPS plant species are physically affected by activities associated with vegetative management by either mechanical or hand treatment. Direct effects can physically break, crush or uproot sensitive plants by driving over them, covering them, falling trees on them, or burning them. The direct effect of prescribed fire is the death or injury of individuals from fire or heat. Timing of prescribed burns is critical for annual plant species. Annuals are less affected by fall burns, which take place after they have set seed, but could be greatly affected by spring burns when they are growing and flowering.

Vegetative management, mechanical or hand treatment can indirectly affect TEPS plants by causing changes in vegetation composition and successional pathways of that vegetation, changing local hydrologic patterns in TEPS plant habitat, changing the fire regime, or changing the soil characteristics of the habitat. Some of these changes may result from shifts in hydrologic, solar, and soil characteristics of their habitat. Indirect effects can also occur from noxious weed invasion or from impacts to pollinators or mycorrhizae associated with TEPS plant species. Indirect effects can have positive or negative effects.

Cumulative Effects

Current management direction is designed to eliminate or reduce possible negative cumulative effects by protecting TEPS plant species from direct and indirect effects.

MacDonald (2000) reports that a critical step in cumulative effects analysis is to compare the current condition of the resource (in this case TEPS plants) and the projected changes due to management activities (in this case vegetative management, mechanical or hand treatment) with the natural variability over time in the resources and processes of concern. This approach is difficult for TEPS plants since long-term data are usually lacking, and many TEPS plant habitats have a long history of disturbance (i.e. an undisturbed reference is often lacking). Even though the cumulative effects analysis for TEPS plants is hampered by the absence of historic data and the lack of an undisturbed

reference, we can minimize the potential cumulative effects by minimizing the local (direct and indirect) effects.

A more complete discussion of the species with potential habitat in the Box Creek project area and the effects of the action alternatives on those species can be found in the Biological Evaluation.

Air Quality—Affected Environment

National Forests in the State of Colorado have signed a Smoke Management Memorandum of Understanding (MOU) with the Colorado Air Pollution Control Division and other federal and state land managers in Colorado. Signatories of the MOU are responsible for ensuring proper smoke management for any prescribed fires conducted and obtaining a permit from the State before initiating prescribed burning.

Fire management activities on public lands must meet the State standards for air and water quality. Activities must be conducted in accordance with Colorado Regulation 9, the State of Colorado Smoke Management Plan, Smoke Management MOU, and have an approved open burning permit issued by the Colorado Department of Public Health and Environment, Air Pollution Control Division.

Air quality in the Box Creek Watershed is very good and is considered as attainment for all six criteria pollutants. This may be due to relatively low emissions and particulate matter (PM) from stationary and mobile sources

Currently, Lake and Chaffee Counties do not have nonattainment areas. The nearest non-attainment areas are: Aspen (22 air miles northwest) and Lamar (210 air miles southeast). There are no Class I airsheds in the Box Creek Watershed area.

The closest commercial source (producing more than 100 tons per year of PM_{10}) is a bulk materials storage facility in Chaffee County producing 106 tons annually and in both counties, the greatest contributor to annual PM_{10} production is fugitive dust from unpaved roads (Environmental Protection Agency, 2001). Another important winter source for PM_{10} includes wood burning emissions.

Both the FS and BLM conduct prescribed burning (pile and broadcast) throughout the year. The number of acres, timing of the prescribed burn and the associated smoke production is limited by the Colorado Air Pollution Control Division through a permit system.

Smoke sensitive receptors near the project area include Leadville, Twin Lakes, Granite, Pan Ark Subdivision, Mount Massive Lakes Subdivision, Beaver Lake Estates, as well as other small subdivisions and individual homes. Downwind communities include Buena Vista, approximately 21 miles southeast of the project area and Fairplay, approximately 12 miles east of the project area.

Air Quality—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

The No Action Alternative would allow prescribed fire activities to continue in fuelwood, and post and pole units to reduce slash created from these activities. Smoke from prescribed fire would be limited in scope and duration (usually less than 24 hours). Broadcast burning would occur from spring to fall, and piles would be burned during the winter; all prescribed burning would occur under a permit issued from Colorado Air Pollution Control Division.

In the long-term, large quantities of emissions could be released if a large wildfire developed due to an abundance of hazardous fuels in the area. A large wildfire has the potential to emit large amounts of smoke that could remain in the local air sheds for a few days to several weeks depending on the size and intensity of the fire.

This alternative would add limited emissions to the air shed in the short term. However, long term increased fuel loads would allow new wildfire ignitions to have the potential to become large fires and would produce more emissions. Recent fire seasons in 2000 and 2002 have shown how wildfire emissions can be high, of long duration, and detrimental to public health.

Cumulative Effects

Under this alternative only small areas would be burned to reduce slash from fuelwood and post and pole sales. The cumulative increase in the demand for airshed would be minimal when combined with other projects.

The No Action Alternative would have minimal effects on the scheduling of other prescribed burns in the adjacent National Forest or BLM areas.

Action Alternatives

Direct and Indirect Effects

Action Alternatives B and C would have a direct short-term effect on air quality in the project area and surrounding area. Under these alternatives, PM_{10} would be released because of prescribed burning operations.

The Colorado Air Pollution Control Division controls the amount of burning conducted in any one air shed. Therefore, none of the alternatives would be expected to result in a violation of National Ambient Air Quality Standards (NAAQS).

Indirect effects of Action Alternatives B and C include a potential reduction for PM_{10} released from wildfires in the area. These alternatives would reduce the amount of standing live fuels as well as ground fuels. In addition, the arrangement of thinned stands across the landscape following treatment would create natural fuel breaks, which would reduce the amount of fuel that could be burned during a wildfire and limit the extent of wildfires.

Crown fires tend to release high levels of PM_{10} because of the amount of live fuel that typically burns. Conversely, prescribed fires implemented under the action alternatives would generally burn at lower intensity, producing lower emissions than would be produced under wildfire conditions. A recent scientific report (Martinson and CSO, 2002) analyzing the effects of prescribed fire and other fuel treatment methods in reducing wildfire severity indicates crown fire hazard (e.g., height to crown, crown bulk density, stand density, and basal area), fire resistance (e.g., height and diameter), and fire severity (e.g., scorch height, crown volume scorch, stand damage, and depth of ground char) were compared between previously treated and untreated areas. The results indicate treated stands experience lower fire severity than untreated stands burned under similar weather and topographic conditions.

The prescribed burning proposed by each of the action alternatives would have a direct, short-term effect on air quality in the Box Creek Watershed. The estimates for emissions are based on the acres treated in each alternative (assumptions: all areas proposed for burning would be treated and ground fuels are continuous across the area burned). Simple Approach Smoke Estimation Model results indicate an average of 332 tons of PM_{10} would be released from the proposed prescribed burning projects. If these burns were conducted over a 4-year period, an average of 83 tons per year of PM_{10} would be released. If these same areas were to burn in a wildfire, 2302 tons of PM_{10} could be released over a period of a few days. In reality, there would be natural openings in some areas, other areas with lighter fuels. Actual emissions would likely be less than these estimates for the reasons above. Since the amount of burning conducted in any one air shed is monitored and controlled by the state, these alternatives would not be expected to result in violations of air quality standards.

Prescribed burning would increase the number of smoky days in the local area, possibly affecting local communities and downwind communities. Smoke would stay in the local air shed a relatively short time (few hours to several days depending on weather). Generally, areas to the west and south of the burning would not be affected due to prevailing winds blowing smoke away from these areas. However, there could be some smoke settling into the river valley along the Upper Arkansas River during the evenings.

Smoke trapped in low-lying areas would be expected to dissipate once morning temperatures rose and the nighttime inversion lifted. Prescribed burning would be conducted under Colorado Air Pollution Control Division permitted conditions. Under these conditions, the smoke would be expected to lift to the mixing layer and then be transported aloft out of the air shed.

The action alternatives could result in an indirect effect on the public in the project vicinity from the smoke generated from burning. Depending on weather conditions at the time of burning, smoke sensitive areas that could be affected would be identified in the Prescribed Fire Burn Plan and associated permits.

Alternative C

Direct and Indirect Effects

Alternative C, which emphasizes the use of fire, would result in a greater short-term effect on air quality because a greater amount of fuel would be burned.

Cumulative Effects

The activities listed in Action Alternatives B and C may cause delays in burning due to the increased demands for the airshed, but most of these concerns will be mitigated by scheduling at the local administrative level and by prioritizing treatment areas.

Impacts on the local air quality are not usually evident once the emission source is removed due to dispersion. The cumulative effects from past emissions would be negligible. The greatest cumulative effects would be from activities that release emissions at the same time prescribed fire activity occurs in the project area. Activities that could have a cumulative effect on air quality include other prescribed burns scheduled for the same time. Future and foreseeable activities include proposed prescribed burning on adjacent BLM and FS lands.

The procedures and burning restrictions imposed by the State's smoke management program would limit any cumulative impacts of the action alternatives and any foreseeable future actions. Taking the Chaffee and Lake Counties emission inventory as a surrogate for the rest of the project area, the additional emissions from the treatments, even in the short term should not violate NAAQS or the State of Colorado's air quality standards and would cause minimal degradation to visibility and regional haze.

Recreation—Affected Environment

The Box Creek Watershed and surrounding area provides recreation opportunities for local and regional communities along the Front Range, Interstate-70 corridor, and the Upper Arkansas River Valley. Important recreation resources in the project area include Mt. Elbert (the highest mountain in Colorado), the Colorado Trail, the Continental Divide National Scenic Trail (CDNST), the Lodgepole Flats area, and the Mt. Elbert Forebay area.

The Forest Plan has assigned Recreational Opportunity Spectrum (ROS) settings to all MA. The ROS is a system developed by the FS that classifies recreation settings on National Forest lands according to their physical, social, and managerial characteristics. The ROS classes assigned to NF lands in the project area are:

- **Primitive (P)** – A natural environment of large size. Interaction between users is very low and evidence of other users is minimal. Motorized use in the area is not permitted.
- **Semi-Primitive Non-Motorized (SPNM)** – A natural, or natural appearing, environment of moderate to large size. The concentration of users is low, but there is often evidence of other users. No roads are present.
- **Semi-Primitive Motorized (SPM)** – A natural, or natural appearing, environment of moderate to large size. Interaction between users in this setting is low, but there is often evidence of other users. Local roads used for other resource management activities may be present.
- **Roaded Natural (RN)** – A natural, or natural appearing, environment of moderate size with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between

users may be moderate to high, with evidence of other users prevalent. Motorized use is allowed.

- **Rural (R)** – An area characterized by a substantially modified natural environment. The sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities for intensified motorized use and parking are available.

The Semi-Primitive Non-Motorized ROS setting are mostly outside the project area and located along the Colorado Trail, CDNST corridor and areas to the west of this trail up to the summit of Mt. Elbert. The Roaded Natural ROS setting consists of approximately 3,800 acres. Large areas of RN are around the Mt. Elbert Forebay and Lodgepole Flats. Approximately 1,500 acres of the Semi-Primitive Motorized ROS setting are also located in the Lodgepole Flats area north of Box Creek and west of FDR 130 and 160.

RECREATION RESOURCES

The bulk of the recreational use in the area occurs along the Colorado Trail and CDNST corridor as many visitors hike this section of trail to gain access to the two main routes leading to the summit of Mt. Elbert. There is also a considerable array of recreation activities in the Lodgepole Flats and Mt. Elbert Forebay area.

The area locally known as Lodgepole Flats is comprised of the area to the east and west of FDR 130N and 130S (also known as the Mt. Elbert Conduit or Pipeline Road). Lodgepole Flats is viewed by the public as a designated area for fuel wood and post-and-pole permits. It is also popular for a variety of recreational activities including walking, running, mountain biking, skiing, hunting, dispersed camping, target shooting, four-wheeling, and snowmobiling. Three commercial outfitters are permitted by the FS to operate specifically in the Lodgepole Flats area. The permitted activities include hiking, backpacking, and mountain biking. The number of service days allocated to commercial outfitters in the Lodgepole Flats area equals 254 person days per year. The Leadville Trail 100 Bike Race, a permitted recreation event, also takes place in the Lodgepole Flats area and is allocated 700 service days for the one-day summer event.

Big game hunting is very popular in the Lodgepole Flats area because it provides access to timbered areas further west in the Box Creek Watershed. Lodgepole Flats is in Game Management Unit (GMU) 48, which extends from Tennessee Pass (northern boundary) and Clear Creek Road (southern boundary) with the Continental Divide and Highway 24 serving as the west and east boundaries respectively. In 2004 there were almost 850 deer and elk hunters using the area for nearly 5,000 recreation days (CDOW 2005). GMU 48 is a draw area only. Use is expected to increase in 2005 since 100 more cow elk tags will be issued for the area during the rifle season.

Mt. Elbert Forebay is a reservoir that is part of the Bureau of Reclamation's Fryingpan-Arkansas Project that supplies water to southeastern Colorado. Managed by the Bureau of Reclamation, it has approximately 250 surface acres and three miles of shoreline popular for water-based activities such as fishing and boating. The National Forest System lands surrounding this area are popular for a variety of recreational activities, including dispersed camping, and motorized recreation. FS survey conducted in 1998, revealed several miles of user-created roads in the Mt. Elbert Forebay area, and approximately 70 dispersed camping sites. There are five commercial outfitters who are

permitted by the FS to operate specifically in the Mt. Elbert Forebay area, also known as the "Lily Ponds" recreational carrying capacity compartment. The permitted activities include hiking, backpacking, winter skiing and mountaineering, mountain biking, horseback riding, and fishing. The number of service days allocated to commercial outfitters in the Lily Ponds Compartment equals 387 days per year. Portions of the Leadville Trail 100 Run pass through this area adding about 700 service days over a two to three day period in the summer. The Mt. Elbert Forebay area is also included in GMU 48.

The approximately 500-mile long Colorado Trail and 3,100-mile long Continental Divide National Scenic Trail (CDNST) passes for about five miles, from north to south, through the western part of the Box Creek Watershed. This shared trail is one of the best-known trail systems in the nation. Additionally, the two main routes leading to the Mt. Elbert summit branch off this portion of trail. Fourteen commercial outfitters are permitted by the FS to operate specifically in the North Elbert and South Elbert recreational carrying capacity compartments. The permitted activities include hiking, backpacking, rock climbing, winter mountaineering, and backcountry skiing. The number of service days allocated to commercial outfitters in North and South Elbert Compartments equals 695 days per year. Portions of the Leadville Trail 100 Run also pass through this area. Based on trailhead register data for 2001, there were approximately 2,000 people who hiked on the Colorado Trail starting at the North Elbert Trailhead in the Halfmoon Creek drainage and approximately 4,100 people starting from the South Elbert Trailhead in 2001. Activities included hiking, backpacking, skiing, mountaineering, and snowshoeing. Since many people choose not to register at FS trailheads, the numbers presented here are not actual and probably under represent current use levels. The Mt. Elbert area is also included in GMU 48.

Recreation—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

The No Action Alternative would not have any direct effects on the recreational resource. An indirect effect of the alternative would be a continuation of the trend towards increasing fuel loads. This alternative would have the potential for a large, high intensity wildfire that could substantially damage recreational resources in the project area. A major fire in the area could result in the temporary or permanent loss of recreational opportunities. For example, the Hayman Fire on the Pike National Forest destroyed many recreational facilities, such as trails and campgrounds, causing much of the area to be closed to recreational use.

Recreationists using current roads would continue to disturb riparian areas and wildlife habitat, erode stream banks and hill slopes, and potentially degrading water quality and fish habitat. Over time, the degraded road conditions would negatively affect the recreation experience and could compromise the safety of some recreationists.

Cumulative Effects

Future foreseeable actions in the project area include noncommercial sale of firewood and post-and-pole and slash treatment using prescribed fire and mechanical chipping. These effects on recreation are minor and short-term.

Action Alternatives

Direct and Indirect Effects

The action alternatives would have only minor, short-term adverse effects due to the proposed activities. These effects would primarily be due to actual harvest activities and prescribed burning.

In the long-term, the recreational resources would be improved by these alternatives. The harvest treatments would move towards improving the fire regime condition classes, which would reduce the potential for damage of recreational resources due a large, high intensity wildfire. The action alternatives would improve the safety and aesthetics of the roads system in the project area, reducing further resource damage and rehabilitating some of the areas already damaged by overuse.

The proposed vegetation/timber stand treatments would have the greatest long-term, direct effect on recreation by changing the character of portions of the project area where recreation takes place. When the project is completed, the appearance of the treatment areas would be different from the appearance of the existing forest. The treatment areas would still have a natural appearance, but the forest would be less dense and there would be numerous openings created.

The action alternatives may result in a short term indirect effect of increased illegal off road recreation use of areas after vegetation treatments are completed. A more open forest would have potential for an increase of non-system roads or undesirable off- road vehicle use. Implementation of road activities (road closures by gates or barriers, fencing, placement of boulders, obliteration and treatment buffer strips) would decrease the off road use.

The actions proposed would not change the ROS settings of the project area. No new permanent roads would be constructed and the vegetation treatments would not change the long-term recreational use. Treatments would utilize existing roads.

Short-term effects of the treatments would include noise, visual activity, smells, and smoke that could affect the experience of people using this area. Traffic associated with the harvest and prescribed burning would also affect recreationists. The primary affect of the increase in traffic would be noise and dust along the road corridors.

Before burning, logging slash would be noticeable to visitors. Although these effects would be considered minor, some recreationists may choose to avoid the affected areas while harvest activities are being conducted. Recreationists may also avoid the areas being burned because of smoke. This would temporarily reduce the use of the area, however, the duration of the effect is short, and therefore, the overall effect of the burning would be considered minor.

The primary long-term effect to visitors would be visual. Areas where the forest has been thinned and/or burned would have different visual characteristics than the existing forest. The effect of this change would depend upon the sensitivity of the individual.

The overall difference in appearance would be a change to a more open mosaic of vegetation size class, structure, and species. The treated areas would retain a natural character more closely resembling the past forest conditions. The change in appearance of the treated areas may be noticeable but would not cause an adverse effect to recreationists.

An indirect effect of the vegetation/timber stand treatments would be the reduction of fuel loads and the resulting reduction in the potential for damage to recreational resources due to a high intensity wildfire. The action alternatives would result in a mosaic of vegetative size class, structure, and species beneficial to wildlife, and could also increase the opportunities for wildlife watching, bird watching, hunting, and aspen viewing. These recreational activities may augment Lake County-based tourism opportunities.

The seasonal road closures would take place on FDR 160, 130 (west of intersection with 130A), 130B and 136. Since the seasonal road closures would take place primarily during the winter months, the effects on summer-motorized recreationists would be minor.

The closure and obliteration of the non-system roads in the project area would potentially affect those recreationists who have become accustomed to using these roads. The effect would be minor since there are still existing system roads providing the same level of recreational access but in a sustainable manner. The reclamation may affect any individuals who use the non-system roads for hiking or mountain biking; other opportunities exist in the area for these activities, so the effect would be minor.

Cumulative Effects

Mechanical harvest treatments and prescribed burning would result in a cumulative increase in management activity in the project area. For a period when activities are concurrent, the cumulative effect may increase the feeling of crowding and negatively affect the recreation experience. This effect would be short term while activities are completed. The long-term cumulative effect of these combined actions would be a reduction in the potential for adverse effects to recreational resources due to a large high intensity wildfire.

Another potential cumulative effect is the increased popularity of the area for recreation activities since the actions would provide substantial improvements to a moderately used recreation resource.

Currently, the project area mainly provides OHV and hunting recreational opportunities. Taken collectively, the effects of the action alternatives (ie, increasing forest diversity, reducing unsightly mistletoe infestations, improving wildlife habitat, and implementing travel management provisions) would provide more attractive (or improved) recreation opportunities, especially for dispersed recreation.

Visual Resource—Affected Environment

The project area is partially visible from Highway 24, the Pan Ark Subdivision, Twin Lakes, Mt. Elbert, Colorado Trail, CDNST, and County Road 24 (Shore Pretty Drive).

Visual Resource—Environmental Consequences

Alternative A – No Action

Direct and Indirect

Under this alternative, the scenic quality would remain relatively unchanged. The potential for a crown fire would remain high due to the forest conditions.

Cumulative Effects

Continuation of the current management direction in the project area may result in minor changes in scenic quality due to removal of private fuel wood, post and poles, and maintenance of regeneration units. In the event of a crown fire, scenic quality would be affected for an extended period of time.

Action Alternatives

Direct and Indirect

The treatments would be visible to people driving through the project area. Due to topography, the majority of the treatments would not be visible from the highway or neighboring housing developments.

Cumulative Effects

Action Alternatives B and C would have similar effects for scenic quality for visitors in the project area. During implementation, there may be some visual effects, such as accumulation of slash, smoke from prescribed fire, and added traffic. In the long term, the forest would be more open, which would increase the level of scenery. The potential for a crown fire, and subsequent visual impacts, would be reduced.

Transportation—Affected Environment

The current FS policy limits travel to National Forest System Roads designated with a road number and designated with the “open to” and “closed to” signing.

All roads in the project area were analyzed via the roads analysis process, and the interdisciplinary team made recommendations based on the roads analysis findings. All roads in the planning area were assessed as to their potential uses and effects on resources, including erosion hazards, influences on big game and other wildlife species, as well as threatened and endangered species of wildlife. Road densities were examined and compared to Forest Plan standards.

There is approximately 60 miles of roads on federal lands in the Box Creek Watershed. Fifty-two percent of these roads have been created by users and, therefore, are not included in the federal transportation system. User-created roads often do not meet FS specifications, lack water diversion and erosion control structures, exceed maximum grade percentages, and generally compromise resource values.

The existing transportation system (including non-system roads) has several problems, such as parallel or duplicate roads, excessive road densities, and erosion issues resulting from improper drainage problems. Current road closure techniques have been very effective through the use of gates and barriers over the past decade (Box Creek Watershed Roads Analysis, 2003).

Transportation—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

Under the No Action Alternative the current road and trail system would remain the same (Map 6).

The No Action Alternative will not alleviate the resource problem, such as erosion and resource damage, caused by the current road system.

Indirect effects of the no action alternative include the proliferation of additional non-system roads created by users.

Cumulative Effects

Under the No Action Alternative, it is likely additional user created roads will be established. The ever-increasing road network may channel enough water that the roads (including maintained system routes) would not be sustainable.

All Action Alternatives

Direct and Indirect Effects

All action alternatives would close approximately 13.2 miles of roads and include approximately 7.9 miles of seasonal closures (Map 7). All roads not assigned as a system road on FS lands following this decision will be permanently closed and rehabilitated. Motorized activities will be restricted to system open roads. Newly created routes will be closed as soon as possible after discovery. Forest Protection Officers will enforce closures. Nonmotorized uses will be allowed on closed roads. Seasonal closures for resource protection will be placed on identified roads (Map 7). Four seasonal closure gates will be installed for these closures. Administrative use may occur at times.

Implementation of road closures and obliteration of non-system roads would decrease road densities allowing for a decrease in erosion, benefit wildlife, and allow for a more effective transportation system. Use of gates, barriers and road rehabilitation are proven effective measures for road closures.

Cumulative Effects

Cumulatively, reduction in miles of road would make the transportation network easier to maintain and would result in less resource damage from erosion from unclassified roads. The reduced road density would also allow wildlife to utilize more of the project area. Keeping users on properly built and maintained roads would make motorized recreation safer in the Box Creek project area.

Wildlife—Affected Environment

The project area is mainly comprised of MA 4B and 5B, which is managed for MIS emphasis and big game winter range respectively. Elk is the only terrestrial MIS expected to occur in the Box Creek area and is also the most common big game species in the project area. Currently, the high road density and low forage production of the project area is of particular concern. Other wildlife related items to note in the area include low tree species diversity, very little CWD, and a paucity of desirable wildlife snags.

Numerous studies have documented the negative impact of vehicle traffic on forest roads to elk (Ward et al., 1973; Rost and Bailey, 1974, 1979; Rost, 1975; Marcum, 1976; Perry and Overly, 1976; Thiessen, 1976; Ward, 1976; Lyon, 1979, 1983; Edge, 1982; Edge and Marcum, 1985, 1991; Edge et al., 1987; Marcum and Edge, 1991). The extent of reduced habitat use from open roads can be very substantial. With only two miles of roads open to vehicular traffic per square mile, the area affected can easily exceed half of the available elk habitat (Lyon, 1983). There are approximately 27 miles of roads open to motorized use currently. This equates to over three miles of roads open to motorized use per square mile in the project area.

Much of the project area is currently comprised of dense lodgepole pine stands with little species diversity and no understory vegetation. Areas that have been thinned or patch cut in the past have exhibited similar understory characteristics prior to treatment. These areas produce a considerable amount of grass that established naturally. However, the amount of open areas producing forage for elk is relatively low in the project area. Hundreds of elk overwinter in and adjacent to the Box Creek area. Winters have been relatively mild in the area for over a decade and the elk population has remained relatively stable. The estimated elk population (2,450) is slightly above CDOW objectives (2,200) for the Collegiate data analysis unit (DAU) (J. Vayhinger pers comm. 2004).

The high proportion of lodgepole pine in the area is likely the result of extensive timber harvesting for mining related activities in the late 19th and early 20th centuries. Remaining stumps indicate Douglas-fir and ponderosa pine were more numerous throughout the area than occurs currently. Higher proportions of Douglas-fir, ponderosa pine and aspen are desirable because they satisfy additional wildlife needs that lodgepole often cannot. These include attaining a larger diameter on average, thus becoming more attractive for foraging and cavity excavation.

The relative absence of snags and CWD in the project area can also be attributed to the early mining days. The area has not had sufficient time to recover from these previous activities, and wildlife in this area that require CWD or snags is currently suppressed.

POPULAR HUNTED SPECIES - MULE DEER

Mule deer are most likely to be found in open forested regions or on the plains and prairies (Snyder, 1991). They prefer rocky or broken terrain at elevations near or at the subalpine zone in the mountainous regions of the west (Carpenter et al., 1981). They are also found in alpine, montane, and foothill zones. Mule deer seek shelter at lower elevations when snows become deep. In open prairie regions mule deer tend to concentrate in river breaks and brushy stream bottoms (Mackie et al., 1987). Open road densities greater than one mile per square mile of habitat are considered a limiting factor (Hoover and Willis, 1984).

The Box Creek Watershed is entirely within the Cottonwood Creek Deer Area identified by CDOW. The Cottonwood Creek deer herd includes GMU 48, 481, 56 and 561. There is some seasonal interchange of deer into and out of the units but the segments of the population that winter in the herd area are rather consistent. Like the mule deer population throughout the west, this herd declined significantly in the early 1990s, and for the last three years the population trend has been upward. Current estimates place this population at approximately 6,300 animals with a long-term goal of 10,700. GMU 48 provides a much smaller percentage of the total deer population than it does of the elk population (J. Vayhinger, pers. comm., 2004).

Telemetry data from the Cripple Creek deer survival study has shown some movement by collared does and fawns from winter ranges north and northeast of Buena Vista, Colorado, into and through GMU 48 for spring, summer, and fall use. No radio-collared deer were located within the project area, but likely traveled through the area on their way to sites where they were subsequently located. A significant increase in deer numbers in the project area during the spring-fall period probably occurs, as they tend to winter to the south and east of GMU 48 (J. Vayhinger, pers. comm., 2004).

For the last several years deer hunting for this herd has been for bucks only and hunter numbers have been limited through the application and drawing process. Hunter numbers were set at 66 percent of the historic (1996 through 1998) level and will remain at that level for the near future. Buck/doe ratios have improved as a result of this limitation as the population has also been slowly increasing (J. Vayhinger, pers. comm., 2002).

Population Trend: Global and Colorado mule deer populations are known to be increasing (COVERS, 2001). There was a population decline at the turn of the century, but mule deer now has an unprecedented distribution (Mackie et al., 1987).

Habitat Trend: Summer range for mule deer covers the entire project area. Winter range includes 8,500 acres (45%) of the project area and 3,600 acres (42%) of National Forest lands (CDOW, 2002). The Box Creek Watershed represents ~19 percent and 2 percent of the mule deer winter range on the District and Forest, respectively. Fawning areas are unmapped, but occur in the general location of elk calving areas (T. Martin pers. comm., 2002).

Habitat Trend (mule deer and elk): The structure, composition, and landscape pattern of vegetation in many areas used by mule deer and elk on the Forest, particularly the lower montane zone, has been substantially altered from its pre-European conditions by

cumulative human impacts. Before logging, grazing, and fire suppression, ponderosa pine stands along the Colorado Front Range were less dense, more open, and less vulnerable to diseases, insects, and large intense wildfires (Foster Wheeler 1999).

Scientists (Kaufmann et al., in prep.; Huckaby et al., 2000; Kaufmann et al., 2000; Brown et al., 1999) have been studying historical landscape conditions on Denver Water's Cheesman Lake property with the Pike National Forest for the past several years. They showed that historically, the forests in the Cheesman Lake area were less dense, more open, and less vulnerable to large-scale fires than the surrounding forested landscape. As a result, the forest in this area now favors a crown fire regime, with a high risk of stand-replacing fire.

Kaufmann and others (in prep.) describe four basic stand conditions in the area: 1) openings vegetated primarily with grasses and shrubs; 2) patches that are pure or nearly pure ponderosa pine; 3) patches having both ponderosa pine and Douglas-fir; and 4) patches of very old trees, persistent old-growth. Historically 15% of landscape had persistent old-growth patches, pure ponderosa pine patches probably accounted for 35 to 50% of the landscape, primarily on east, south, and west slopes. Ponderosa pine/Douglas-fir patches on north slopes and portions may have accounted for 20 to 30% of the landscape, and at least 25% of the landscape was open, with no more than 10% tree crown closure. Undoubtedly these proportions varied over time, especially when fires created openings, reduced tree densities, or killed young Douglas-fir trees invading patches (Kaufmann et al., in prep.).

These patch proportions shifted dramatically because of the effects of logging, grazing, fire suppression, and transplanting, all of which are likely to increase tree density within these stands. Logging decreased the amount of old-growth. Grazing probably reduced understory competition and establishment of new seedlings, and the lack of fire allowed seedlings to survive. The result was a sharp increase in tree density, expansion of the area having a significant Douglas-fir component, and the loss of openings that temporarily increased during intense logging during the late 1800's (Kaufmann et al., in prep.).

Management Indicator Species (MIS)

ELK

Elk tend to inhabit coniferous forests associated with rugged, broken terrain or foothill ranges. During summer elk spend most of their time in high mountain meadows in the alpine or subalpine zones or in stream bottoms (Adams, 1982). Elk may use more open areas during spring and summer because of earlier spring green-up (Edge et al., 1987). During hot summer months, elk seek shaded, cool habitats (Leege, 1984). Use of forage areas depends on proximity to cover. Use is typically concentrated to within 200 to 600 feet of cover. Either cover or forage may be limiting to elk, particularly on winter ranges or calving habitats (Roderick and Milner, 1991). Cook et al. (1998) illustrated that "it remains uncertain that thermal cover significantly influences the nutritional condition, survival, or productivity of wild ungulates". Cook et al. (1998) found no significant, positive effect of thermal cover on elk condition, and in fact found that "dense cover provided a costly energetic environment, resulting in significantly greater overwinter mass loss, fat catabolism and (in one winter) mortality". Open road densities greater than

1.5 miles per square mile of habitat on summer range or one mile per square mile of habitat on winter range are also considered a limiting factor (Rodrick and Milner 1991).

The Box Creek project is entirely within the Collegiate Elk Area as identified by CDOW. The Collegiate elk herd includes the same GMU 48 and uses the same boundaries as the Cottonwood Creek deer herd. There is some movement in and out of this area by elk, primarily yearling bulls exploring new territories, and wintering cow/calf groups temporarily crossing the east boundary. Generally, however, this is a fairly autonomous group of elk. The current population estimate for this herd is 2,450 animals, of which approximately 600 remain in GMU 48 year-round in average to mild winters. In severe winters some of those animals move on south out of the unit. The summer population increases with wintering elk returning from winter ranges to the south of the unit and annual calf production (J. Vayhinger, pers. comm. 2004).

The long-term objective for this herd has been 2,200 animals for several years with the population fairly stable at the 2,100 to 2,450 level (J. Vayhinger, pers. comm. 2004). CDOW harvest objectives hope to return the population to approximately 2,200 in the near future. To help accomplish population objectives an additional 100 cow permits were issued for the 2005 rifle season. The CDOW manages this unit as a "quality unit" with limited licenses for both bull and cow hunters to reduce hunter crowding and improve bull/cow ratios to a minimum of 35/100 (J. Vayhinger, pers. comm. 2004).

Population Trend: Global and Colorado elk populations are known to be increasing (COVERS, 2001). Elk are widespread throughout the northern United States and southern Canada. They are intensively managed and there is good data on population size and trends (Fitzgerald et al., 1994; Zeveloff, 1988; Peek, 1982). Elk are expanding their range due to reintroductions, management, and habitat conversion (COVERS, 2001).

Habitat Trend: Summer range for elk covers the entire Box Creek Watershed. Winter range and calving areas include approximately 11,800 acres (63%) and 4,200 acres (22%) of the Box Creek Watershed, respectively (CDOW, 2002). Winter range includes approximately 4,275 acres (50%) of National Forest lands. The Box Creek Watershed represents approximately 58,000 acres (20%) and 490,000 acres (2%) of the elk winter range on the District and Forest, respectively.

Wildlife—Environmental Consequences

The Box Creek Watershed is used as the analysis area for wildlife species unless stated otherwise.

The effects of the alternatives on wildlife are based on expected changes in habitat and specific criteria contained in the Forest Plan. Amendment 30 to the Forest Plan changed the MIS list to include elk, Abert's squirrel, brook trout, and greenback cutthroat trout. Elk are the only terrestrial MIS affected by action alternatives and analyzed in the EA. The project record contains additional analysis on all previous MIS. Other wildlife species are discussed in the Biological Assessment (federally listed), Biological Evaluation (BE), and BE addendum located in the project record.

For habitat capability analyses (HABCAP) in this section, the habitat types were determined by photo interpretation and ground verified.

Alternative A – No Action

Direct and Indirect Effects

VEGETATION

The habitat capability for MIS addressed in this assessment would remain at the existing level for the short-term. Direct effects to wildlife would be negligible under this alternative since approximately 450 acres already patch cut would be maintained. In the short term, this alternative would involve allowable thinning, and would result in forest conditions similar to current conditions. Tree growth would continue to be suppressed in dense stands, and habitat structure would continue to be homogenous. Species associated with late successional/old-growth forests (three-toed woodpecker and marten) would continue to use forested stands, where these conditions occur. However, these species' presence would likely be limited by the availability of these forest characteristics in the project area. Similarly, species associated with early successional habitats for foraging (bluebirds, deer, and elk) and species associated with snags and CWD (bluebirds and sapsuckers) would continue to be limited by the relative lack of these habitats and structures within forested areas. This alternative compromises ungulate cover because of the high road density and does not promote quality elk foraging habitat (Tables 3-2 and 3-3). As a result habitat capability for mule deer and elk is somewhat limited in the area, especially during the winter months. Over 50% and 57% of the diversity unit will be hiding and thermal cover respectively. The project record contains additional information for ungulate thermal and hiding cover evaluation.

ROADS

This alternative would result in no change in the current road system within the watershed (Map 6). Summer and winter mule deer and elk habitat effectiveness (Table 3-2 and Table 3-3) would remain very low in all management areas because of the number of roads in the area.

Unlike the modeling efforts that generate relative effects of road densities for deer and elk, the specific number or density of roads required to cause affects to most species are not well known. The following is a discussion of general effects of roads on wildlife. Many of these effects likely occur in relation to the number and density of roads within the watershed.

Roads convert large areas of habitat to non-habitat (Hann et al., 1997; Wisdom et al., 2000). Construction of roads removes habitat that could otherwise be continuous interior forest habitat and creates new edge habitat. Increasing edge diversity for avian species may adversely affect interior species (Anderson et al., 1977; Hanowski and Niemi, 1995). In addition to effects caused by the conversion of habitat to road surface, forest roads cause changes in habitat and animal behavior, which result in changes in wildlife populations (Lyon 1983). Roads fragment habitats by changing the structure of the landscape. Roads dissect patches of vegetation, which increase the area of edge habitat and decrease the area of interior habitat.

The presence of a forest road and not its associated use can have adverse effects on populations by creating barriers to dispersal. Some small mammals will not cross roads

(Oxley et al. 1974, Swihart and Slade 1984). Both of these studies suggest that the inhibitory effect of roads may have adverse effects on population genetic diversity. The avoidance of roads, causing displacement, is common in large and small mammals. Areas of off-road vehicle use have a lower diversity, density, and biomass of small mammal species (Bury et al. 1977). Road avoidance is also common in large mammals such as elk, bighorn sheep, and mule deer and avoidance distances of approximately 328 to 656 feet have been reported for these species (Lyon 1983).

Some forest interior species suffer increased rates of parasitism and predation through increased numbers of edge species. Robinson et al. (1995) found that as percent forest cover decreased, nest parasitism by brown-headed cowbirds increased for nine species of birds. They also found increased nest predation rates for nine species of birds and associated the decrease with forest fragmentation.

Human use of the existing road system may cause reduced nesting and/or denning success. Human disturbance to nesting raptors such as northern goshawk are suspected as a cause of nest abandonment (Reynolds et al 1992). Female wolverines are sensitive to disturbance in their natal den sites and desertion has been documented by Copeland (1996) in Idaho.

Habitat loss and modification may also occur indirectly as a result of increased human activities facilitated by road access. Many species considered in this analysis are dependant on CWD and are adversely affected by increased harvest of snags and downed logs along roads (Hann et al. 1997). Human access facilitated by roads may also increase the likelihood of human caused wildfires.

Human use of the existing road system causes some amount of road kill. Most forest roads are designed for low-speed travel. Therefore, direct mortality on forest roads is not usually an important consideration for large mammals (Lyon 1985). Forest roads present a greater hazard to small mammals, amphibians, and reptiles. Small mammals are often "trapped" within the roadbed by roadside burms. Although some levels of mortality from road kill occurs within the analysis area, it is unknown what effect this has on animal populations.

This alternative leaves approximately 27 miles of open motorized routes on FS lands. This equates to over three miles of roads open to motorized use per square mile in the project area. With only two miles of roads open to vehicular traffic per square mile, the area affected can easily exceed half of the available elk habitat (Lyon 1983). The combination of high road density and low forage production in the area increases the probability of ungulate winter mortality, especially elk because of the high number that winter in the vicinity.

Cumulative Effects – Wildlife

Historic mining activities have occurred and have had great impacts on wildlife. Much of the mixed conifer was harvested for mining timbers, fuelwood, and charcoal. The snags and CWD important for denning habitat was also harvested for fuel. Within most of the watershed, only lodgepole and aspen were regenerated, reducing species diversity. These small, dense lodgepole stands were relatively homogenous and more susceptible to abnormal levels of insect and disease populations and tree mortality. Few snags were created and existing snags continued to be harvested for fuel. Within the spruce-fir

(subalpine) zone, harvest activities associated with mining also occurred, but probably occurred on a smaller scale because of steeper terrain. In summary, these historic activities combined to produce a forest that has smaller trees, less structure (snags and CWD), less species diversity, and a low stand age diversity (older stands). These features are inconsistent with high quality wildlife habitat.

Numerous activities require continued use of, or construction of new roads and trails. Roads in particular increase soil erosion, increase sedimentation, fragment, and directly remove habitat, facilitate the spread of invasive and noxious weeds. The spread of noxious weeds has led to changes in species composition of the forest, increased competition with native plant species, and altered fire regimes that have adversely affected many plant and wildlife species addressed here. Motorized and non-motorized recreational use (including OHV use, camping, horseback riding, mountain biking, hiking, hunting, and fishing) has led to the development of non-system roads and trails, development of dispersed campsites, erosion, disturbance to wildlife species, and the vectoring of invasive and nonnative plants in previously pristine areas.

The creation of new roads has decreased wildlife habitat effectiveness and capability within the project area. Other recreational activities within the project area have the potential to affect wildlife populations through disturbance.

Recreation is frequent within the watershed. Motorized touring (i.e., automobiles, four-wheeled drive vehicles, off highway vehicles, and snowmobiles), is prevalent as are hunting, camping, hiking, and horseback riding during certain times of the year. Each of the above activities have incrementally impacted wildlife and plant species addressed in this assessment directly, indirectly, and cumulatively through fragmentation, habitat loss, and loss of effectiveness through human disturbance.

Human access facilitated by roads may also increase the likelihood of human caused wildfires. However, access facilitated by roads also allows firefighting personnel to shorten their response time to wildfire incidents and may decrease the potential of wildfire spread.

Fire and the absence of fire have changed wildlife habitats. Since 1955, there have been more than 15 fire starts in the Box Creek Watershed. Little acreage has burned to date but current fuel loading presents opportunity for that pattern to change.

Timber harvest and thinning has led to a more open canopy with additional light reaching the forest floor (which may be beneficial or detrimental depending on the species), soil disturbance and compaction, development of skid roads, and nonnative plant invasion. Changes in forest composition, structure and fire frequency have also taken place. See mining discussion above.

Urban development is expected to continue on private lands. This will continue to destroy and fragment species habitat, fragment/isolating populations, increase the risk of nonnative plant invasion, and the incidence of wildfire.

In addition, to the activities listed above, the proposed FS CDNST project is currently being planned by the Leadville District of the San Isabel National Forest. Parts of the 40+ mile trail project occur in the Box Creek Watershed. The BLM has conducted and will continue to implement similar vegetation treatments and travel management adjacent to the Box Creek project area.

Past and present forest management activities have caused changes in plant community structure and composition across the forests. These management activities have altered the present landscape to various degrees and have had direct, indirect, and possibly cumulative effects on TEPS species. These effects can be minimized by following the FS standards and guidelines, and by implementing integrated design features to monitor or offset impacts. With these protective measures in place, cumulative effects are less likely to be adverse.

Maintenance treatments associated with the No Action Alternative would be negligible in conjunction with cumulative effects for the Box Creek project.

All Action Alternatives

Direct and Indirect Effects

VEGETATION TREATMENTS

Under these alternatives, vegetative conditions would change (Table 2-5) and have subsequent effects on wildlife habitat (Tables 3-2 and 3-3). The differences between the action alternatives are primarily treatment area size. Alternative C would treat approximately 100 additional acres with prescription 10 (regeneration of lodgepole) and roughly 1550 acres of prescription 19 (spruce-fir patchy burn). Additionally, Alternative C would have a snag patch (prescription 13), while the proposed action would use prescription 12 for the same area. Under the proposed action prescription 12 would distribute patches of snags over the entire treatment area. Effects discussed below apply to all action alternatives unless stated otherwise. Alternative C would have similar effects to the proposed action, but would be expected over a larger area.

Many of the treatments are designed to reduce the amount of mistletoe in the project area. Effects of mistletoe on wildlife can be positive or negative. Blue grouse and blacked capped chickadees have been observed foraging on mistletoe in lodgepole pine in Wyoming (Hawksworth & Wiens, 1996). While a few mammals such as red squirrel, chipmunk and elk occasionally utilize mistletoe as a dietary supplement, none depend on it as a primary food source (Hawksworth & Wiens, 1996). The brooms may also be favored as nesting sites for some animals, although this has not been studied in the lodgepole pine system. However, mistletoe reduces tree growth and the potential for stands to become large enough to provide adequate structure for cavity nesters or potential denning habitat. While the amount and extent of mistletoe will be reduced with the action alternatives, the parasite would still remain in the project area and adjacent lands following treatments.

COMMON TO ALL SPECIES

Project activities, including mechanical harvest and prescribed burning, would cause habitat modification. In the short term, vegetation treatments could directly remove cover, forage, nests, dens, and possibly juvenile wildlife that are unable to disperse. Decreases in cover could reduce concealment of nests and dens for wildlife and could increase predation until under-story vegetation establishes and/or the over-story canopy fills in. Treatments opening the over-story canopy would increase the amount of herbaceous vegetation, with a subsequent increase of prey species, such as microtine rodents (e.g., red-backed voles). Beneficial effects to ungulates and predators of small

mammals could result from the increase in herbaceous vegetation. Change in small mammal communities in response to treatments is affected by individual sites (e.g., elevation, slope, aspect, size, and vegetation community), intensity, and time of individual treatments.

Prescribed fire and equipment associated with vegetation treatments may create opportunities for the introduction of nonnative plants. However, one action common to all action alternatives involves monitoring and removal of all such nonnative plant species. Smoke from prescribed fires may also disturb wildlife activities. These effects are temporary; species should return to these areas when the disturbance has ended.

MATURE FOREST SPECIES

Tree growth would be facilitated within dense stands of lodgepole pine treated with a thinning prescription and habitat structure within the watershed would be less homogenous. Species associated with late successional/old growth forests will continue to use forested stands where these conditions occur. However, outside of Prescription 19 these habitats are not found in the project area. The action alternatives will result in maintaining suitable habitat for these species and provide for recruitment of habitat in the future.

SNAG AND CWD DEPENDENT SPECIES

For many species of wildlife, CWD provides places for foraging, denning, hiding cover, hibernacula, increased moisture content, and nutrient recycling. All areas treated under action alternatives will retain and create additional CWD that are important habitat features of many of the species addressed in this document. Selecting retention trees within clumps will likely mimic the natural and historic distribution of snags on the landscape as disturbance events (insects, disease, fire, wind) generally occur within localized areas. This will benefit snag and CWD dependent species by providing these structural components in those areas in which these species would naturally use them.

Retention guidelines of a minimum of 40 retention trees per five acres of treatment area in these alternatives would satisfy snag densities required for a variety of snag-dependant species (red-naped sapsucker, three-toed woodpecker, and marten). The eight snags per acre would be averaged over an area that approximates the smallest territory size of a management species. Instead of having approximately 200 acres designated for a snag patch (Prescription 13 in Alternative C), the proposed action would retain 1 to 5 acre snag patches throughout prescription 12. The snag patches in the proposed action count toward the snag retention guidelines. Retaining snag patches over the entire project area is more desirable than retaining individual snags, or one large snag patch because potential habitat is provided for a greater number of species.

The increase in snags and CWD from retention and creation from mixed-severity fire (Alternative C) will benefit red-naped sapsucker, three-toed woodpecker, marten, and other wildlife by creating additional snags that could be used for nesting and foraging. Mountain bluebirds will gain additional foraging and perch sites from additional snags. Marten will benefit from the increased numbers of snag and CWD dependent prey species that should accompany the increased number of snags and downed logs provided in Prescription 19. The proposed action is expected to have no effect on marten or three-toed woodpeckers since there is no quality habitat within treatment areas.

UNGULATES

Elk, and to a lesser extent deer, will benefit from the reduced road density and increased forage production. Alternative C generally provides the best potential habitat because more forested area is converted to quality foraging habitat (Tables 3-2 and 3-3).

The Forest Plan at III-32 and 33 states that "in diversity units dominated by forested ecosystems, maintain a minimum of 40 percent of the diversity unit in deer or elk hiding cover. This hiding cover should be well distributed over the unit. Maintain 20 percent of the diversity unit in thermal cover (winter or spring-summer). Hiding cover can be used to meet thermal cover requirements also, if they indeed coincide biologically."

However, since the diversity unit in the Box Creek project contains MA 4B and 5B, the forest direction listed above is superceded by standards listed for the management areas (Forest Plan pg. III-138 and III-153) which states in diversity units dominated by forested ecosystems, maintain a minimum of 50 percent of the diversity unit in deer or elk hiding cover. This hiding cover should be well distributed over the unit. Maintain 30 percent of the diversity unit in thermal cover (winter or spring-summer). Hiding cover can be used to meet thermal cover requirements also, if they indeed coincide biologically.

Additionally, MA 5B (Forest Plan pg. III-152) has a standard to provide thermal cover for elk or deer on at least 20 percent of the area.

The document *Calculating Hiding and Thermal Cover for Forest-wide and Big Game Diversity Units on the PSICC: Updating Project Analyses with Best Available Science* is located in the administrative record and provides methodology for quantifying hiding and thermal cover.

Figures A1 and A2 illustrate that over 50 percent and over 60 percent of the diversity unit would be maintained as hiding cover for the no action and action alternatives respectively.

Figures A3 and A4 illustrate that approximately 57 percent and 54 percent of the diversity unit would be maintained as thermal cover for the No Action and action alternatives respectively. The proposed action and Alternative C appear together despite approximately 100 acres more in Alternative C being converted from thermal cover because rounding makes these action alternatives virtually the same. Additionally, even with the maximum amount of treatment, each action alternative would greatly exceed Forest Plan standards.

The thermal cover table in the administrative record shows that approximately 2,680 acres are available in MA 5B.

Alternative	Acres of thermal cover in MA 5B (percent)
No Action	1,960 (73)
Proposed Action	1,820 (68)
Alternative C	1,800 (67)

Action alternatives will reduce the likelihood of winter mortality and assist the CDOW with attaining management objectives for the deer and elk herds.

ROAD RECLAMATION

The proposed road system is the same under all action alternatives (Map 7) and represents a decrease in open motorized route miles. These alternatives would reduce the amount open motorized roads currently from 27 miles to 13.3 miles (5.4 miles open all year and 7.9 miles open seasonally). Action alternatives would result in motorized route densities less than 1.7 miles per square mile, compared to densities over three miles per square mile currently. The reduced motorized route density increases ungulate security and hiding cover for the diversity unit and increases the area potentially used by deer and elk. Habitat effectiveness for deer and elk improves with the proposed road system of the action alternatives because several miles of non-system roads used currently would be decommissioned. Action alternatives are consistent with Forest Plan standards and guidelines of maintaining at least 80 percent habitat effectiveness because effectiveness is increased compared to the no action alternative (over 100 percent habitat effectiveness maintained).

Other general effects of roads on terrestrial wildlife (e.g., habitat loss and modification, changes in behavior, barriers to dispersal, displacement, increased rates of parasitism and predation, introduction of pests and forest diseases, reduced nesting and/or denning success, and road kill) would occur in each of the action alternatives at levels much less than under the no action alternative.

Cumulative Effects

Ongoing actions that contribute to cumulative effects under this alternative are the same as those discussed under the No Action Alternative. Alternative C would have slightly greater effects than the proposed action as a result of the additional acres treated.

Action alternatives will add to the overall cumulative effects to the species addressed in this assessment from the thinning, fuels reduction treatments, and associated increased level of human activity during treatments. These treatments within the project area may reduce short-term habitat effectiveness during implementation, but should return to pre-treatment human activity levels upon completion. Habitat changes could be positive or negative depending on species requirements discussed above in the direct and indirect effects section. Changes from the Box Creek project would be in addition to the vegetation changes from the adjacent BLM treatments and CDNST project.

Table 3-1. Threatened, endangered, candidate/proposed, and FS sensitive species with the potential to occur within the analysis area on the San Isabel National Forest.

NOTE: The U.S. Fish and Wildlife Service species list (FWS 2003), Region 2 Forest Service sensitive species list (Forest Service 2005a), and PSICC species list (Forest Service 2005b) were reviewed and species not having the potential to occur on the Forest were excluded from further review. The rational for these exclusions are documented in Forest Service in prep. (2005c).

Species Common and Scientific Name	Status[1]	Potential to Occur	Rationale for Exclusion[2]	Habitat Description and Range in Colorado
PLANTS				
Aquilegia chrysantha var. *rydbergii* Golden columbine	S		ODR	along streams and in rocky ravines in mountains; (5,500 ft?) 8,000-9,800 ft; El Paso and Fremont counties.
Armeria maritima ssp. *sibirica* Siberian sea thrift	S		HAB ELE	grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,900-13,000 ft; Park & Summit counties.
Asclepias uncialis Dwarf milkweed	S		HAB ELE	plains, short-grass prairie, outwash mesas and gravelly side-slopes; 4,000-6,500 ft; Baca, Fremont, Huerfano, Las Animas, and Pueblo counties.
Astragalus leptaleus Park milkvetch	S	✓		moist swales and meadows; South Park to the Wet Mountain Valley; 7,500-10,000 ft; Park, Fremont, and Custer counties.
Botrychium campestre Iowa moonwort	S	✓		dry, gravelly hillsides, 3,700-10,800 ft; Yuma and Clear Creek counties
Botrychium lineare Narrow-leaved moonwort	S	✓		disturbed sites, grassy slopes among medium height grasses, along edges of streamside forests, alpine areas & aspen forests; 7,900-9,500 ft; Boulder & El Paso counties
Botrychium multifidum Leathery grapefern	S		ODR	mountain meadows; 6,700-9,900 ft; Larimer to Routt counties.
Braya glabella Arctic braya	S		HAB ELE	sparsely vegetated slopes above timberline, especially on calcareous substrates; 12,000-13,000 ft; Chaffee, Gunnison, Park, and Pitkin counties.
Carex diandra Lesser panicled sedge	S		HAB	wet meadows and subalpine willow carrs; 7,400-9,000 ft; Boulder, Grand, Jackson, and Larimer counties.
Carex livida Livid sedge	S		HAB	fens and wetlands; 9,000-10,000 ft; Jackson, Larimer, and Park counties.
Cypripedium parviflorum Lesser yellow lady's slipper	S	✓		moist forests and aspen groves; 7,400-8,500 ft; Clear Creek, Custer, El Paso, Huerfano, Jefferson, Las Animas, Park, Pueblo, and Teller counties.
Draba exunguiculata Clawless draba	S		HAB ELE	alpine on rocky and gravelly slopes or fellfields, usually on granitic substrates; 12,000-14,000 ft; north-central Colorado including Lake, Park, and Summit counties.
Draba grayana Gray's peak whitlow-grass	S		HAB	alpine and subalpine on tundra, gravelly slopes or fellfields; 11,500-14,000 ft; central Colorado, including Chaffee, Clear Creek, Huerfano, and Park counties.

Species Common and Scientific Name	Status[1]	Potential to Occur	Rationale for Exclusion[2]	Habitat Description and Range in Colorado
Draba smithii Smith whitlow-grass	S	✓		upper montane, subalpine and alpine, 8,000-11,000 ft; Custer, Las Animas, Mineral, and Saguache counties.
Drosera rotundifolia Roundleaf sundew	S		HAB	amongst *Sphagnum* on the margins of ponds, fens, and floating peat mats; 9100-9800 ft; Gunnison and Jackson counties. Also, a new collection from "North Park".
Epipactis gigantea Giant helleborine, stream orchid	S		HAB	seeps, springs, riparian areas and wetlands; 4,800-8,000 ft; western Colorado, also Chaffee, El Paso, Fremont, and Park counties.
Eriogonum brandegei Brandegee's buckwheat	S		HAB ELE	piñon -juniper or sagebrush, often on grayish limestone soils; 5,700-7,600 ft; Chaffee, El Paso, Fremont, and Park counties.
Eriogonum exilifolium Dropleaf buckwheat	S	✓		sagebrush flats; North and Middle Parks in Jackson and Grand counties.
Eriophorum altaicum var. *neogaeum* white-bristle cottongrass	S		HAB	alpine wetlands; 9500-14,000 ft; Eagle, Gunnison, Hinsdale, La Plata, Park, Saguache, and San Juan counties.
Eriophorum chamissonis Chamisso's cottongrass	S		HAB	alpine wetlands; 10,400 ft; the Colorado distribution of this species is not known, partially due to taxonomic issues (the species is often confused with *Eriophorum altaicum* var. *neogaeum*).
Eriophorum gracile Slender cottongrass	S	✓		montane and subalpine wetlands, wet meadows and pond edges; 8,100-12,000 ft; Jackson, Las Animas, and Park counties.
Eutrema penlandii Penland alpine fen mustard	T		HAB ELE	alpine areas, downslope from persistent snowfields providing year round moisture, bogs that are wet with a constant source of flowing water; 12,000-12,800 ft; known to occur on the leeward side of the crest of the Mosquito Range, from Hoosier Pass to Mount Sherman, Park and Summit counties
Festuca campestris Rough fescue	S		ODR	subalpine meadows; 11,000 ft; Huerfano County
Festuca hallii Plains rough fescue, Hall fescue	S		ODR	alpine and subalpine grasslands and meadows; 11,000-12,000 ft; Larimer County.
Ipomopsis globularis Globe gilia	S		HAB ELE	alpine ridgetops, and gravelly, calcareous soils; 12,000-14,000 ft; Lake, Park, and Summit counties.
Kobresia simpliciuscula Simple bog sedge	S		HAB	alpine areas including tundra, fens, moist gravel, and glacial outwash; Park and Clear Creek counties.
Machaeranthera coloradoensis Colorado tansy-aster	S	✓		mountain parks, slopes & rock outcrops & dry tundra; 8,500-12,500 ft; Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Saguache, & San Juan counties.
Malaxis brachypoda White adder's-mouth orchid	S		ELE	riparian areas, amongst mosses; 7,200-8,000 ft; El Paso & Jefferson counties.
Mimulus gemmiparus Weber's monkeyflower	S	✓	Addressed in original BE	granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests; 8,500-10,500 ft; Grand, Jefferson, Larimer, and Park counties.

Species Common and Scientific Name	Status[1]	Potential to Occur	Rationale for Exclusion[2]	Habitat Description and Range in Colorado
Neoparrya lithophila Rock-loving aletes	S	✓		piñon/juniper woodlands, rocky places, montane grasslands and openings, and sometimes on Dry Union formation; 7,000-10,000 ft; Chaffee, Conejos, Fremont, Huerfano, Mineral, Rio Grande, and Saguache counties.
Oenothera harringtonii Arkansas Valley evening primrose	S		HAB ELE	grasslands; 4,700-6,100 ft; El Paso, Fremont, Huerfano, Las Animas, and Pueblo counties.
Parnassia kotzebuei Kotzebue's grass of parnassus	S		HAB	alpine and subalpine, in wet rocky areas, amongst moss mats and along streamlets; 10,000-12,000 ft; north-central and southwestern Colorado, including Park and Summit counties.
Penstemon degeneri Degener's beardtongue	S	✓		piñon/juniper, ponderosa pine woodlands, & montane grasslands with coarse gravelly or rocky reddish soil with igneous bedrock, rock slab cracks; 6,000-9,500 ft; Fremont & Custer counties
Potentilla rupincola Rocky Mountain cinquefoil	S	✓	Addressed in original BE*	subalpine or montane granitic outcrops amongst ponderosa or limber pine; 6,900-10,500 ft; Boulder, Clear Creek, Larimer, and Park counties.
Primula egaliksensis Greenland primrose	S	✓		wet meadows, streambanks, willow carrs, fens, and on hummocks; 9000-10,000 ft; Park County.
Ptilagrostis porteri Colorado false needlegrass/Porter feathergrass	S		HAB	hummocks in fens and willow carrs; 9,200-12,000 ft; El Paso, Lake, Park, and Summit counties.
Ranunculus karelinii tundra buttercup	S		HAB ELE	alpine slopes and summits amongst rocks and scree; 12,000-14,100 ft; central Colorado, including Chaffee, Clear Creek, Gunnison, Lake, Park, & Summit counties
Rubus arcticus ssp. *acaulis* Northern blackberry	S		HAB	wetlands in willow carrs and mossy streamsides; 8,600-9,700 ft; Clear Creek and Park counties.
Salix arizonica Arizona willow	S		ODR	meadows, springs, seeps, riparian areas and wetlands; 8,300-10,800 ft; Conejos county
Salix candida Sageleaf willow	S	✓		fens and pond and stream edges in foothill/montane wetlands; 8,800-10,600 ft; Gunnison, Hinsdale, Lake, La Plata, Larimer, and Park counties.
Salix myrtillifolia Blueberry willow	S		HAB	in fens from foothills to alpine; 9,300 ft; Park County.
Salix serissima Autumn willow	S		HAB	wetland areas including marshes, fens, and bogs; 7,800-10,200 ft; Custer, Park, Larimer, and Routt counties.
Selaginella selaginoides Club spikemoss	S	✓		marshy areas and wet spruce forests; east side of the Park Range (possibly in Park, Teller, Jefferson, and Douglas counties?); little is known about the distribution of this species in Colorado.
Utricularia minor Lesser bladderwort	S		HAB	shallow water of subalpine ponds; 5,500-9,000 ft; north-central and west-central Colorado; little is known about the Colorado distribution of this easily overlooked plant.

Species Common and Scientific Name	Status[1]	Potential to Occur	Rationale for Exclusion[2]	Habitat Description and Range in Colorado
Viola selkirkii Selkirk's violet	S	✓		forests from montane to subalpine; 6,000-9,100 ft; Douglas, El Paso, and Larimer counties.
INVERTEBRATES				
Hudsonian emerald *Somatochlora hudsonica*	S		HAB	boggy wetlands, streams, ponds, & reservoirs are breeding sites, documented in Lake County; however, distribution in CO is unknown, populations appear to be disjunct.
Rocky mountain capshell snail *Acroloxus coloradensis*	S		HAB	littoral zone of oligotrophic and mesotrophic mountain lakes with neutral to slightly alkaline water and high dissolved oxygen content; 8,800-9,800 ft.
Uncompahgre fritillary butterfly *Boloria acrocnema*	E		ODR HAB	known to only occur above timberline on Mt. Uncomaghre, laying eggs on snow willow (*Salix nivalis*); potentially occurring in Custer and Saguache counties.
FISH				
Greenback trout *Oncorhynchus clarki stomias*	T		HAB	well-oxygenated headwaters of mountain streams, restricted to 7 drainages on Pike-San Isabel NF; found in Custer, Douglas, El Paso, Huerfano, Lake, Park, and Pueblo counties.
AMPHIBIANS AND REPTILES				
Boreal toad *Bufo boreas boreas*	C, S	✓	Addressed in original BE/BA*	breeds in ponds & over winter in refugia within lodgepole pine, spruce-fir forests, & alpine meadows; 7,500-12,000 ft.
Northern leopard frog *Rana pipiens*	S		HAB	banks & shallow portions of marshes, ponds, lakes, reservoirs, beaver ponds & streams, especially those with rooted aquatic vegetation up to 11,000 ft.
BIRDS				
Bald eagle *Haliaeetus leucocephalus*	T	✓	Addressed in original BA*	near open water including rivers, streams & lakes, nesting & roosting in large ponderosa pine, Douglas-fir, or cottonwood trees in proximity to open water and rivers.
Black swift *Cypseloides niger*	S		HAB	nests on cliffs near or behind high waterfalls.
Boreal owl *Aegolius funereus*	S	✓	Addressed in original BE*	high elevation, subalpine mature & old-growth coniferous woodlands, including mature Engelmann spruce, subalpine fir or spruce/fir-lodgepole pine forests, interspersed with meadows, nesting in cavities in trees larger than >15 in dbh.
Brewer's sparrow *Spizella breweri*	S		HAB	Sagebrush, mountain meadows, and mountain shrub habitat in CO.
Flammulated owl *Otus flammeolus*	S	✓	Addressed in original BE*	old-growth or mature ponderosa pine, ponderosa pine, & Douglas-fir forests, often mixed with mature aspen, nesting in cavities, feeding on insects.
Loggerhead shrike *Lanius ludovicianus*	S	✓		open riparian areas, montane meadows, agricultural areas, grasslands, shrublands, & piñon/juniper woodlands in western valleys in E CO

Species Common and Scientific Name	Status[1]	Potential to Occur	Rationale for Exclusion[2]	Habitat Description and Range in Colorado
Northern goshawk *Accipiter gentilis*	S	✓	Addressed in original BE*	primarily forest habitat, especially in mountains, nesting in lower portions of mature Douglas-fir, ponderosa pine, lodgepole pine, or aspen canopies; prefers mature or old-growth forest structure.
Northern harrier *Circus cyaneus*	S		HAB	spring & fall migrant in western valleys mountain parks, and eastern plains in CO inhabiting grasslands, agricultural areas, marshes & tundra in fall; 3,500-13,000 ft.
Olive-sided flycatcher *Contopus cooperi*	S	✓	Addressed in original BE*	mature spruce-fir & Douglas-fir forests, especially on steep slopes or near cliffs, near bogs & meadows during the summer, 10,000-11,000 ft.
Peregrine falcon *Falco peregrinus anatum*	S	✓	Addressed in original BE*	wide variety of habitats, selects cliff ledges or rock outcroppings for nesting, preferring high, open cliff faces that dominate the surrounding area.
Purple martin *Progne subis*	S		HAB	old-growth & aspen forests near parks, generally near water; 6,500-10,000 ft in the summer, nesting in colonies in tree cavities or man made structures
Short-eared owl *Asio flammeus*	S		HAB	Diurnal, prefers to inhabit open places like plains, marshes, but can also be found in forests, nests on the ground
Three-toed woodpecker *Picoides dorsalis*	S	✓	Addressed in original BE*	mature or old-growth spruce-fir forest, but also occurs in ponderosa pine, Douglas-fir, & lodgepole pine forests with abundant snags and insect populations are present due to outbreaks from disease or fire.
White-tailed ptarmigan *Lagopus leucurus*	S		HAB ELE	Inhabit alpine tundra with moist, low-growing alpine vegetation, particularly willows (Salix ssp.), with boulders, in proximity of water.
MAMMALS				
American marten *Martes americana*	S	✓	Addressed in original BE*	spruce-fir & lodgepole pine mature to old-growth forests with moderate to high density canopy closures & abundant snags & logs; 8,000- 13,000 ft.
Canada lynx *Felix lynx canadensis*	T	✓	Addressed in BA*	dense spruce-fir, Douglas-fir, early seral lodgepole pine, mature lodgepole pine with developing understory of spruce-fir & aspen in subalpine zone & timberline, using caves, rock crevices, banks, logs for denning, closely associated with snowshoe hare.
North American wolverine *Gulo gulo*	S	✓	Addressed in original BE*	alpine & subalpine mature/intermediate timbered areas around natural openings, including cliffs, slides, basins, & meadows, dependant on ungulates, historically in CO, extending the length of the Rocky Mts.
Pygmy shrew *Sorex hoyi*	S	✓		occupies a wide variety of habitats in the mountains of eastern CO at elevations above 9,600 ft., such as subalpine forests, edges of meadows, bogs, willow thickets, aspen-fir forests, and parklands.

Species Common and Scientific Name	Status[1]	Potential to Occur	Rationale for Exclusion[2]	Habitat Description and Range in Colorado
River otter *Lontra canadensis*	S		HAB	closely associated with aquatic and riparian habitats with abundant fish and crustaceans with a minimum flow of 10cfs, ice free reaches are required, may inhabit lakes and reservoirs, dens and resting sites may be located in beaver bank dens/lodges, log jams, dense riparian veg., undercut banks.
Townsend's big-eared bat *Plecotus townsendii*	S	✓	Addressed in original BE*	typically associated with caves & abandoned mines for day roosts & hibernacula, will also use abandoned buildings in western shrubland, piñon/juniper woodlands, & open montane forests in elevations up to 9,500 feet.

[1]**Status Codes**: **E**=federally listed endangered; **T**=federally listed threatened; **C**= federally proposed/candidate for listing; and **S**=Forest Service sensitive

[2]**Exclusion Rationale Codes**: **ODR**=outside known distributional range of the species; **HAB**= no habitat present in analysis area; and **ELE**= outside of elevational range of species

* Species shown above in shaded rows were previously addressed in original BE/BA and will not be revisited in this assessment. Effect determinations for those species have remained the same with changes to the proposed action. See original BE (dated March 2003) for additional information for those species.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

Determination Summary from BE and BA

Plants

No sensitive plant species listed below are known to occur within or immediately adjacent to the project site. Field reconasance revealed no new occurrences of any TES plant species. It is unlikely that there would be any adverse effects from this action to TEPS plant species due to the following:

1) a review of existing information show no known TEPS plant occurrences in or adjacent to the project area, and
2) field reconnaisance revealed no new occurrences of any TES plant species, and
3) riparian and wetland areas will be avoided during project implementation.

Based on the above stated rational, it is our determination that the proposed project will have **NO EFFECT** on slender cottongrass (Eriophorum gracile), Greenland primrose (Primula egaliksensis) and sageleaf willow (Salix candida).

Based on effects discussed in detail in the BE, it is our determination that the proposed project **MAY IMPACT INDIVIDUALS, BUT NOT LIKELY TO CAUSE A TREND TOWARD FEDERAL LISTING OR LOSS OF VIABILITY TO THE FOLLOWING PLANT SPECIES**: park milkvetch (Astragalus leptaleus), prairie moonwort (Botrychium campestre), narrow-leaved moonwort (Botrychium lineare), yellow lady's-slipper (Cypripedium parviflorum), Smith's whitlow-grass (Draba smithii), dropleaf buckwheat (Eriogonum exilifolium), Colorado tansy-aster (Machaeranthera coloradoensis), Weber's monkeyflower (Mimulus gemmiparus), rock-loving aletes (Neoparrya lithophila), Rocky Mountain cinquefoil (Potentilla rupincola), club spike-moss (Selaginella selaginelloides), and great-spurred violet (Viola selkirkii).

Wildlife

Boreal toad. Although suitable breeding habitat exists in the Box Creek Watershed, surveys conducted by the CDOW indicate there are no known toads. Suitable breeding habitat is in untreated areas and will not be affected by project activities and suitable non-breeding habitat will continue to be present following project activities. Should toads repopulate the area (naturally or by re-introduction); suitable habitat will continue to be present. All project activities include practices that retain coarse woody debris. The project will increase the amount of CWD that will benefit the species. Because boreal toads overwinter in burrows excavated by small mammals and slash piles, the proposed project may have a beneficial effect on toads by increasing small mammal habitat (downed logs and slash piles) and increasing burrowing habitat used for overwintering. Because this species is not known to be present in the area, it is our determination that the proposed project will have **NO EFFECT** on boreal toad.

Bald eagle. Bald eagles use the Arkansas River (including the eastern edge of the project area) during winter months. No evidence of nesting bald eagles has been observed in the project area. The possible nesting activity recently observed on the Leadville Ranger District suggests that bald eagles may breed in suitable habitats in Lake County. In the project area, the Arkansas River is contained in a wide valley, without cliff or forested habitats containing large trees that could be potential nest sites adjacent to the river. Therefore, suitable nesting habitats are not present in the project area. The proposed action does not include any treatments in riparian habitats, including the riparian habitats along the Arkansas River where bald eagles have been observed during winter months. However, it is possible that trees used by eagles for roosting may exist in the treatment areas. If the proposed action removed one of these trees, eagles would likely find another suitable tree for roosting. In addition, it is possible that areas thinned will no longer provide thermal protection, or protection from severe weather conditions. However, it is unlikely that treatment areas provide winter roost sites. This effect would be small and of short duration. Therefore, it is our determination that the proposed project **MAY AFFECT, BUT IS NOT LIKELY TO ADVERSELY AFFECT**, the bald eagle.

Canada Lynx. Proposed project road reclamation will result in no net increase in groomed or designated over-the-snow routes and play areas and open motorized routes will be reduced below the two miles per square mile density suggested in the Lynx Conservation Assessment Strategy (LCAS) used for prioritization of seasonal closures or restrictions. Because this action does not convert currently non-system roads into federal system roads, and there will be an overall reduction in open motorized route miles in potential lynx habitat by 68 percent (summer) and 85 percent (winter), there will be a beneficial effect to this species.

Proposed project mechanical and fire treatments may have short-term, small, negative effects from noise disturbance as discussed above. Proposed activities will treat some denning and foraging habitat and may make some of this habitat ineffective. These activities would represent treatment of less than 1 percent of lynx denning and foraging habitat currently available in the Tennessee Pass LAU. Further, the proposed action project design will maintain most existing lynx denning and foraging habitat while creating additional future denning and foraging habitat and connectivity. The proposed action is consistent with the LCAS conservation measures. In the long-term, these

actions are expected to beneficially affect Canada lynx and its habitat. However, because of the potential for short-term affects from disturbance, it is our determination that the proposed project **MAY AFFECT, BUT IS NOT LIKELY TO ADVERSELY AFFECT** Canada lynx or its habitat.

Based on the effects from the proposed project discussed above and in additional detail in the BA/BE, the project **MAY IMPACT INDIVIDUALS OR HABITAT, BUT WILL NOT LIKELY CONTRIBUTE TO A TREND TOWARDS FEDERAL LISTING OR LOSS OF VIABILITY TO THE POPULATION OR SPECIES** for the following species: boreal owl, flammulated owl, northern goshawk, olive-sided flycatcher, peregrine falcon, three-toed woodpecker, American marten, wolverine, pygmy shrew and Townsend's big-eared bat. The proposed project would have **NO IMPACT** on the loggerhead shrike.

KEY TO INTERPRETING HABITAT CAPABILITY AND HABITAT EFFECTIVENESS

Habitat Capability and Effectiveness Standards in the Forest Plan		
Management Area	Forest Plan Standards	Page Number
3A	MIS habitat capability: Maintain capability at 70 percent or more of potential capability	III-128
4B	MIS: Maintain habitat capability at a level at least 80 percent of potential capability	III-137
4B	Maintain at least 80 percent habitat effectiveness	III-138
5B	MIS: Maintain habitat capability at a level at least 80 percent of potential capability	III-152
5B	Big game: Maintain habitat effectiveness during winter of at least 90 percent	III-153
5B	Big game: Maintain habitat capability at a level at least 80 percent of potential capability	III-153

Habitat capability using HABCAP modeling provides a relative index for an area to provide the forage and cover needs of various wildlife species. The scale goes from 0 to 1, with 1 being optimal habitat and 0 being the least favorable conditions. The higher the habitat value the more likely a given wildlife species could be supported in the area, but even an optimal rating (1) does not guarantee the species presence. Habitat capability does not account for roads.

Habitat effectiveness uses the same concepts as habitat capability, but also incorporates the effect of open road density.

A key word in all the standards listed in the table above is potential. Potential habitat capability is the ability of the land to provide forage and cover needs for various wildlife species without a change in the current management or major vegetation changes in the foreseeable future.

There would be no major vegetation changes in the foreseeable future under the No Action Alternative of the Box Creek project. Therefore, the No Action Alternative values for habitat capability and habitat effectiveness are also the potential values. Thus, calculations for the No Action Alternative for habitat effectiveness and habitat capability are 100 percent of potential capability.

Example: Habitat capability for elk during winter in MA 5B is 0.61 for alternative A (Table 3-2). Because elk is a management indicator species, Forest Plan standards to "maintain habitat capability at a level at least 80 percent of potential capability" (Forest Plan pg. III-152) apply. Using this example actions could not drop habitat capability below 0.488 (80 percent of 0.61) and comply with Forest Plan standards.

Table 3-2. Habitat Capability by Management Area (Excludes Road Effects)

	Habitat Capability by Management Area (Excludes Road Effects)											
Management Area	All			3A			4B			5B		
Alternative	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
Mule deer summer	.77	.80	.83	.78	.78	.81	.75	.76	.82	.83	.93	.92
Mule deer winter	.37	.40	.41	.11	.09	.10	.38	.39	.41	.58	.61	.62
Elk summer	.52	.57	.61	.52	.52	.55	.51	.53	.62	.61	.76	.75
Elk winter	.44	.49	.51	.37	.35	.36	.42	.44	.51	.61	.75	.75

* See Key to Interpreting Habitat Capability and Habitat Effectiveness (pages 59 – 60).

Table 3-3. Habitat Effectiveness by Management Area (Includes Road Effects)

	Habitat Effectiveness by Management Area (Includes Road Effects)											
Management Area	All			3A			4B			5B		
Alternative	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
Mule deer summer	.73	.78	.81	.78	.78	.81	.73	.75	.81	.66	.86	.85
Mule deer winter	.36	.40	.41	.11	.09	.10	.37	.39	.41	.46	.59	.60
Elk summer	.29	.40	.43	.50	.52	.55	.37	.46	.54	.20	.38	.38
Elk winter	.25	.42	.44	.35	.35	.36	.31	.44	.51	.20	.49	.48

* See Key to Interpreting Habitat Capability and Habitat Effectiveness (pages 59 – 60).

Cultural Resources—Affected Environment

The cultural resources located in the project area constitute a unique and important record of human habitation of the central Colorado mountains and valleys. The significance of individual sites is a function of their relationships to important events, peoples or styles and their ability to provide additional scientific information about the prehistory or history of the area.

Both FS and BLM have conducted surveys in the project area. Multiple sites were recorded including historic and prehistoric sites. The historic sites are related to mining, ranching and logging. The mining related sites are associated with the Colorado High Country Mining Boom of the late 19th and early 20th century. Mining sites in the Box Creek vicinity are expressed as prospect complexes, miner's cabins, charcoal processing areas, and mining camps. The ranching related sites are expressed as corrals, earth dams and irrigation ditches. Charcoal processing sites were also identified. These sites are expressed as concentrations of charcoal, platforms, and depressions.

The prehistoric sites are generally characterized as surface areas of stone tools and stone tool manufacturing debris. Concentrations of finished tools and manufacturing debris were noted at some of the sites; these may represent the remnants of temporary dwellings or outside activity areas. Total quantities of material items on the surfaces of these sites generally range from 5 to 50. Prehistoric sites with relatively few surface items and with no recognizable materials concentrations are usually interpreted as resource procurement and processing areas; sites with many surface items (30 or more) and material concentrations are thought to be seasonal camps. Thus, the prehistoric properties recorded in the Box Creek vicinity probably represent locations where small prehistoric social groups processed or consumed harvested resources. Based on assemblage variation and soil deposition, the majority of sites identified in the Box Creek project area date from the Middle Ceramic Period to the Historic Contact Period (A.D. 1000-1870); the area probably was inhabited during earlier periods, but the evidence for such use has been obscured or destroyed by later human use and geological forces. Only one of the prehistoric sites is eligible to the National Register of Historic Places; this site contains archeological contexts that are a potential wealth of archeological and cultural information. This site is a potential source for addressing research problems in Colorado Mountain archeology, for example, calculating the time span of prehistoric occupation in the southern Rocky Mountains, or reconstructing the subsistence patterns and other lifeways of indigent social groups. Some of the sites may be important to the modern descendants of the American Indians peoples who previously inhabited the area.

Cultural Resources—Environmental Consequences

Direct impacts to cultural resources can result from the actions of prescribed fire, road construction, and mechanical tree harvesting. These activities can negatively affect a site through the mixing or disturbing of archaeological soils. Vehicles can trample artifacts causing them to break or be altered and vehicle tires can wear away archeological soils or do worse damage in wet conditions. Vehicles and fire can damage or destroy standing historic structures or destroy archeological deposits. Indirect effects, primarily water erosion, are potentially just as damaging to archeological sites as direct forces. Fire can

reduce the amount of vegetation allowing soils to be stripped away by water exposing archaeological material.

Alternative A – No Action

Direct and Indirect Effects

This action would increase the likelihood of a high intensity wildfire that could damage standing historic structures. Fire would destroy standing trees and surface vegetation increasing erosion and loss of archaeological material.

Cumulative Effects

There should be no cumulative effects resulting from implementation of the No Action Alternative; potential future actions will trigger National Historic Preservation Act mandated studies that contain assessments of effects cultural resources and recommendations for mitigation of harmful effects.

All Action Alternatives

Direct and Indirect Effects

The indirect effect of project implementation would be the reduction in fire danger, erosion, and soil loss on and around archaeological sites. The reduction of the fire danger and current water and wind erosion would be a positive indirect effect.

Cumulative Effects

Cumulative effects would also be positive, in that the positive effects realized through implementation of the treatments contained in this alternative would not be negated by additional actions of projects in the near future. Vegetation would periodically have to be thinned to insure adequate site protection standards are maintained.

Watershed (Hydrology)—Affected Environment

The Box Creek Watershed is approximately 29 square miles with approximately 32.3 miles of FS system roads and trails. There are approximately 14.3 miles of stream, most of which are intermittent. In addition, the Mt. Elbert Forebay and several beaver ponds along Corske and Box Creeks exist in the project area. The State of Colorado has designated the waters in the Box Creek Watershed as aquatic life cold 1, recreation 1, drinking water supply, and agriculture.

The Upper Arkansas Assessment and Box Creek Watershed Assessment indicate water quality is in good condition. The U S Fish and Wildlife Service has mapped approximately 0.5 square miles of wetlands in the analysis area, most of which are related to intermittent streams. These are considered to be in good condition.

Watershed (Hydrology)—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

The Watershed Effects Checklist, Table 3-4, ensures that all required effects are analyzed. (An "N" means no effect, "M" means minor effect and "S" means substantial effect).

Table 3-4. Watershed Effects Checklist

Aquatic Ecosystems	*Alt. A*	*Alt. B*	*Alt. C*
Sediment	***M***	***M***	***M***
Bed and Bank Stability	***M***	***M***	***M***
Flow Regimes	***M***	***M***	***M***
Temperature and Oxygen	***M***	***M***	***M***
Water Purity	***M***	***M***	***M***
Aquatic Life	***M***	***M***	***M***
TES Species	***M***	***M***	***M***
Soil Productivity	***N***	***N***	***N***
Soil Erosion	***M***	***M***	***M***
Soil Compaction	***M***	***M***	***M***
Nutrient removal	***M***	***M***	***M***
Soil Heating	***M***	***M***	***M***
Regeneration Hazard	***M***	***M***	***M***
Geologic Hazards	***N***	***N***	***N***
Soil Failures	***N***	***N***	***N***
Earthquakes	***N***	***N***	***N***
Special Areas			
Riparian Ecosystems	***M***	***M***	***M***
Wetlands	***M***	***M***	***M***
Floodplains	***M***	***M***	***M***
Cumulative Effects	***N***	***N***	***N***
Aquatic Ecosystem	***M***	***M***	***M***
Soil Productivity	***M***	***M***	***M***
Riparian Ecosystems	***M***	***M***	***M***

Table 3-5, Special Designation Checklist identifies special values of concern.

Table 3-5. Special Designation Checklist

Riparian management area	***M***
Drinking supply watershed	***M***
Impaired/threatened stream	***N***
Jurisdictional wetlands	***N***
Critical habitat (TES)	***M***
Wild and scenic river	***N***
Critical watershed	***X***
Research Natural Area	***N***
Rare ecosystem	***N***

The special designations checklist provided in the Region 2 NEPA streamlining protocol identified special values that might require increased concern and protection. The special items that could be affected by alternatives in the Box Creek EA are riparian management areas, drinking supply watershed, critical habitat for TES species and critical watersheds.

All Action Alternatives

Direct and Indirect Effects

Connected disturbed areas, like roads and other disturbed soils, near streams can deliver sediment directly to the stream system during runoff events. This sediment can be deposited in the stream, affecting insect populations and fish habitat. If severe enough, sediment can reduce a stream's productivity and diversity.

Only a few roads in the project area are connected to the drainage network. Some of these roads have inadequate buffers between the road and aquatic ecosystem to adequately filter sediments before they reach the streams. In addition, there are a few stream crossings, most of which are culverts that affect the aquatic ecosystem.

For this project, no new road construction is needed; the existing road network will be used. Potential effects associated with roads should be minor.

The action alternatives would produce more sediment in the short term than the No Action Alternative. However over the long term, total sediment loads produced would be lower under the action alternatives due to; the removal of roads from sensitive areas, disconnecting roads from the drainage systems, following Colorado Forest Stewardship Best Management Practices (BMPs) and Watershed Conservation Practices, and reducing the risk of high intensity wildfire in the area.

Under the action alternatives, minimal activity is planned in riparian areas; BMPs would be followed. The effects on streambed and stream bank stability posed by management activities in this analysis would be minor. Although if sediment enters the stream channel, pools can fill with sediment, streams may become wider and shallower, and aquatic habitat could be lost. Should unstable stream banks become increasingly unstable through management activities, the potential risk of unacceptable effects to the aquatic ecosystem could increase.

Under the action alternatives the changes in flow regime would be minor because of the type of vegetative treatments and site preparation being planned. The increases in stream flow and water yield that would occur under the action alternatives would return to pretreatment levels overtime (approximately 30 years), as the stand becomes vegetated. This effect is considered short-term. Vegetating of disturbed areas would also accelerate the recovery rates of water yield increases in the project area.

Alternative B poses the least effect on water temperature and dissolved oxygen due primarily to the placement of the harvest units. Alternative C poses the greatest risk to water temperature and oxygen levels because of the location and number of acres to be burned under this alternative.

Of the action alternatives, Alternative B poses the least affect to water purity because of the placement of the harvest units on the landscape, the power to control potential effects through a timber sale contract, and the ability to implement conservation measures. Alternative C poses the greatest risk to water purity because of the large area to be burned, increases in organic carbon concentrations, and limited ability to provide effective protection measures for controlling pollution sources.

There will be no effects to the public water supply from any of the action alternatives.

At each stream crossing there is a potential to create a barrier to aquatic life migration. Culverts, if not properly installed or sized, can restrict aquatic biota movement. Leaving the culverts in, while the road is closed, leads to increased maintenance cost and the potential for culvert failure. This leads to long-term potential impacts from increased sediment loads as well.

Impacts from the action alternatives would be minor because the road network exists. Alternative B poses the least effect on aquatic life due to the placement of harvest units and maintenance that would be done for the timber sale under the timber sale contract. All roads scheduled for rehabilitation and closure would have the culverts removed and the stream channel banks would be re-contoured to their original conditions.

Emphasis was placed on location of the vegetative units to minimize effects on riparian ecosystems and the timber sale contract provides for protection of riparian areas. For these reasons, the effect from the Alternative B would be minor. Effects from Alternative C will be much higher than the Alternative B because of the limited protection that could be provided to riparian areas, burning of the riparian vegetation, and loss of vegetative vigor of the riparian area.

The effects of the timber harvest on wetland areas in the action alternatives will be minor due to the amount of wetlands and the avoidance of those areas during the planning of the harvest units and the application of conservation measures during the implementation of the activity. In addition, the action alternatives provide for disconnection of the existing road system to wetland through the obliteration and rehabilitation measures.

The effects on floodplain functions would be minor from the action alternatives. The rehabilitation and obliteration of roads, removal of culverts and re-contouring of stream banks would remove current stream channels constrictions leading to reduced risk of flood damages during flooding events.

Cumulative Effects

There are several activities currently occurring in the Box Creek Watershed. There is a subdivision in the lower portion of the watershed and a public water supply pipeline crossing the project area. In addition, the Box Creek Watershed is used for dispersed recreation activities such as fishing, hunting, hiking, driving for pleasure, and off road vehicle use. These activities pose potential impacts to the water resource and aquatic life. However, by following Watershed Conservation Practices/BMP, the risk to watershed conditions and designated beneficial uses posed by this project would be minimal.

Soils—Affected Environment

The Box Creek Watershed has been shaped by glaciation in the last 12,000 years and the landscape includes such glacial landforms as ground and lateral moraines, glacial valley bottoms, and cirques. Gravels, alluviums, glacial drifts, and landslide deposits were laid down by the most recent ice activity. Unstable geologies include granitic and biotitic gneiss, schist, and migmatite of the Precambrian period. These strata are primarily located on the western-most boundary of the project area, on the face and at the toe of Mt. Elbert.

Soils that are dominant in the watershed are coarse-textured and have greater than thirty-five percent coarse fragments, with sizes mainly between three and ten inches. This soil type is prone to exhibit hydrophobic conditions under coniferous canopy. These soils are nutrient-limited.

Soils—Environmental Consequences

Alternative A – No Action

Direct and Indirect Effects

The No Action Alternative would increase or maintain erosion rates due to the continued use of non-system roads. These roads do not have erosion control structures, such as water bars, and are often steep and rutted. Erosion rates and sediment transport would continue with continued and/or increased usage.

The area would remain in dense lodgepole pine stands with little to no understory growth to reduce erosion without a large-scale disturbance.

Cumulative Effects

The proliferation of more user-created spurs off of the existing unclassified routes would cause additional erosion. Increased recreation will continue to impact the soil resource, and compaction will also be affected if such routes are allowed to be created and utilized.

There is an active gravel pit just to the north of the project area. It is on flat ground and there are no watercourses close by for sediment to affect. This should not add to erosion or take away from overall soil productivity in the area.

Historically, this area has undergone heavy resource effects. Much of the lower part of the watershed was deforested and stumps were burned in-situ for charcoal around the turn of the century. Charcoal can still be found today below the soil surface, indicating that stump-burning and possibly other types of fire were prevalent across the landscape.

These effects are still evident today, and to what extent this disturbance has affected the succession of this ecosystem can not be quantified. However, the historical use of the Box Creek Watershed could be responsible for erosion and lack of soil productivity, both past and current.

All Action Alternatives

Direct and Indirect Effects

The action alternatives would reduce erosion by implementing road closures. It would indirectly reduce erosion by reducing the probability of a high intensity wildfire in the project area. The action alternatives would produce more short-term erosion, but would reduce erosion over the long-term.

Alternative C would have the ability to increase hydrophobicity in the watershed. This usually occurs in moderate to high severity burn areas in granitic soils under coniferous cover. This would slow infiltration, thereby increasing runoff. In decomposed granite soil types at dry sites, the resulting erosion can last several years. The Forest Plan dictates no more than 15 percent of soils in a project area will be left in a severely burned and/or eroded condition, so keeping high severity fire to a minimum will ensure compliance. Minimizing high severity burn areas will also reduce nutrient removal. Low intensity surface fire is favorable for nutrient cycling and the regeneration of certain vegetation to help stabilize slopes.

Vegetative treatments create the opportunity for understory species to revegetate the area, increasing soil productivity and deterring erosional processes. Opening stands with mechanical and/or fire treatments is beneficial for long-term soil functionality.

Due to the very rocky and coarse-textured nature of the upland soils, harvest operations in the dry season should not increase compaction more than the threshold 15 percent. However, length of skid trails would be minimized, especially where existing roads are not present to reduce soil disturbance and displacement. Soil fertility depends on organic matter and nutrients. Soil productivity can be degraded if humus and topsoil, including excess leaves and limbs, are taken off-site.

Due to the type of vegetative treatments proposed, the potential impact from the action alternatives will be minor. The Alternative B poses the least risk to nutrient removal; Alternative C poses the greatest risk to nutrient removal because of the large area to be burned. The nutrients may be volatized during burning, and/or flushed further down in the watershed during rainfall and snowmelt runoff events.

Severe fires that consume the humus and litter layer of the soil cause soil heating. Soil heating can sterilize the soil and removes nutrients from the site. Soil heating would potentially affect soils by increasing nutrient removal and hydrophobicity, thereby decreasing infiltration. This is a short term impact; hydrophobicity residence times in granitic soils are shown to be less than two years (Huffman, et al., 2000). Alternative C poses the great risk to soil heating. Due to the large area to be burned under this alternative it is likely that hydrophobicity of the soil would increase.

The potential for reforestation is moderate because the soils are stony and nutrients limited in the project area. With scarification provided by logging, and based upon the

evidence of regeneration from past harvests, the degree to which the stoniness of the soils would effect reforestation would be minor under the action alternatives.

Soil creep, debris avalanches and flows, slumps and earthflow can occur on unstable slopes if management activities occur on unstable ground. The degree of hazard would depend on the type of disturbance, nature of the material and water content.

Because the existing road network is already in-place, and the proposed treatments are on slopes less than 25 percent, the potential impact for all alternatives is minor.

Cumulative Effects - Soils

There is an active gravel pit just to the north of the project area. It is on flat ground and there are no watercourses close by for sediment to impact. This should not add to erosion or take away from overall soil productivity in the area.

The impacts from historical use of this area are still evident today. The effects of this disturbance has affected the succession of this ecosystem are not easily quantified. Past use in Box Creek could be responsible for erosion and lack of soil productivity.

Economics

Introduction

The purpose of this analysis is to evaluate each of the proposed action alternatives using discounted cash flow rate of return analysis. All of the reviewed alternatives are mutually exclusive investment opportunities available to the partners in the project, the FS and BLM.

The purpose and need for action for this project, as outlined in Chapter 1, indicates that the project is being driven primarily by ecological and biological factors. The purpose of the project is to manage the landscape to ultimately create a different ecosystem from the current condition in a way that resembles the desired environmental conditions as described in the Forest Plan. Part of this return to desired conditions involves reducing the risk of catastrophic loss due to fire, which includes timber harvest, improving wildlife habitat, prescribed fire, and thinning in the wildland-urban interface. In this project, the Leadville Ranger District is proposing to use the stewardship timber management function to achieve its desired resource objectives. Given the stewardship, non-commercial mechanisms in the project description, the action alternatives will be evaluated on a least cost basis, rather than in the traditional greatest benefit basis.

The analysis tool used for project is the Forest Service Quiksilver financial analysis software package. For each action alternative, the financial measures of present net value (PNV), benefit-cost ratio, net annual equivalent, and composite rate of return were calculated.

Inputs and Assumptions

The cost and benefit inputs used in the analysis are directly related to the management activities under consideration. The No Action Alternative therefore does not have any costs or benefits directly associated with it. The benefits associated with Action Alternatives B and C are revenues generated from the sale of timber within the project area. The costs associated with these alternatives are sale preparation and administration,

road obliteration, prescribed burn preparation, implementation, and reforestation, and timber stand improvement. The difference in costs among alternatives lies in the amount of area being treated. Generally speaking, benefits and costs begin to accrue in 2006 and extend for roughly 8 years to 2013.

Some of the inputs to this analysis are assumed for simplicity. The discount rate used in the project is 4.5 percent. The timing of all benefit and cost activities is consecutive and assumed to occur at the beginning of the indicated time period. Inflation is assumed to equal cost escalation over the analysis period.

The timing of both benefit and cost activities is subject to some sensitivity which is not considered in this analysis. The present value of future revenues and costs is derived from when they happen in the future and there is not 100 percent certainty that management activities proposed under any alternative would occur in the years noted in the analysis. If benefits are realized sooner than planned, the present value of the project cost would decrease. The opposite is true if benefits are realized later than planned. The timing of benefit and cost activities do not, however, affect the amount of recognized cash flow of the activity as it occurs.

The alternatives also contain a number of ecological and social benefits that cannot be quantified at this time. For example, as elk habitat is improved, the goal is to improve the health, vitality, and number of elk in the area. This, in turn, could potentially increase the number of hunters who visit the area, thus increasing local revenues related to tourism and hunting. This sort of indirect social benefit is not considered in this analysis.

It is also important to mention that since part of the treatment is driven by a need to reduce wildfire risk in the wildland urban interface, there is be a benefit associated with a reduced risk of property loss as a result of the management alternatives. Because the analysis is not in place to quantify this potential benefit, it is not included in the analysis. To properly be included, the probabilities of property loss due to fire before and after treatment would have to be included in this document over the entire effective life of the treatment, which in some cases may be 15-20 years.

Analysis and Results

The results of the economic analysis are presented in the table below:

Table 3-6. Results of the Economic Analysis.

Alternative	Present Net Value ($)	Benefit/Cost Ratio	Net Annual Equivalent ($)	Composite rate of return (%)
A (No Action)	**0**	**0**	**0**	**0**
B (Proposed)	**-322,928.71**	**.47**	**-48,959.11**	**-4.84**
C	**-569,517.42**	**.34**	**-86,344.34**	**-8.78**

Given that the decision is one of least cost, the most attractive economic alternative is Alternative A. However, given the nature of the project is not necessarily to derive economic benefits, Alternative B, with a net present value of $-322,928 is the most attractive action alternative with a cost of approximately $40,000 per year over the 8 to 10 year duration of the project.

The analysis would be more complete by considering some of the indirect benefits associated with the management alternatives. However as a starting point in this respect, consider the PNV as the cost of reducing catastrophic property loss in residential areas adjacent to or within the project area, increasing the value of wildlife habitat, reducing the risk of insect and disease, improving forest health per the Forest Plan direction, and enhancing recreational opportunities.

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Bibliography

Adams, A. W. 1982. Migration. In: J.W. Thomas, Toweill, D.E., eds. Elk of North America: ecology and management. Harrisburg, PA: Stackpole Books: 301-322.

Alexander, M.E. and F.G. Hawksworth. 1975. Wildland fires and dwarf mistletoes: a literature review of ecology and prescribed burning. USDA Forest Service General Technical Report RM-14. Rocky Mountain Forest and Range Expt. Sta. 12 pp.

Anderson, A.H., K. Mann, and J.J. Shugart. 1977. The effect of transmission-line corridors on bird populations. American Midland Naturalist 97(1):216-221.

Brown, P.M., M.R. Kaufmann, W.D. Shepperd. 1999. Long-term patterns of past fire events in a montane ponderosa pine forest of central Colorado. Landscape Ecology 14:513-532.

Bull, E.L., C.G. Parks and T.R. Torgerson. 1997. Trees and logs important to wildlife in the interior Columbia River Basin. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-391. 55 pp.

Bury, B.R., R.A. Luckenbach, and S.D. Busack. 1977. Effects of off-road vehicles on vertebrates in the California desert, No. 8. U.S. Dept. of Interior, Fish and Wildlife Service, Sacramento, CA.

Carpenter, L.H. and O.C. Wallmo. 1981. Rocky Mountain and Intermountain habitats: habitat evaluation and management. In: Wallmo, O.C., ed. Mule and black-tailed deer of North America. Lincoln, NE: University of Nebraska Press: 399-422.

Colorado Division of Wildlife (CDOW). 2002. Wildlife Resource Information System Digital Data Map. Unpubl.

Cook, John G., Larry L. Irwin, Larry D. Bryant, Robert A. Riggs, and Jack Ward Thomas. 1998. Relations of forest cover and condition of elk: a test of the thermal cover hypothesis in summer and winter. Wildlife Monographs. 141:1-61.

Copeland, J.P. 1996. Biology of the wolverine in central Idaho. Moscow, ID: Univ. ID. 138pp.

COVERS. 2001. Colorado Vertebrate Ranking System. Designed and produced by John E. Gross at the Natural Resource Ecology Laboratory for the Colorado Division of Wildlife.

Edge, W. D., and C. L. Marcum 1991. Topography ameliorates the effects of roads and human disturbance on elk. Pages 132-137 in A. G. Christensen, L. J. Lyon, and T. N. Lonner, compilers. Proceedings of the elk vulnerability symposium. Montana State University, Bozeman, Montana.

Edge, W. D, C. L. Marcum, S.L. Olson-Edge. 1987. Summer habitat selection by elk in western Montana: a multivariate approach. Journal of Wildlife Management. 51(4): 844-851.

Edge, W. D., and C. L. Marcum. 1985. Movements of elk in relation to logging disturbances. Journal of Wildlife Management 49(4):926-930.

Edge, W. D. 1982. Distribution, habitat use and movements of elk in relation to roads and human disturbance in western Montana. Thesis, University of Montana, Missoula, Montana.

Fitzgerald, J.P, Meaney, C.A, Armstrong, D.M. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado.

Foster Wheeler Environmental Corporation. 1999. Landscape Assessment, Upper South Platte Watershed. Volumes 1, 2, and 3. Prepared for the U.S. Forest Service, Colorado State Forest Service, Denver Water Board, and U.S. Environmental Protection Agency.

Hann, W.J., J.L. Jones, M.G. Karl, P.F. Hessburg, R.E. Keane, D.G Long, J.P. Menakis, C.H. McNicoll, S.G. Leonard, R.A. Gravenmier, and B.G. Smith. 1997. Landscape dynamics of the basin. Vol. II. In: Quigley, T.M. and S.J. Arbelbide eds. An assessment of ecosystem components in the interior Columbia basin. Gen. Tech. Rep. PNW-405. Portland, Or: U.S. Dept. of Agriculture, Forest Service, Pacific NW Research Station.

Hann, W. and D. Strohm. 2001. Fire Regime Condition Class and Associated Data for Fire and Fuels Planning: Methods and Applications. Unpublished. U.S. Department of Agriculture, Forest Service, Pike-San Isabel National Forest, Pueblo, CO

Hanowski, J.M. and G.J. Niemi. 1995. A comparison of on-and-off-road bird counts: do you need to go off road to count birds accurately? Journal of Field Ornithology 66(4):469-483.

Hardy , Colin C., Kirsten M. Schmidt, James P. Menakis, R. Neil Samson. 2001. Spatial data for national fire planning and fuel management. Int. J. Wildland Fire. 10(3&4): 353-372.

Harmon, M.E., J.F. Franklin, et al. 1986. Ecology of coarse woody debris in temperate ecosystems. Adv. Ecol. Res. 15:133-302.

Harvey, A.E., M.F. Jurgensen and M.J. Larsen. 1978. Seasonal distribution of ectomycorrhizae in a mature Douglas-fir/larch forest soil in western Montana. Forest Science 24:203-208.

Harvey, A.E., M.J. Larsen and M.F. Jurgensen. 1976. Distribution of ectomycorrhizae in a mature Douglas-fir/larch forest soil in western Montana. Forest Science 22:393-398.

Hawksworth, F.G. 1978 Biological factors of dwarf mistletoe in relation to control. pp. 5-15 In: R.F. Scharpf & J.R. Parmeter, Jr., techn. coord., Proceedings of the Symposium on Dwarf Mistletoe Control through Forest Management. Pacific Southwest Forest and Range Expt. Sta., USDA Forest Service. General Technical Report PSW-31, 190 pp.

Hawksworth, F.G. and D. Wiens. 1996. Dwarf Mistletoes: Biology, Pathology and Systematics. USDA Forest Service Agricultural Handbook 709. 410 pp.

Hawksworth, F.G. and D.W. Johnson. 1989. Biology and Management of Dwarf Mistletoe in Lodgepole Pine in the Rocky Mountains. USDA Forest Service, Rocky Mtn. Forest and Range Expt. Sta. General Technical Report RM-169. 38 pp.

Hoover, R. and D.L. Wills, ed. 1984. Managing Forested Lands for Wildlife. Colorado Division of Wildlife in cooperation with USDA Forest Service, Rocky Mountain Region, Denver, Colorado.

Huckaby, L.S., M.R. Kaufmann, J.M. Stoker, and P.J. Fornwalt. 2000. Landscape patterns of montane forest age structure relative to fire history at Cheesman Lake in the Colorado Front Range. Conference: Steps Toward Stewardship: Ponderosa Pine Forest Ecosystem Restoration and Conservation, Flagstaff, AZ, April 24-28, 2000.

Huffman, E.L., L.H. MacDonald, and J.D. Stednick, 2001. Strength and persistence of fire-induced hydrophobicity under ponderosa and lodgepole pine, Colorado Front Range. Hydrological Processes, Volume 15, Issue 15, Pp: 2877-2892.

Kaufmann, M.R., C.M. Regan, P.M. Brown. 2000. Heterogeneity in ponderosa pine/Douglas fir forests: age and size structure in unlogged and logged landscapes of central Colorado. Can. J. For. Res. 30:698-711.

Kaufmann, M.R., P.J. Fornwalt, L.S. Huckaby, and J.Stoker. in preparation. Cheesman Lake – a historical ponderosa pine landscape guiding restoration in the South Platte Watershed of the Colorado Front Range. USDA Forest Service General Technical Report RMRS-GTR-XXX. Rocky Mountain Research Station, Fort Collins, CO.

Kipfmueller, K.F. and W.L. Baker. 1998. Fires and dwarf mistletoe in a Rocky Mountain lodgepole pine ecosystem. Forest Ecology and Management 108:77-84.

Leege, T.A., compiler. 1984. Guidelines for evaluating and managing summer elk habitat in northern Idaho. Wildlife Bull. No. 11. Boise, ID: Idaho Fish and Game. 37 p. [A cooperative effort. Financial support provided by the Idaho Department of Fish and Game Federal Aid Project W-160-R,

U.S. Forest Service, Bureau of Land Management, Plum Creek Timber Company and Idaho Forest Industry Council].

Lotan, J.E. 1975. Regeneration of lodgelpole pine forests in the Northern Rocky Mountains. In: Baumgartner, D.M., ed. Management of lodgelpole pine ecosystems symposium proceedings; 1974. Pullman: Washington State University Cooperative Extension Service; 516-535

Lyon, L. J. 1979. Habitat effectiveness for elk as influenced by roads and cover. Journal of Forestry 77:658-660.

Lyon, L.J. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81: 592-595.

Lyon, L.J. 1985. Road effects and impacts on wildlife and fisheries. Proceedings, Forest transportation symposium, Dec. 11-13, 1984, Casper WY. Denver, CO: US Dept. of Agriculture, Forest Service, Rocky Mountain Region.

MacDonald, L.H., 2000. Analyzing Cummulative Effects: Process and Constraints. Submitted to Environmental Management.

Mackie, R.J., Hamlin, K.L., Pac, D.F. 1987. Mule-deer. In: Chapman, J.A., Feldhamer, G.A., eds. Wild mammals of North America. Baltimore, MD: Johns Hopkins University Press: 862-877.

Marcum, C. L., and W. D. Edge 1991. Sexual differences in distribution of elk relative to roads and logged areas in western Montana. Pages 142-148 in A. G. Christensen, L. J. Lyon, and T. N. Lonner, compilers. Proceedings of the elk vulnerability symposium. Montana State University, Bozeman, Montana.

Marcum, C. L. 1976. Habitat selection and use during summer and fall months by a western Montana elk herd. Pages 91-96 in S. R. Hieb, editor. Proceedings of the elk-logging-roads symposium. Forestry Wildlife and Range Experiment Station, University of Idaho, Moscow, Idaho.

Martin, T. 2002. Personal communication with Tom Martin, Colorado Division of Wildlife, Area Manager.

Martinson and CSO. 2002. Effect of Fuels Treatment on Fire Severity. Omi.

Oxley, D.J., M.B. Fenton, and G.R. Carmody. 1974. The effects of roads on populations of small mammals. Journal of Applied Ecology 11 51-59.

Peek, J.M. 1982. Elk. Pages 851-861 in: J.A. Chapman, and G.A. Feldhamer, eds. Wild Mammals of North America. The Johns Hopkins University Press, Baltimore, Maryland.

Perry, C., and R. Overly 1976. Impact of roads on big game distribution in portions of the Blue Mountains of Washington. Pages 62-68 in S. R. Hieb, editor. Proceedings of the elk-logging-roads symposium. Forestry Wildlife and Range Experiment Station, University of Idaho, Moscow, Idaho.

Reynolds, R.T., R.T. Graham, M.R. Hildegard, R.L. Bassett, P.L. Kennedy, D.A. Boyce Jr., G. Goodwin, R. Smith and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the Southwestern United States. Gen. Tech. Rep. RM-217. Fort Collins, CO. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 90p.

Robinson, V.L., F.R. Thompson, T.M. Donovan, D.R. Whitehead, and J. Faaborg. 1995. Regional forest fragmentation and the nesting success of migratory birds. Science 267(5206):1987-1990.

Rodrick, E. and R. Milner, eds. 1991. Management Recommendations for Washington Priority Habitats and Species. Washington Department of Wildlife and Wildlife Management, Fish Management and Habitat Management Divisions.

Rost, G. R., and J. A. Bailey. 1979. Distribution of mule deer and elk in relation to roads. Journal of Wildlife Management 43(3):634-641.

Rost, G. R., and J. A. Bailey. 1974. Responses of deer and elk to roads on the Roosevelt National Forest. Department of Fish and Wildlife Biology, Colorado State University, Fort Collins, Colorado. 19pp.

Rost, G. R. 1975. Response of deer and elk to roads. Thesis, Colorado State University, Fort Collins, Colorado.51pp.

Schmidt, Kirsten M., James P. Menakis, Colin C. Hardy, Wendel J. Hann, David L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41p. + CD.

Snyder, S.A. 1991. Cervus elpaphus. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2001, February). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/ [Accessed 3/7/01].

Snyder, S.A. 1991. Odocoilius hemionus. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2001, February). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/ [Accessed 3/7/01].

Swihart, R.K. and N.A. Slade. 1984. Road crossing in Sigmodon hispidus and Microtus ochrogaster. Journal of Mammalogy 65: 357-360.

Thiessen, J. L. 1976. Some relations of elk to logging, roading, and hunting in Idaho's Game Management Unit 39. Pages 3-5 in S. R. Hieb, editor. Proceedings of the elk-logging-roads symposium. Forestry Wildlife and Range Experiment Station, University of Idaho, Moscow, Idaho.

Thinnes, J. 2001. Pike and San Isabel National Forests lower montane forest vegetation trends. USDA Forest Service, Pike National Forest, South Platte Ranger District unpublished report.

U. S. Dept of the Interior, Bureau of Land Management. 2003. BLM Vegetation and Travel Management in Box Creek Watershed. Royal Gorge Field Office, Canyon City, CO.

U.S. Forest Service (Forest Service). Box Creek Roads Analysis. Unpublished Report, Leadville Ranger District, Leadville, CO.

U.S. Forest Service (Forest Service). 1984. Final Environmental Impact Statement, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands, Volume 1. Pueblo, CO.

U.S. Forest Service (Forest Service) 1999a. Upper Arkansas Assessment, Unpublished Report, Leadville Ranger District, Leadville, CO.

U.S. Forest Service (Forest Service) 1999b. Lodgeple Flats Categorical Exclusion. Leadville Ranger District, Leadville, CO.

U.S. Forest Service (Forest Service) 2001. The National Fire Plan – Cohesive Strategy (GAO/RCED-99-65 2000).

U.S. Forest Service (Forest Service). 2005. Region 2 Regional Foresters sensitive species list. R2 supplement 2600-2003-1 (May 17, 2005).

U.S. Forest Service (Forest Service). 2005. Amendment 30. Land and Resource Management Plan Pike and San Isabel National Forests; Cimarron and Comanche National Grasslands (August 8, 2005).

U.S. Forest Service (Forest Service) in prep. 2005. Threatened, endangered, and sensitive species expected to occur on the Leadville Ranger District of the San Isabel National Forest and those eliminated from further consideration and analysis. Unpubl. rpt.

U.S. Fish and Wildlife Service (FWS). 2003. Federally listed, proposed, and candidate species and their status in Colorado (by county). Ecological Services Colorado Field Office (17 October, 2003).

U.S. EPA, State Emission Index for Colorado, July 7, 2001

Van Wagner, CE. 1977. Conditions for the start and spread of crown fire. Canadian Journal of Forest Research 7:23-34

Vayhinger, J. 2004. Personal communication with Jack Vayhinger, Colorado Division of Wildlife, Wildlife Biologist.

Vayhinger, J. 2002. Personal communication with Jack Vayhinger, Colorado Division of Wildlife, Wildlife Biologist.

Ward, A. L., J. J. Cupal, A. L. Lea, C. A. Oakley, and R. W. Weeks. 1973. Elk behavior in relation to cattle grazing, forest recreation, and traffic. Transactions of the North American Wildlife and Natural Resources Conference 38:327-337.

Ward, A. L. 1976. Elk behavior in relation to timber harvest operations and traffic on the Medicine Bow Range south-central Wyoming. Pages 32-43 *in* S. R. Hieb, editor. Proceedings of the elk-logging-roads symposium. Forestry Wildlife and Range Experiment Station, University of Idaho, Moscow, Idaho.

Wisdom, M.J., R.S. Holthausen, R.S, and B.K. Wales. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Gen Tech Rep PNW GTR-485. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

Worrall, J. pers comm. 2001. e-mail to Dave Tolle and Jim Zornes. Subject: Box Creek EA – Forest Health Section.

Zeveloff, S.I. 1988. Mammals of the Intermountain West. University of Utah Press, Salt Lake City, Utah.

Zimmerman, G.T. & R.D. Laven. 1984. Ecological interrelationships of dwarf mistletoe and fire in lodgepole pine forests. pp. 123-131 In: F.G. Hawksworth & R.F. Scharpf, techn. coord., Biology of Dwarf Mistletoes: Proceedings of the Symposium. Rocky Mtn. Forest and Range Experiment Sta., USDA Forest Service. General Technical Report RM-111, 131 pp.

Glossary

A

Affected Environment - The physical and human-related environment that is sensitive to changes resulting from the proposed actions.

Alternative - A mix of management prescriptions applied to specific land areas to achieve a set of goals and objectives. The alternative provides management direction for the proposed project, which reflects, identified public and management concerns for the project area.

Analysis Area - The Analysis Area is the area that bounds the analysis for a particular resource and/or issue. It may be confused with the Project Area, which is the area within which the proposed activities are limited to.

Arterial Road - Roads, which provide service to large land areas and usually connect with public highways or other Forest arterial roads to form an integrated network of primary travel routes.

B

Basal Area - The area of the cross section of a tree stem near the base, generally at breast height and inclusive of bark.

Big Game - Large mammals normally managed for sport hunting (e.g., deer, elk, etc.).

Biological Assessment - Document that analyzes the potential effects of FS actions on Fish and Wildlife Service federally listed and candidate species and critical habitat.

Biological Diversity (Biodiversity) - The relative distribution and abundance of different plant and animal communities and species within an area.

Biological Evaluation - Document that analyzes the potential effects of FS actions on Forest Service Region 2 sensitive species.

Board Foot (bf) - The amount of wood equivalent to one foot wide by one inch thick by one foot long

Broadcast Burn - Prescribed burning activity where fire is applied generally to most or all of an area within well defined boundaries for reduction of fuel hazard, as a resource management treatment, or both.

C

Candidate Species - Plant and animal taxa considered for possible addition to the list of endangered and threatened species under Section 4 of the Endangered Species Act of 1973, as amended (ESA). These are taxa for which the Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions.

Canopy - The more-or-less continuous cover of branches and foliage formed collectively by the crown of adjacent trees.

Chipping - The reduction of woody residue, by a portable chipper, to chips.

Cirque – a semicircular, concave bowl-like area with a steep face resulting from erosive activity of a mountain glacier.

Classified Road – A road that is constructed or maintained for long-term highway vehicle use. Classified roads may be public, private, or forest development.

Clearcut Harvest - A harvest regeneration method under an even-aged silvicultural system in which the existing stand of trees is removed with a rotation length of 100-150 years. System of reproducing stands of trees which naturally grow in even ages and which reproduce themselves in nature through fire, windstorm, earth movement, or other disturbances.

Coarse Woody Debris - Downed woody material such as trees, branches, or tops that have fallen to the forest floor.

Codominant Tree –Trees or shrubs with crowns receiving full light from above, but comparatively little from the sides. Crowns usually form the general level of the canopy. (In stagnated stands will be small-sized and crowded on the sides).

Collector Road - These roads serve smaller land areas than do the arterial roads and are usually connected to a Forest arterial or public highway. They collect traffic from Forest, local roads or terminal facilities.

Colluvial – referring to material, such as rock fragments, that have been moved solely by gravity

Commercial Thinning - Tree thinning that produces merchantable material at least equal in value to the direct costs of harvesting.

Compaction - The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density.

Compartments - A geographic area delineated by sub-watershed drainage for management planning purposes.

Condition Class - Depiction of the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime groups. Based on the coarse-scale national data, they serve as generalized wildfire rankings. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk).

Conifer - Any of a group of needle and cone-bearing evergreen trees.

Cover - Vegetation used by wildlife for protection from predators or to escape the adverse effects of weather. Also described as - The percentage of the ground covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of plants. See also CANOPY COVER. Used to map and stratify stands of vegetation and as a measure of protection of a site or stream.

Crown Base Height - The vertical distance in feet from the ground to the base of the live crown.

Crown Class - The relative position of the tree or shrub crown with respect to competing vegetation surrounding the tree or shrub. Crown class for each tree or shrub is judged in the context of its immediate environment; that is, those trees or shrubs which are competing for sunlight with the subject tree. Crown class is essentially a classification of competition for light and is aimed at separating trees that are growing freely from those that are not. It designates trees or shrubs with crowns of similar development and occupying similar positions in the crown canopy. This is an ocular classification of trees or shrubs based on dominance in relation to adjacent trees or brush as indicated by crown development and amount of sunlight received from above and on the sides. In uneven-aged stands of tolerant species (in which the trees are not in small even-aged groups), trees in the intermediate crown position in the stand and with medium-sized crowns will be considered comparable to codominants of even-aged stands and coded as such. As a general rule, in multi-story stands crown class for each tree must be judged in the

context of its immediate environment, that is, those trees affecting it or being affected by it in terms of crown competition. In cases where the overstory consists of scattered veterans standing above larger numbers of younger trees, a considerable portion of the understory trees will undoubtedly be classified as dominant or codominant.

Crown –The upper part of a tree, including the branches and foliage.

Cumulative Effect - The impact on the environment, which results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor, but collectively significant, actions taking place over a period of time.

D

Decommissioned Road - Road that receives the following treatments - water bars installed, roadbed seeded, and all culverts removed. Motorized access will be discouraged with berms, boulders, fences, and signs.

Diameter at Breast Height (dbh) - The diameter of a tree measured four feet, six inches above the ground.

Dominant Tree - Trees or shrubs with crowns receiving full light from above and partly from the side; usually larger than the average trees or shrubs in the stand, with crowns that extend above the general level of the canopy and that are well developed but possibly somewhat crowded on the sides. A dominant tree is one, which generally stands head and shoulders above all other trees in its vicinity. However, there may be a young, vigorous tree nearby, but not overtopped by a dominant tree. This smaller tree may be considerably shorter than the dominant, but still be receiving full light from above and partly from the sides. In its own immediate environment, it is dominant and should be recorded as such. Only understory trees immediately adjacent to the overstory tree will be assigned subordinate crown classes.

Dwarf Mistletoe Rating - is based on the Hawksworth Scale. This is a simple scale to assess dwarf mistletoe infestation developed by Frank G. Hawksworth, and has become the standard used by both federal and state forestry professionals. The scale breaks a tree crown into three sections: top, middle, and bottom. It then assigns a dwarf mistletoe infestation rating of 0 to 2 to each section. The scale may, therefore, range from 0 to 6 in total for a tree.

0 = no infestation

1 = less than half the branches are infested

2 = more than half the branches are infested

Duff - An organic surface soil layer below the litter layer in which the original form of plant and animal matter cannot be identified with the unaided eye.

E

Ecosystem - An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them.

Effects (or impacts) - Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place, indirect, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable, or cumulative interacting system.

Endangered Species - As defined under section 3 of the Endangered Species Act - Any species which is in danger of extinction throughout all or a significant portion of its range.

Endemic - The population of potentially injurious plants, animals or diseases that are at their normal balances level, in contrast to epidemic.

Environment - The aggregate of physical and biological factors affecting organisms in an area.

Environmental Assessment (EA) - A concise public document which serves to - a) briefly provide sufficient evidence and analysis for determining whether to prepare an EIS, or a finding of No Significant Impact; b) Aid an agency's compliance with NEPA when no EIS is necessary; and c) facilitate preparation of an EIS when necessary.

Environmental Impact Statement - A detailed summary prepared by the responsible official in which a major Federal action which significantly affects the quality of the human environment is described, alternatives to the proposed action provided, and the effects analyzed.

ESA - Endangered Species Act of 1973, as amended

Even-aged Management - The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. Clearcut, shelterwood or seedtree harvest methods produce even-aged stands.

Even-aged Stands - Stands in which all trees are of about the same age (a spread of 10 to 20 years is generally considered one age class).

F

Fire Resiliency – The ability of an ecosystem to withstand fire without increased amounts of mortality.

Forb - An herbaceous plant that is not a graminod.

Fuel Treatment - Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning).

Fuels - Combustible materials present in the forest.

G

Ground Moraine – An extensive, fairly even layer of till having an uneven or undulating surface; a deposit of rock and mineral debris dragged along in, on, or beneath a glacier (NSSH, 1996).

Group Selection - An uneven-aged silvicultural harvest system in which all trees in a small group are removed for regeneration purposes. The size of the group is small enough in area that all subsequent regeneration will be influenced by the surrounding uncut stand. Cuts are generally 0.25 - 2.0 acres in size.

H

HABCAP - A computerized planning tool used to provide estimates of the capability of habitats to support wildlife based on the mix of vegetation cover types and structure present in an area.

Habitat - The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

Habitat Capability - The estimated ability of an area, given existing or predicted habitat conditions, to support a wildlife, fish or plant population. It is measured in terms of potential population numbers.

Habitat Effectiveness - The degree to which a physical wildlife habitat (food, water, shelter) is free from disturbances, and therefore attractive for wildlife occupancy.

Habitat Structural Stage - Two digit code used to indicate the general stem size and stem canopy closure within a geographic area (See table below). For example, a 4C stand would largely be comprised of trees 9.0 to 15.9 inches in diameter and have a canopy closure of 70 to 100 percent.

Habitat Type - An aggregation of all land areas potentially capable of producing similar plant communities at climax stage.

Hiding Cover - Vegetation capable of hiding 90 percent of a standing adult deer from the view of a human at a distance equal to or less than 61 meters (200 feet); generally, any vegetation used by elk for security or escape from danger.

High Risk - Individual or groups of trees that are live (green) but that have the physical characteristics favorable to insect infestation or disease infections. Trees in this category are subject to mortality and loss of economic value.

Hydrophobicity – A discontinuous water-repellant layer that forms under coniferous cover naturally at the mineral surface in coarse granitic soils; also, a water-repellant layer of varying depths that forms during fire, the heat from which creates a waxy residue from coniferous litter that is consumed (Huffman et al., 2001).

I

Immature Timber - Trees that have not attained full development, especially height.

Indirect Effects - Secondary effects which occur in locations other than the initial action or significantly later in time.

Individual Tree Selection - A non-unevenaged silvicultural harvest system that removes selected trees of all size classes on an individual basis.

Interdisciplinary (ID) Team - A group of professional specialists with expertise in different resources that collaborate to develop and evaluate management alternatives.

Interdisciplinary Approach - Utilization of one or more individuals representing areas of knowledge and skills focusing on the same task, problem, or subject. Team member interaction provides needed insight to all stages of the process.

Intermediate Tree – Trees or shrubs receiving little direct light from above, and none from the sides; usually with small crowns considerably crowded on the sides that are generally either below or extending into the canopy formed by codominant trees or shrubs.

Interplanting – A method of planting seedlings mixed with natural regeneration or trees that are already established.

L

Lateral Moraine – A ridge-like moraine carried on and deposited at the side of a valley glacier, mainly composed of rock fragments from the valley wall and/or colluvial accumulation from adjacent slopes

Long-term Sustained Yield - The estimated timber harvest that can be maintained indefinitely over time, once all stands have been converted to a managed state under a specific management intensity consistent with multiple-use objectives.

Lop and Scatter - Fuel treatment where, following tree felling, limbs and branches are cut off and scattered in the unit.

M

Main Roads - Roads that are 1½ lanes wide or more, improved, good condition, main route of travel, and receive constant maintenance.

Management Indicator Species (MIS) - Those species selected in the planning process to monitor the effects of planned management activities on viable populations of all wildlife and fish species, including those species that are socially or economically important.

Mature Timber - Trees that have attained full development, particularly height.

Monitoring and Evaluation - The evaluation, on a sample basis, of Forest Plan management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.

Mortality - In forestry, trees in a stand that die of natural causes.

Mountain Pine Beetle - The common name for the bark beetle (Dendroctonous ponderosae Hopkins).

Mulching - Covering the surface of the soil with natural (e.g. litter) or deliberately applied organic materials (e.g. straw, wood chips, foliage).

N

National Environmental Policy Act (NEPA) Process - An interdisciplinary process, which concentrates decisionmaking around issues, concerns, alternatives, and the effects of alternatives on the environment.

National Forest Management Act (NFMA) - Law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring preparation of Regional Guides and Forest Plans, and the preparation of regulations to guide that development.

Natural Regeneration - Reforestation of a site by natural seeding from the surrounding trees. Natural regeneration may or may not be preceded by site preparation.

No Action Alternative - The No Action Alternative is required by regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The No Action Alternative provides a baseline for estimating the effects of other alternatives. When a project activity is being evaluated, the No Action Alternative is defined as one where current management direction would continue unchanged.

Noxious Weed - A plant species that is highly injurious or destructive and has a great potential for economic impact. A plant species that is listed as noxious by the State of Colorado.

O

Old Growth Habitat - Habitat for certain wildlife that is characterized by mature coniferous forest stands with large snags and decaying logs.

Overstory - The portion of trees in a forest which form the uppermost layer of foliage.

P

Partial Cut - Term to relate harvest units where many trees are left and forested appearance is retained. Partial cutting usually provides no long-term benefits to forest health and productivity.

Pathogen - A specific causative agent of disease, such as a virus.

Pioneer Species - A plant capable of invading a bare site (newly exposed soil surface) and persisting there until replaced by another species or community as succession progresses.

Plant Community - An assembly of plants living together.

Plastic Limit – The moisture content at which a soil changes from semisolid to plastic;

Pole Timber - Trees of at least five inches in diameter at breast height (DBH), but smaller than the minimum utilization standard for sawtimber.

Precommercial Thinning - The practice of removing some of the trees less than marketable size from a stand so that the remaining trees will grow faster.

Prescribed Burning - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

Prescription - Management practices selected and scheduled for application on a designated area to attain specific goals and objectives.

Primitive Road - A one-lane unimproved forest road in fair to poor condition that is seldom or never maintained.

Project Area - The area where proposed activities will occur. It may be confused with the Analysis Area, which is the area that bounds the analysis for a particular resource and/or issue.

Public Road – A road open to public travel that is under the jurisdiction of and maintained by a public authority such as States, counties and local communities.

R

Range of Alternatives - An alternative is one way of managing the National Forest, expressed as management emphasis leading to a unique set of goods and services being available to the public. A range of alternatives is several different ways of managing the Forest, offering many different levels of goods and services.

Reforestation - The natural or artificial restocking of an area with forest trees.

Regeneration - The renewal of a tree crop, whether by natural or artificial means. This term may also refer to the crop itself (i.e. seedlings or saplings).

Regeneration Harvest - Used in reference to harvest methods, which remove an existing stand to prepare the site for regeneration.

Rehabilitation – A plan or treatment to return an ecosystem towards a healthy balance.

Release - Freeing trees from competition for light, water and nutrients by removing or reducing the vegetation growth that is overtopping or closely surrounding them.

Residual Stand - The trees remaining standing after some activity, such as an individual tree selection.

Riparian - Pertaining to areas of land directly influence by water. Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Stream sides, lake borders, or marshes are typical riparian areas. Vegetation bordering watercourses, lakes or swamps; it requires a high water table.

Roadless Area - A National Forest-system area which is larger than 5,000 acres or, if smaller than 5,000 acres, is contiguous to a designated Wilderness or primitive area; contains no roads, and has been inventoried by the Forest Service for possible inclusion into the wilderness preservation system.

Rotation - The planned number of years required to establish (including the regeneration period) and grow timber to a specified condition or maturity for regeneration harvest. Selected management prescriptions provide the basis for the rotation age.

S

Salvage Harvest - Intermediate harvests made to remove trees that are dead or in imminent danger of being killed by injurious agents such as insects.

Sanitation Harvest - Intermediate harvests made to remove dead, damaged or susceptible trees to prevent the spread of pests or pathogens.

Sawtimber - Trees containing at least one 12 foot sawlog or two non-contiguous eight foot logs, and meeting regional specifications for freedom from defect.

Seasonal Road Closure - Road closed to motorized use during a specified time period. Closure implemented with gates.

Secondary Road - A forest road of 1½ lanes or less, somewhat improved, in good to fair condition, and is irregularly maintained.

Seedlings and Saplings - Non-commercial size young trees.

Selection Harvest - The periodic removal of trees, usually at 10-20 year intervals, individually or in small groups, from an unevenaged forest in order to realize yield and establish regeneration or irregular constitution.

Sensitive Species - Those plants and animals identified by the FS Regional Forester and BLM State Director for which population viability is a concern.

Seral - A biotic community, which is a development, transitory stage in ecological succession.

Seral Stage - A biotic community that is in a development, transitory stage in ecological succession.

Series - A group of habitat types having the same climax tree species.

Silvicultural System - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the cuttings that remove the mature crop and provide for regeneration, and according to the typed of forest thereby produced.

Silviculture - The art and science of growing and tending forest vegetation, i.e. controlling the establishment, composition, and growth of forests, for specific management goals.

Site Preparation - A general term for a variety of activities that remove or treat competing vegetation, slash and other debris that may inhibit the establishment of regeneration.

Site Productivity - Production capability of specific areas of land.

SIZE STRUCTURE	SIZE CLASS
Grass-forb-shrub (1)	≤ 0.9”
Shrub-tree-	1.0-4.9”
Pole-sapling (3)	5.0-8.9”
Large (4)	9.0”-15.9”
Very Large (5)	≥ 16.0”

CANOPY STRUCTURE	CANOPY CLOSURE
Open (A)	0-39%
Moderate (B)	40-69%
Closed (C)	70-100%

Slash - The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning of trees.

Snag - A standing dead tree usually without merchantable value for timber products, but may have characteristics of benefit to some cavity nesting wildlife species.

Snag Recruitment Tree - A standing live tree designated for non-removal to allow for future snag creation.

Stand - A community of trees or other vegetation uniform in composition, constitution, spatial arrangement, or condition to be distinguishable from other adjacent communities.

Stand Replacing Fire - A fire that consumes an entire stand of trees. These fires are generally quite hot and can burn hundreds of acres.

Stocking - The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standard; that is, the basal area and/or number of trees required to fully utilize the land's growth potential.

Succession - The progressive changes in plant communities toward climax habitat.

Successional Stage - A stage or recognizable condition of a plant community which occurs during its development from the bare ground to climax habitat.

Suitable Forest Land - Forest land (as defined in CFR 219.3, 219.14) for which technology is available that will insure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is a reasonable assurance that such lands can be adequately restocked (as provided in CFR 219.14); and for which there is management direction that indicates that timber production is an appropriate use of that area.

Suppressed Tree - Trees or shrubs with crowns receiving no direct light either from above or from the sides, and that will not respond to release. Usually crowns are entirely below the general level of the canopy.

System Road - Road that is officially designated as a Forest Service or BLM Road.

T

Thermal Cover - Cover used by animals to ameliorate effects of weather.

Thinning - Cutting in even aged stands to redistribute growth potential or benefit the quality of the residual stand.

Threatened Species - As defined under section 3 of the ESA - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Timber Types - A descriptive classification of forest land based on present occupancy of an area by tree species (i.e. lodgepole, mixed conifer). More appropriately called cover types, this category is further defined by the composition of its vegetation and/or environmental factors that influence its locality.

U

Unclassified (non-system) Road – Road that is not officially designated as a Forest Service. Usually illegal, user-created roads.

Understory - Vegetation (trees or shrubs) growing under the canopy formed by taller trees.

Uneven-aged Management - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover. Harvest systems that develop or maintain uneven aged stands are individual tree and group selection.

V

Vertebrates - Animals having a backbone, or a spinal column, including mammals, fishes, birds, reptiles, and amphibians.

Viable Population - A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area.

Visual Condition Class (VCC) - A measure of the level of disturbance to the visual resource, expressed in acres. The visual condition classes are used as indicators to measure the existing conditions and effects of alternatives.

Visual Quality Objective (VQO) - A system of indicating the potential expectations of the visual resource by considering the frequency an area is viewed and the type of landscape. Specific VQOs are in Chapter 3 - Visual Quality.

Visual Resource - The composite of landforms, water features, vegetative patterns, and cultural features which create the visual environment.

W

Water Influence Zone (WIZ) - area including the geomorphic floodplain, riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is the greater of 100 feet or the mean height of mature dominant late-seral vegetation. It includes adjacent unstable and highly-erodible soils. The WIZ protects interacting aquatic, riparian, and upland functions by maintaining natural processes and resilience of soil, water, and vegetation systems.

Wetlands - Areas that are inundated by surface or ground water with a frequency sufficient to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, wet meadows, river overflows, mud flats, and natural ponds.

Wilderness - All lands included in the National Wilderness Preservation System by public law; generally defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation.

Wildfire - Any wildfire not designated and managed as a prescribed fire with an approved prescription.

Windrowing - Slash or debris piled in a row along the contour of the slope.

Y

Yarding - A method of bringing logs into a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

Appendix A

The following pictures are a small subset of the Box Creek Monitoring photos. Figure A5 - Sample of Photo Monitoring Points Established in the Summer of 2004 shows the location of each photo for reference.

Point 13
This unit was cut in the 1970s/80s. In the foreground is the underground water conduit.

Point 35
This unit was cut in the 1980s and burned in the late 1990s. Grass production and lodgepole regeneration are what is expected to occur in patch cuts (prescription 10).

Point 10
Thinned lodgepole regeneration typical of maintenance associated with prescription 3 and, in the future, for prescription 10. Cut in the 1970s or 1980s and thinned in the late 1990s.

Point 20
Treatment was similar to Point 10 above.

Point 84-2. Prescription 12 (thinning) for next 3 photos proposed. The larger trees would remain and would look similar to Point 78 (page 92) with more variability in the stand (i.e. more clumps of trees and some areas more open). Some mistletoe would remain in the stand. A growth spurt would be expected in the remaining trees following treatment.

Point 84-3.

Point 61.

Point 78.
Area thinned in the 1980s. Prescription 12 would be similar to this treatment.

Point 101 next to Forebay. Prescription 10 (patch cut) for these two areas proposed. Some wildlife trees (snags) and down logs would remain following treatment. Expected results would be similar to Point 35 (page 89) within five years of treatment.

Point 28.

Appendix B

RESPONSE TO COMMENTS

Introduction

The Forest Service received 7 public comment letters on the 2005 Box Creek Vegetation and Travel Management Environmental Assessment (EA). These comments have been documented, analyzed for content, and responses have been prepared. These responses are considered a part of the Environmental Assessment.

This section presents all of the substantive comments received on the EA and the agency's response to those comments. Comments that simply favor or oppose specific alternatives, that only agree or disagree with Agency policy, or that are outside the scope of this project were not considered substantive comments and were not addressed in this section.

The comments are not presented in their entirety, but are available for public review in the Project Record. Comment letters were numbered for tracking purposes.

Comment Letter Number	**Name/Organization**
1	Ms. Annie Mueller
2	Colorado Wild
3	Dennis Zadra
4	Sam Galey
5	Unknown
6	Patrick Lucero
7	Frank Shober

Annie Mueller

Comment 1: The USFS claims of fire cycles apparently do not take into account the mining history of this area that decimated the forests without regard to what computer simulations are supposed to predict.

Response: The effects of mining on, not only fire cycles but also the composition of timbered species is fully explained in the Final EA, pgs. 19 - 20, Historical Condition.

Comment 2: As I understand, thinning trees to mitigate mistletoe will serve instead to aggravate the situation by creating more seedlings on which the parasite will thrive as well as introduce an unnatural imbalance into the existing eco system thereby weakening an otherwise healthy context.

Response: The intent of the project is not to eradicate mistletoe, but to manage the extent current and future of infestation. We aim to manage mistletoe using partial cuts oriented toward mistletoe management in areas where infestation is less severe (forest stands with dwarf mistletoe rating <3) and sanitation is likely to be more effective. Sanitation thinning in this case is known to be effective over a long time (Hawksworth and Johnson 1989).

Comment 3: Thinned forest burn. Thinned forests create ground level combustible tinder in the form of additional grasses.

Response: Under the right weather and fuel conditions, thinned forests will burn. The wildfire may be a surface fire, crown fire, or combination of both, depending on weather and fuel conditions. Past management in the area shows that grass will grow in units that have been patch cut and prescribed burned (Final EA, Appendix A, photo point 13, pg. 90). Areas that have only been thinned show minimal grass regeneration (Final EA, Appendix A, photo point 78, pg. 93). All project generated fuels not need for course woody debris will be treated using a combination of methods.

In areas with grass regeneration, cured grass will rapidly spread as a surface fire. Thinned forests and the removal of ladder fuels will help to maintain the fire on the surface and reduce the likelihood that the fire will spread to the crowns of trees (Final EA, pg. 25).

Comment 4: Thinned forests also facilitate off-road vehicles and easier access for more human impact and its potential carelessness than would otherwise be the case.

Response: Thinned forests may facilitate OHV use and disperse camping within the project area. Increase human use, increases the likelihood of human caused wildfire ignitions (Final EA, pg. 25). However, the proposed action includes closing more that 7 miles of road seasonally, more than 7 miles would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned.

The proposed action combined with the BLM's transportation plan will provide an aggressive transportation management plan on public lands in Box Creek area for managing these concerns.

Colorado Wild

Comment 1: We have repeatedly stated that we are willing to work with you and your staff to design a project that we can all accept, and hopefully, even be proud of. However, you continue to ignore our concerns.

Response (from the District Ranger, Jim Zornes): A check of the Project Record indicates at least 9 opportunities for interaction between Colorado Wild and the Interdisciplinary Team, starting in December of 2001 and ranging from letters to on-the-ground field trips. As this project has evolved over the past 5 or 6 years, I believe your concerns have been addressed. In response to your challenge of the large spruce/fir prescribed burn within the confines of the Box Creek project area, the burn has been removed from the proposed action, data quality has been improved through the new CVU mapping and ground truthing within the project area, quantifiable MIS habitat has been ground truthed, and project boundaries have been adjusted to better meet design criteria.

We still have a fundamental philosophical disagreement on the degree of treatment outside the wildland urban interface, use of funds for this project, and uncertainty that the project will meet stated standards and goals of the purpose and need. In recognition of that philosophical disagreement, I would like to propose an implementation and monitoring advisory committee to oversee results and make recommendations back to the District Ranger. I am proposing a committee of at least four and no more than five people consisting of at least two members from the environmental community, one member would be the Forest Service Leadville Ranger District Natural Resource staff officer, one elected official (possibly County Commissioner), and one member (if needed) at large. The District Ranger would act upon recommendations from this group in not only successes or failures of the proposed project but also in identifying opportunities to collaborate upon better understandings of the complex ecosystem associated with this project.

Comment 2: Citing unpublished (and therefore <u>not</u> peer reviewed) data, the Forest Service apparently believes that, prior to heavy manipulation during the late 19th century mining area, the project area consisted of a very diverse forest, with considerable presence of ponderosa pine and Douglas-fir, as well as the now omni-present lodgepole pine. See EA at 7, 23. There is little evidence for this belief.

Comment 3: Also, widespread ponderosa pine presence in the project area was unlikely because the lowest elevations of the project area are near the upper limit of ponderosa pine's elevational range. The fact that there is some ponderosa pine present today, and that there is evidence of ponderosa stumps, does not change this fact. Indeed, the EA states: '[e]vidence shows that ponderosa pine and Douglas-fir historically occurred primarily on the southern end of the project area…" (EA at 24), which is at the lowest elevations of the Project Area.

Response: Stumps, charcoal and live trees in the area suggest that there was more diversity historically in the project area. The southern portion of the project area has and likely had a greater proportion of ponderosa pine, but they also likely occurred in the remainder of the project area. Recently a ponderosa pine snag was noticed as far north as Turquoise Lake. In most of the project area, ponderosa pine and Douglas-fir were never the dominant species, but did occur to some extent. In the wake of all the mining activity that occurred at the turn of the century, much of the potential seed source for Douglas-fir

and ponderosa pine was eliminated. For prescription 10, in appropriate areas, interplanting Douglas-fir and ponderosa pine would again provide for species diversity. Foresters believe interplanting Douglas-fir and ponderosa pine will be successful, as it has been with Douglas-fir and Engelmann spruce plantings in 1978 and 1979 in the area.

Comment 4: The EA states that "[h]istorically, the forest was more open" and had more frequent low intensity fire" (p. 23). It is hard to imagine, under the current climate regime, that fires were very frequent in the project area, which is entirely at or above 9,300 feet elevation (EA at 6), with much of it above 10,000 feet. Indeed, the EA states that "[s]ince 1955, there have been more than 15 fire starts in the Box Creek Watershed". EA at 49. Unless the number is a great deal larger than 15, that is not very many fires in 50 years. With the relatively heavy human use of the area, one would expect a significantly higher number of fire ignitions.

Response: Fire frequency is based on the number of ignitions from lightning and human sources. The fire behavior and intensity of a wildfire is a factor of fuel type, fuel moisture, weather, and topography, not elevation. In the late 1800's, mining and logging significantly changed the Box Creek area. The majority of the vegetation was removed, including stumps and down logs. At approximately the same time (early 1900's) suppression of wildland fires began in full force. Since all wildland fires have been suppressed, it is difficult to know the ecological role those fires would have naturally played in the environment.

Currently, both human caused fires and naturally caused fires are difficult to detect if they stay within the lodgepole pine duff. These types of fires are typically low intensity and spread slowly. The smoke typically does not rise above the tree canopy. The majority of these fires "natural out" due to rain, snow, or increased humidity before discovery.

The Box Creek project area consists of multiple fuel types, with dominant fuel type being lodgepole pine. A secondary fuel type in the project area is sagebrush. Sagebrush is dominant in the draws of the Box Creek project area and also plays a role in lodgepole pine stands located on the edge of Lodgepole Flats. Sagebrush typically burns every 40 – 60 years. It is likely fires in the lodgepole pine were more frequent on edge due to the influence of the sagebrush in the area.

Comment 5: Thus a majority of the project area is highly unlikely to be in fire regime condition class 3, i. e., having a very high departure from the historical range of variability, as stated. EA at 27.

Response: Fire regime condition class (FRCC) is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and diseased mortality, grazing and drought).

There are three levels of fire regime condition class (FRCC 1 – 3). A simplified description of each level is listed below. For more detailed information on FRCC, see www.frcc.gov.

- Condition Class 1: Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.
- Condition Class 2: Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.
- Condition Class 3: High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.

In the project area, other associated disturbances include high incidence of dwarf mistletoe in lodgepole pine and extensive logging in the late 1800's that removed the majority of trees from the area, including stumps and down logs that would have naturally built soils. Due to these associated disturbances, the area was rated as condition class 2 and 3 (Final EA, pg. 23).

Comment 6: Lodgepole pine stands usually originate via a stand-replacement event, such as fire, over a considerable area, and exist for a century or more before the next such event. The stands in the project area originated similarly, as a result of the extensive manipulation (likely a combination of logging and burning) that occurred during the settlement/mining era, mostly during the period of 1877-1893. EA at 23. Thus the only difference in the manifestation of a totally natural disturbance regime and the stands we see today in the project area is that the latter came into existence over a longer time period than a typical larger scale stand replacement fire in the lodgepole pine type.

Comment 7: Also, a large stand replacement fire in this area could have produced virtually the same composition and structure as we see today.

Response: With a cursory look, a large stand replacing fire and extensive logging (like what occurred in the Box Creek Watershed) appear very similar. However, a more thorough understanding of the role of fire shows that these two events are quite dissimilar. Following a stand replacing fire many snags remain standing for quite some time. As these snags begin to fall they create many microhabitats that facilitate regeneration and provide soil stability and nutrient flow. Because the area was extensively logged at the turn of the century, there is a paucity of coarse woody debris and snags in the project area currently. Additionally, even with large fires, there are often pockets that are moderately burned, or are not burned at all. Timbered areas that escape complete mortality enhance the stand diversity and provide a seed source for regeneration that is absent with extensive clearcutting.

Comment 8: In order to have the omni-presence of dense lodgepole pine stands evident on the landscape today, caused by the extensive logging during the 19th century mining era, there must have considerable lodgepole pine present prior to this activity, as otherwise there would not have been a sufficient seed source to produce the amount of lodgepole now present. If ponderosa pine had been fairly prevalent on the landscape prior to this time, there would probably be many 100-125 year old ponderosa pine trees on the landscape, as the high level of disturbance that occurred in the mining era would likely have created conditions favorable for ponderosa pine regeneration, just as it did for lodgepole pine.

Response: A look at current landscape in the project area quickly reveals that lodgepole regeneration was quite prolific following the extensive logging in the late 19th and early 20th century. Ponderosa pine and Douglas-fir can grow much larger than lodgepole pine and were probably removed first during the mining boom. Since the majority of the area included lodgepole pine prior to logging, it's logical that most of the regeneration was lodgepole pine. Removing the limited seed source of Douglas-fir and ponderosa pine gave a distinct advantage to lodgepole pine, with its prolific cone production, opportunistic tendency, and domination of the project area prior to disturbance.

Comment 9: The current EA states that more frequent fires "would have limited the growth of Douglas-fir saplings" (p. 23). This is true, but these fires would have also just as easily killed young ponderosa pine. Small trees of both species are easily killed by fire, before they have a chance to develop the thick bark that protects them from fire when they are more mature.

Response: Mr. Smith is correct. More frequent surface fires would limit the growth of both Douglas-fir and ponderosa pine saplings. Small trees of both species are easily killed by fire, before they have a chance to develop thick bark that protects them from fire.

Comment 10: Dr. Kaufmann's research is totally inapplicable to the Box Creek Project area.

Response: The Kaufman et al. research cited on page 45 of the August 2005 EA (Final EA, pg. 42) is pertinent in the context within which it was used—habitat trends at the Pike and San Isabel Forest (PSI) scale. No direct connection with the Box Creek project area was made; rather this section describes a broader picture for habitat trend for the Pike and San Isabel National Forests as a whole.

Comment 11: It must be remembered that how the forest looked in, say, 1850, or shortly before settlement by European descendants (if that could even be accurately determined) is not necessarily representative of how the forest generally looked over a the remainder of the current climatic period (i.e., since the last ice age). Thus it is not at all certain that the area is outside its range of historical variability.

Response: The EA identifies four issues that were brought forth from scoping for alternative development. The four issues include Forest Health and Dwarf Mistletoe Management, Travel Management, Wildlife Habitat, and Fire Regime Condition Class. Only one issue, Fire Regime Condition Class, deals directly with range of historical variability (Final EA, pg. 8).

There is no proof, but the lack of species diversity, old growth or large diameter trees, snags, course woody debris, and the high incidence of dwarf mistletoe contribute to the areas being in a state that is outside what is expected to occur (Final EA, pgs. 19 – 20).

Comment 12: Given the uncertainty regarding pre-European stand conditions, the Forest Service must assume a greater burden of proof in justifying its insistence that the historical condition of the area varied greatly from the current condition, and that attempting to restore the putative historical condition is a worthwhile endeavor.

Response: As stated above, the EA identifies four issues that were brought forth from scoping for alternative development. Only one issue, Fire Regime Condition Class, deals directly with range of historical variability (historical condition vs. current condition).

According to the purpose and need statement (Final EA, pg. 1), "The purpose of the Box Creek project is to move the project area toward the desired conditions as described in the Land and Resource Management Plan: Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands (Forest Plan) by addressing forest health, dwarf mistletoe (mistletoe), travel management, and wildlife habitat concerns. In addition, the purpose is to address hazardous fuels adjacent to the wildland-urban interface (WUI), improve fire regime condition class (FRCC) per the National Fire Plan (NFP), and provide cohesiveness in managing public lands between FS and the BLM."

The project area is not being restored, nor is that an intention. Regardless of what may have occurred in the project area historically, the area currently does not meet desired conditions listed within the Forest Plan. Action alternatives move the area closer to the desired future conditions.

Comment 13: The EA repeatedly states that opening up the lodgepole canopy, as is proposed in the action alternatives, would result in the growth of understory vegetation, and even increase soil productivity. See, e.g., EA at 50, 69. However, if openings are created, lodgepole pine will likely regenerate in them, and often densely.

Comment 14: This would also result in dense lodgepole pine regeneration, as has already occurred in the clearcuts done in the project area in the 1980s.

Response: Previous patch cuts from the 1970's and 1980's in the Box Creek project area do have lodgepole pine regeneration, as expected, but these areas did not regenerate densely and were thinned as needed (Final EA, Appendix A, photo 10 and 20, pg. 91). Additionally, the grass production has markedly increased compared to adjacent stands which received no treatments.

Comment 15: Under treatment prescription 12, which accounts for almost half the total proposed treatment acreage (EA at 17), "[t]rees with mistletoe rating…greater than 2 would be removed" unless needed for snag or coarse woody debris retention. EA at 15. Given the high level of mistletoe infection present, won't that mean that most of the lodgepole pine would be removed, resulting in dense regeneration of lodgepole?

Response: As stated in the purpose and need statement for the Box Creek project (Final EA, pg. 1), the need for the project is to reduce mistletoe infestations. Under prescription 12, the areas with a DMR > 2 would be removed. Partial cuts would be used in other areas with a lower dwarf mistletoe rating. Partial cuts oriented toward mistletoe management are used in areas where infestation is less severe (forest stands with a dwarf mistletoe rating <3) and sanitation is likely to be more effective. Sanitation thinning as a management tool is known to be an effective long term treatment medthod (Hawksworth and Johnson 1989).

The Forest Plan direction for a minimum stocking level (seven years after clearcut treatment) is 150 trees per acre at a height of 6 feet. In partial cuts, the basal area (BA) is to be reduced 40 to 70 per cent or 40 to 80 BA, depending on the stand condition. Sanitation thinning may also include the BA reduction standard. The Forest Plan direction also sets a range for growing stock of 60 to 160 BA. The principle is to re-enter the stand as the stocking reaches 160 BA and reduce it to back to 60 to 80 BA to increase tree vigor and maintain forest health. Following the Forest Plan guidelines above, the treated stands would be monitored and treated to reduce density and manage for mistletoe.

Comment 16: It is not uncommon to have mistletoe throughout mature lodgepole stands. It cannot be eradicated except by removing every single tree that has this parasite. That is impossible to do, because some trees be infested with mistletoe will not show any evidence of the parasite for several years after first receiving the seed.

Response: According to the purpose and need statement (Final EA, pg. 1) the need for the project is to reduce dwarf mistletoe infestations, not eradicate the dwarf mistletoe.

Comment 17: Dwarf mistletoe has also been found to have considerable benefit to wildlife. See Bennetts et al, 1996, and EA at 50.

Response: The effects of mistletoe on wildlife can be positive or negative. Some of the benefits associated with dwarf mistletoe for wildlife are list in the Final EA, pg. 47.

Comment 18: We see no evidence that conditions have changed sufficiently since the 2004 FEA was prepared to justify the new capability and effectiveness ratings for no action.

Response: The 2005 Box Creek EA uses new vegetation data (CVU) that became available in the spring of 2005 (CVU data was verified through ground truthing). Acres of each habitat type and structural stage are input into the HABCAP model and habitat capability values for numerous species are output. The addition of miles of roads yields habitat effectiveness. In short, the changes in habitat effectiveness and capability for the No Action Alternative are the result of more current data used in the HABCAP model.

Comment 19: Under prescription 4B, habitat effectiveness must be maintained at 80 percent for elk. Forest Plan III-138. For MIS under this prescription, habitat capability must be maintained to at least 80 percent of potential. Plan at III-137. As is clear from EA pages 61 and 62, these requirements are not met.

Comment 20: Similarly, for prescription 5B, capability must be maintained at least 80 percent of potential for big game, which include elk. In winter, this rises to 90 percent. Plan at III-152, -153. Maintaining 80 percent of habitat capability is also required for MIS under this prescription. Plan, id. It is clear from EA p. 62 that these would not be met, either.

Response: There would be no major vegetation changes in the foreseeable future under the No Action Alternative of the Box Creek project. Therefore, the No Action Alternative values for habitat capability and habitat effectiveness are also the potential values. Thus, calculations for the No Action Alternative for habitat effectiveness and habitat capability are 100 percent of potential capability. The example on page 60 of the Final EA that states capability for elk during winter in MA 5B is 0.61 for alternative A (Table 3-2), is referring to 100 percent of potential capability. Table 3-2 shows that in all management areas that the preferred alternative meets or exceeds 100 percent of potential capability for elk. See Final EA, pgs. 59 - 62.

Comment 21: The current EA, unlike past EAs for the project, contains only conclusory statements concerning hiding and thermal cover for deer and elk.

Response: The EA does not go into much detail regarding thermal and hiding cover for the alternatives. The project record is much more in depth on quantification methodology and calculations for each alternative.

To summarize, the action alternatives would retain approximately 5,600 acres of hiding cover out of 9,300 acres available in diversity unit 108 (Figure A2, Final EA). The No Action Alternative would retain approximately 4,600 acres (Figure A1, Final EA), plus an additional 3,000 acres of habitat structural stage (HSS) 3B, 3C, 4B and 4C within 400 meters of open roads. The additional HSS calculation adjacent to open roads was not carried out for action alternatives because the cursory calculation exceeded Forest Plan requirements (additional clarification can be found in: Comer, Matt and Brian Cox. 2005. *Calculating Hiding Cover and Thermal Cover for Forest-wide and Big Game Diversity Units on the PSICC: Updating Project Analyses with Best Available Science*).

Since there is MA 4B or 5B within the diversity unit, the 50 percent or more hiding cover and 30 percent or more thermal cover standard for the diversity unit must be adhered to. Thermal cover is considered HSS 3A, 3B, 3C, 4A, 4B, 4C and 5. Figures A3 and A4 in the Final EA show that out of 12,200 acres available in the diversity unit for thermal cover, the No Action Alternative would maintain approximately 7,000 acres (57%) and the action alternatives would maintain approximately 6,600 acres (54%). (Final EA pgs. 59 – 62).

Comment 22: The EA contradicts itself on the need for thermal cover for elk. It states: "[d]uring hot summer months, elk seek shaded, cool habitats". EA at 45, citation omitted. But later in the same paragraph, other studies are cited, stating that there is uncertainty over whether thermal cover "influences nutritional condition, survival, or productivity of wild ungulates". Id.

Response: It is not unusual for studies to come to different conclusions on a subject, but this is not the case in this instance. The summer observations by Adams, 1982 and Leege, 1984, where elk tend to use cooler areas seem to be accurate for the Leadville Ranger District also. During the summer months, elk are often found in alpine or higher elevation areas. During the winter, findings by Cook et al. (1998) seem accurate with elk movements and winter range on the district. Most of the time, in the winter, elk are in areas with little or no canopy cover (personal observation).

Comment 23: We recommend that <u>all</u> treated areas and the road corridor used to access them be inspected for at least three years post treatment, as weeds can spread aerially, by water, by animals, by motor vehicles, and in the boots and clothing of humans. In other words, areas once free of weeds may not remain so after treatment, because logging and burning both create an ideal environment for weed introduction.

Response: Design Criteria #27 was modified in the Final EA, pg. 15; it states, "Inspect and document ground disturbing operations, in all treatment areas, for noxious weeds for at least three growing seasons following project completion. Provide for follow-up treatments based on inspection result".

The Forest Service maintains an on-going contract to treat identified areas with herbicides. Based on post treatment monitoring results, areas that are found to have weed infestations would be added to the contract for areas to be treated.

Comment 24: Inspecting all treated areas is important because little surveying has so far been done.

Comment 25: Limited inventories have been constructed in the project area, so that actual acres of noxious weed infestation have not been calculated. EA at 29.

Comment 26: We strongly recommend that every area where ground disturbance of any type (logging, skid trail use, burning) is proposed be thoroughly survey for weeds before operations commence there, and that any weed populations found be eradicated.

Response: In the summer of 2005, the area was thoroughly surveyed for noxious weeds. The Forest Service botany crew spent 10 – person days on the Box Creek project performing floristic surveys for both threatened, endangered and sensitive plant species as well as noxious weeds within the treatment units (Final EA, page 26).

The noxious weed program, with the support of the botany program, has spent extensive time and energy into updating the Forest Service weed inventory. While we do not know the location and extent of all weed infestations on the district, we have performed enough surveys in the Box Creek project area to give an estimate of approximately 1.5 to 2 acres infested with *Cirsium arvense* (Canada thistle) within the project area. This is the only weed found during the course of surveys in the project area.

As stated on pages 13 - 15 of the Final EA, the design criteria are set-up to follow the best management practices referenced in the Guide to Noxious Weed Prevention and to avoid and treat noxious weeds, as stated in Design Criteria #24 – 27.

Comment 27: The direct and indirect impacts from the project are said to be positive because of "reduction of the fire danger and current wind and water erosion". EA at 64. We do not understand how the project would reduce wind and water erosion affecting cultural sites. Actually, implementation of an action alternative would likely open any cultural sites to more wind erosion because of a reduction in forest cover. Also, this reduction of cover would make any sites more easily accessible to people on motor vehicles, thus greatly increasing the possibility of vandalism.

Response: The cultural sites in the Box Creek project area have been identified and surveyed by the Zone Archaeologist. Specific sites were identified that were likely to be impacted by fire and/or wind and water erosion. In order to protect these sites the Zone Archaeologist identified multiple design criteria (Final EA, pg. 14). Design criteria that specifically address impacts from fire include removal of heavy loads on cultural sites with the archaeologist present. Design criteria that specifically address impacts from wind and water erosion include the use of wood chips on cultural sites to reduce erosion and promote growth of vegetation. The wood chips would be a by-product of the vegetation treatments scheduled for the area. The design criteria for cultural resources are listed in there entirety below.

- Wood chips may be used on identified cultural sites to retard erosion and increase effective moisture, encouraging the growth of grasses and small forbs that act as stabilizing agents. The depth of the chips will be determined by the Zone Archeologist. The Zone Archeologist will supervise and monitor these activities.
- While implementing this action, all listed archeological sites, including a minimum of 30 – 50 foot buffer (depending on slope and fuel loading), will be avoided and protected from damage by equipment traveling in the area and pile burning activities. The Zone Archeologist will determine the buffer and mark the area.
- If heavy fuel loads exist on any of the archeological sites for which avoidance is stipulated, then those fuels may be removed with an archeologist present.

- If artifacts, features, or other indications of previously unrecorded heritage resources are identified in the course of ground-disturbing activities, all work in the vicinity of those materials is to cease and the Zone Archaeologist is to be notified immediately.
- After treatments, flagging, markers and signage for the buffers will be removed to reduce disturbance by the public.

Comment 28: Also, we wonder how local residents would feel about burns near their homes. They may not like the prospect of smoke inundating their residences. Therefore, we recommend that the Forest Service proceed very cautiously with any burning in the WUI, and only after extensive consultation and forewarning with/of local residents.

Response: The Forest Service is required to complete a Prescribed Fire Plan (burn plan) for any project that involves prescribed fire. One component of the burn plan is smoke management; this portion of the plan covers who the smoke will affect, mitigation measures limiting public and firefighters exposure to smoke, and how the public will be contacted prior to burning (for example – news releases in local newspapers and on the radio, prescribed fire signs along the roads in the immediate vicinity of the burn and telephone calls to local homeowners who express an interest in the project). The Forest Service is also required to obtain a smoke permit from Colorado Air Pollution Control Division (CAPCD). The CAPCD is part of the Department of Environmental Health and has regulatory control for air quality in the State of Colorado. CAPCD has the authority to stop a burn if it has significant adverse impacts to a developed area.

The Forest Service has been conducting similar burns in communities surrounding Buena Vista. These burns have been completed successfully, with limited impact to adjacent residences and on a whole have been well received by nearby residents.

Comment 29: Fire, of course, does not respect property boundaries. It would thus make sense for the Forest Service to help create fire management plans for various parts of the Pike-San Isabel National Forest to provide direction for how to manage fire, should an ignition occur. It would especially beneficial in this case to work with other governmental agencies and private land owners to create a community wildfire protection plan for the area adjacent to private land on the south side of the project area.

Response: The Pike and San Isabel National Forest currently has a fire management plan; the plan is updated annually and provides guidance for the management of wildland fire and prescribed fire on Forest Service lands. The Annual Wildfire Operating Plan for Chaffee and Lake Counties specifies roles and responsibilities of the multiple federal, state and local agencies that are involved with fire suppression in the Upper Arkansas Valley.

Currently, Lake County is in the process of developing a community wildfire protection plan (CWPP). Leadville/Lake County Fire Department, Colorado State Forest Service, the USDA Forest Service, as well as many community members and subdivisions are all active members of the taskforce. An initial draft of the plan is scheduled to be completed in December 2005.

Comment 30: The bottom of EA p. 40 states that a potential cumulative effect from the action alternatives would be "substantial improvements to a moderately used recreation resource". To what does this refer? Other than road closures, which would be viewed

favorably by some, but not all, recreationists, we cannot think of what "improvements" would result from implementation of either action alternative.

Response: Currently, the project area mainly provides OHV and hunting recreational opportunities. Taken collectively, the effects of the action alternatives (ie., increasing forest diversity, reducing unsightly mistletoe infestations, improving wildlife habitat, and implementing travel management provisions would provide more attractive (or improved) recreation opportunities, especially for dispersed recreation (Final EA, pg. 37).

Dennis Zadra

Comment 1: Since the Pan Ark Subdivision is distinctly different from the rest of the project area, most of Box III's WUI concerns are not pertinent. The other WUI area of concern (homes built northeast of USFS administered lands) are point-source problems (problems created by private decision to build in hazardous areas). Since the Forest Service's responsibility is to optimally manage public property, insuring private property with public subsidy is not its mission.

Response: The National Fire Plan promotes hazardous fuel reduction on both federal and private lands adjacent to communities at risk from wildland fire. We have a responsibility to protect all private property that could be threatened by wildfire coming from NFS lands onto private property.

Comment 2: The EA completely neglects the issue of aggravated fire hazard due to thinning and subsequent grass growth. As we all know grasses are the most ignitable of ground cover, the place where most wildfires begin and rapidly spread. In its truncated chain of logic the EA completely ignores this essential first step to wildfire and focuses instead on ladder fuels and interlocking crowns.

Response: Under the right weather and fuel conditions, a thinned forest will burn. The wildfire may be a surface fire, crown fire or combination of both depending on weather and fuel conditions. Past management in the area show that grass will grow in units that have been patch cut and prescribed burned (Final EA, Appendix A, photo point 13, pg. 90). Areas that have only been thinned show minimal grass regeneration (Final EA, Appendix A, photo point 78, pg. 93). By keeping the fire on the ground, it is easier and safer to fight. Surface fires in grass tend to be less intense and shorter duration than crown fires running through dense stands of timber.

Comment 3: The EA also fails to address the fire menace that would result from increased ORV trespass due to thinning.

Response: Thinned forests may facilitate OHV use and disperse camping within the project area. Increased human use increases the likelihood of human caused wildfire ignitions (Final EA, pg. 25). In 2004 – 2005, there were 3 human caused fires in the Box Creek project area; those fires were started by abandoned campfires located near roads and disperse campsites. However, the proposed action includes closing more that 7 miles of road seasonally, more than 7 miles would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned.

The proposed action combined with the BLM's transportation plan will provide an aggressive transportation management plan on public lands in Box Creek area for managing these concerns.

Comment 4: Most of Box III's mistletoe remedies (EA pgs 15-16) rely upon removal of lodgepole pine, a "remedy" that was widespread (Arkansas floodplain to alpine region) during the cutting/burning of 1880-1930 yet the Box III EA cites this widespread clearing as the fundamental reason for presumed ecological imbalance (i.e. rampant mistletoe infestation).

Response: Systematic removal of the most seriously infected patches of lodgepole will not eliminate the disease, but can effectively manage its spread into the adjacent stands. The project purpose is not to eliminate mistletoe, just provide some control.

Comment 5: Since elk are the only MIS likely found here, the EA's claim of habitat improvements are not justified. Any presumed forage (grass) increases due to canopy removal would be of little use to elk since forage here is conspicuously underutilized even though the present population is higher than CDOW's target.

Response: Forage is only one component of good habitat. Access to water, hiding cover, and thermal cover also influence elk use. Frequency of disturbance by recreationists may play the largest role in determining why elk may or may not use land that provides excellent habitat.

Comment 6: The only time forage is limiting here is during heavy snowfall and the nutritional deficiency of late winter grass, at which time elk augment their diet with more nutritious browse.

Response: During winter elk minimize energy losses. During adverse weather conditions, such as deep snow, minimizing energy losses may mean not moving to other areas to forage because the energy expended to reach these areas is greater than the forage provides. Elk that winter in and near the project area are often found in open meadows with grass for forage. Cook et al. (1998) found that areas with high canopy closure caused greater energy expenditures for elk compared to completely open areas. Treatments in the proposed action would create openings with additional forage and reduce the canopy closure of the project area overall, which should benefit wintering elk.

Comment 7: The fact is that USFS road management on Lodgepole Flats has been dismal. For example, the portion of FDR 130 in upper Box Creek shown as "gated all year" on Map 6 is not effective because it has rarely been effectively locked whenever I've visited it. I had to install that gate myself (1984) because the USFS installed gate was a token effort adjacent to a clearcut which allowed easy portage. Even though the present gate bears an impressive lock it is so placed that the gate can be opened without unlocking the chain. The last time I viewed that gate it didn't even have a closure sign upon it.

Response: Below is a picture of the gate located on FDR 130. The gate is effectively locked and signed "Road Closed". Recently, members of the public on motorcycles have removed logs blocking access on the right side of the gate. However, passenger vehicle traffic is effectively blocked and actions have been taken to close the access afforded by motorcycles and trail bikes. Since the Fall, 2001 I have never seen a vehicle behind the

gate, nor have I seen any tracks of vehicles behind the gate (Jim Zornes, personal observation).

The proposed action includes closing more that 7 miles of road seasonally, more than 7 miles would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned. The road in question will be gated 1.7 miles before the commenters gate in question. The proposed action combined with the BLM's transportation plan will provide an aggressive transportation management plan on public lands in Box Creek area for managing these concerns.

Comment 8: The "Economics" discussion (pg 70) states "… the project is being driven primarily by ecological and biological factors." As discussed above it is obvious that this EA has created its own wildlife and forest ecology "science" in an attempt to justify (for the third time) an indefensible project. The Benefit/Cost Ratios shown in Table 3-6 should be negative because the numerator is deficient in public benefits and the denominator fails to account for unavoidable degradation of recreational aesthetics, wildlife habitat, etc.

Response: The economics discussion is based on sound estimates of the costs and benefits associated with this project. Values, such as recreational aesthetics and wildlife habitat, have no clear way to quantify their contribution; these values were not included in the economic discussion.

The implementing regulations of NEPA expressly avoids a cost-benefit analysis as being a necessary basis for decisions: "For purposes of complying with the ACT, the weighing of the merits and drawbacks of the various alternatives need not be displayed in monetary cost-benefit analysis and should not be when there are important qualitative considerations." (40 CFR 1502.23)

Comment 9: Valid, ecologically based management must consider all factors and in proper context. For example, the EA proclaims elk to be beneficiaries of "treatments" but ignores detriments to elk security and seasonal mobility. The EA proclaims forage benefits when the kind of forage to be created (grass) is already available in excess.

Project boundaries do not comport with those of free ranging elk and succeeding USFS projects (NW Fuels for instance) are not integrated by cumulative impact analysis.

Response: See Final EA, pg. 49 for discussion of the benefits to elk. The project boundaries are not supposed to follow the boundaries of the elk herd. The project focus is on reducing the fire hazard, and improving habitat effectiveness within the defined project area. See Final EA, pg. 1 for the purpose and need statement. This project does not overlap with the Northwest Fuels project so there will be no detailed discussion. However, it is mentioned (Final EA, pg. 18).

Sam Galey

Comment 1: The EA gives the impression that Dwarf Mistletoe is a major problem and that cutting and burning is a viable solution. An actual personal inspection of the forest, not just a drive by, will show that this too is a false claim, other than the few small areas that have been poorly managed by humans.

Response: The limited vegetation diversity and growth potential of many stands in the project area require active management to move conditions closer to what is desired. Numerous photo points established in 2004 illustrate the current condition of the area, and the expected results of various treatments.

Comment 2: Lodgepole forests that are fire hazards are two or three hundred years old, Lodgepole forests do not become fire hazards in fifty or even 100 years.

Response: Lodgepole pine forests have a mean fire interval between 100 – 250 years (USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 2. 2000, pages 113 – 114). Currently, the lodgepole pine in the Box Creek project area is 100 – 125 years old.

Any forest can burn, given the right humidity, heat, wind, and ignition source. The Hayman fire burned through plantations of young trees and killed almost all of them. What makes them hazardous is how tightly packed together the crowns are, and how drought-stressed they are. By thinning the trees, the crown spacing is opened up. This reduces the opportunity for fire to jump from tree to tree. It also reduces competition for the scarce water in the ground, and allows more rain and snow to get to the ground.

Comment 3: Lodgepole only become the dominant species in marginal habitats. If other trees like Ponderosa, Spruce, or Fir could thrive there they would. There was nothing stopping them from occurring naturally but the harsh conditions. Cutting, burning, and planting will not bring the diversity the EA claims.

Response: Historical accounts and physical evidence indicate that ponderosa pine and Douglas-fir once occupied much of this project area. Plantings of these species in the 1980's have been successful in reintroducing them. Continued plantings will further distribute them in the project area. By planting them, we are returning forest diversity to the area, and undoing some of the damage done during the wood harvests in the 1800's.

Comment 4: The Elk graze in Hayden Flats because there are trees nearby to hide in, and they need to graze in Hayden Flats because any higher there is too much snow cover to access the grass. Removing trees will harm, not benefit the Elk.

Response: We are not thinning any trees near Hayden Flats, so there will be no direct impact from that activity. We are closing some roads in that area so the elk should benefit from more extensive areas of reduced traffic.

Comment 5: Among other things in the Environmental Assessment document, it states that the proposed treatment will enhance the beauty of the area. The proposed treatment could diminish the health of this tourist based economy in the county by marring its beauty.

Response: By thinning some existing stands and interplanting ponderosa pine and Douglas-fir, we will take the currently stagnant stands and open them up. This will lead to more vigorous growth in the trees that are released. This will give us a healthier forest in the near term. The plantings will provide for future diversity and create the multi-species, multi-storied canopy that used to exist. Very few of our public contacts seem to prefer a dense, stagnant mono-culture forest over a diverse and dynamic forest with a variety of species.

Patrick Lucero

Comment 1: The Forest Service has done a very poor job of effectively closing roads on this district. Unmanaged roads create a lot of stress for wildlife such as elk. Roads on Lodgepole Flats (we used to call it the Free Wood Area) used to limited by the dense tree cover.

Response: Some firewood cutters and hunters may want to travel in areas where they should not and open the access

. We will continue to monitor for new routes and close them when we find them. In this area it is especially difficult to close roads because of the flat terrain. We continue to use barriers that are difficult to breach, or gates in areas difficult to bypass. We are also expanding our use of signs to make people aware of the closures.

The proposed action includes closing more that 7 miles of road seasonally, more than 7 miles would be restricted to administrative use only, and nearly 13 miles of roads would be decommissioned. The proposed action combined with the BLM's transportation plan will provide an aggressive transportation management plan on public lands in Box Creek area for managing these concerns.

Comment 2: The wildland-urban-interface problem. Even though I've loved these forests all my life I've had enough sense to know that it's not a good idea to build a house in places that can catch on fire. Those who ignored good sense and built there did so at their own risk.

Response: Location of private homes does not relieve the Federal land management agencies of their responsibility to work to reduce the forest fire potential in areas adjacent to private property. The National Fire Plan promotes hazardous fuel reduction on both federal and private lands adjacent to communities at risk from wildland fire. We have a responsibility to protect all private property that could be threatened by wildfire coming from NFS lands onto private property.

Comment 3: I think this wood should be saved for the long term use of those of us who cut our own firewood rather than those who pay for expensive feller-bunchers with Forest Service subsidized contracts.

Response: Both commercial (timber sales) and non-commercial (firewood cutting) methods will be used to meet the goals of the project. There will continue to be firewood opportunities within the project area. Firewood areas will be used to assist in the removal of stagnant and diseased trees from this area and will help to provide a healthier forest for other users to enjoy.

Frank Shober

Comment 1: There hasn't been a wild Forest fire here for over a 100 years.

Response: Annually, wildland fire crews from both the Federal agencies and the Leadville/Lake County Fire Department respond to wildland fires in the Box Creek project area. In 2004 – 2005, three fires were reported and suppressed in the project area. The majority of the public is unaware of these fires, due to the fact that the fires are small and suppressed rapidly.