BLACK MOUNTAIN/
DEVIL'S HOLE
FUELS AND WATERSHED
PROJECT
ENVIRONMENTAL ASSESSMENT

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SAN ISABEL NATIONAL FOREST
SAN CARLOS RANGER DISTRICT
CANON CITY, COLORADO

HUERFANO COUNTY, COLORADO

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Some of the miles and/or acreages in this analysis vary by resource. This variation often depends on the criteria selected to run the analysis. For example, to determine cumulative impacts, or to better display the effects of roads on a resource, all roads, including private, state, and county, may have been included in a particular analysis. The total road miles in the alternatives only include Forest Service and Bureau of Land Management jurisdiction.

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I. Purpose and Need for Action

This chapter summarizes the purpose and need for this action. This includes describing the proposed action; project area description, summarizes the Pike and San Isabel National Forests Comanche and Cimarron National Grasslands (PSICC) Land and Resource Management Plan (Forest Plan) direction; decisions to be made, public involvement, key issues for the proposed action, and other issues.

A. Location

The U.S. Forest Service (Forest Service), San Isabel National Forest, San Carlos Ranger District manages public lands in Devils Hole/Black Mountain Project Area. The area is generally north and west of Gardner, Colorado (see the Project Location Map) in Huerfano County.

B. Background

Elimination of the historic pattern of frequent low-intensity fires in native grasslands and pine forests has resulted in significant ecological changes in the Black Mountain / Devils Hole area. Today, as the result of fire exclusion, trees are slowly invading and replacing grassland communities. Fire exclusion has increased forest vegetation density and fuel ladders (smaller trees and brush which carry surface fires into the forest canopy). Many forest communities in this area encompass increasingly dense thickets of small trees, are experiencing insect and disease epidemics, and are prone to severe wildfires.

The agencies' resource specialists studied existing vegetation and compared it to the probable natural historic ranges of plant communities by size and age of plants and by their distribution over the area, or Historic Range of Variability (HRV). Douglas-fir/ponderosa pine, mixed conifer/aspen, spruce/aspen, spruce, ponderosa pine, oak/mixed conifer, pinyon pine/juniper, and grasslands vegetation types were considered. Ponderosa pine and pinyon /juniper vegetation types were found to be the furthest outside HRV.

Watersheds in the Black Mountain Analysis Area have been identified as being at high risk for catastrophic wildfires due to the existing forest conditions. In addition, the Forest Fire Risk Assessment identifies the Black Mountain Analysis Areas as a having significant fire risk. Private developed properties adjacent to National Forest System Lands in the analysis area create conditions with potential for large, intense wildfires that could put human life, water supplies, and property at high risk for loss or damage.

The Forest Service is directed by policy to prioritize areas that have significant wildland fire risk to private property, watershed, and wildlife habitat for fuel hazard reduction treatments (The Cohesive Strategy for Protecting People and Sustaining Resources in Fire Adapted Ecosystems, 2001).

The proposed actions are intended to restore the analysis area to a more sustainable condition that follows the historic functionality of the ecosystem, including reintroduction of the historical fire regime, where possible. The project is intended to establish a more fire resilient forest structure through thinning, creating openings, and utilizing prescribed fire.

C. Purpose of and Need for Action

The Forest Service proposes to use prescribed fire and mechanical treatments to meet the purpose and needs listed below. The treatments are outlined by vegetation type, and are described in detail in Chapter 2.

The purpose of doing this project is to:

- Reduce the risk of high intensity wildland fire, and restore and maintain healthy, diverse, fire adapted ecosystems to provide improved resilience and sustainability. This would include modifying the existing fuel conditions to reduce fuel ladders, surface fuels and dense vegetation so that a wind-driven wildfire event with flame lengths less than four feet would not develop into a crown fire if it occurred under hot, dry, and windy conditions (90^{th} percentile) weather conditions.
- Reduce the threat of severe wildland fires to adjacent private property and structures.
- Restore and stimulate forbs, sedges, and grasses in the project area.
- Treat vegetation so that growth and vigor of residual trees are maintained or increased to favor the development of large tree forest structure.
- Provide a diversity of habitat types and stages for a range of historically occurring species.

Needs this project is designed to meet are:

- Return woodland/grassland interface to approximate historical conditions.
- Hazardous fuel reduction.
- Reduce tree density and create openings in the forest canopy.
- Improve or maintain watershed conditions as identified in the Inland West Watershed Inventory (IWWI).
- Protection or restoration of sensitive, threatened, or endangered species habitat.
- Move the area to a condition closer to the historic functioning of the watershed, including reintroduction of the historical fire regime, where possible.

D. Management Direction

Several other documents help outline the goals for this project. The primary drivers are described below.

1. Forest Plan Direction

National Forest System lands will be managed to comply with laws, regulations, Executive Orders, direction in the Forest Service Manual, and Regional Acceptable Work Standards (Forest Plan, III-11).

The Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands (PSICC) Land and Resource Management Plan (Forest Plan) as amended (October, 1984) provides long-term

management direction for the Forest Service portion of the project area. Management direction is expressed in terms of both Forest Direction and Management Area Direction.

Forest Plan goals are statements describing a desired condition to be realized sometime in the future. Tiered under these goals are Forest Plan Direction, and Standards and Guidelines. General Direction Statements specify the actions, measures, or treatments (management practices) to be done when implementing the activity or the condition expected to exist after the general direction is implemented. Standards and Guidelines outline the acceptable limits.

These directions tier in the following order:

1. **Forest Plan Goals and Objectives**
2. **General Direction Statements**
3. **Standards and Guidelines**
4. **Management Area General Direction**
5. **Management Area Standards and Guidelines**

The General Direction Statements, Standards and Guidelines, and Management Area Standards and Guidelines that most directly apply to this project are listed in Appendix A. Key Forest Plan Goals important to this project include increasing diversity for wildlife and habitat improvement and improving the health and vigor of all vegetation types. Summarized below are is the overall Management Area (MA) Direction, and the general direction for that MA related to this project.

MA 5B - Big Game Winter Range Emphasis
(Approximately 13,749 acres in the analysis area)

The management emphasis provides for forage and cover on big game winter ranges. Winter habitat for deer, elk, bighorn sheep, and mountain goats is emphasized. Treatments (e.g., clear cutting, shelterwood, single tree or group selection) to increase forage production or to create and maintain thermal and hiding cover for big game are applied. Treatments to grass, forb, browse, and noncommercial tree species include seeding, planting, spraying, burning, falling and mechanical chopping, or crushing. A variety of browse age classes are maintained. Continuous forest cover is maintained on some sites.

Short-term roads are obliterated in 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.

- **Wildlife:** maintain habitat for MIS; provide big game forage and cover.
- **Fuel Treatment:** maintain fuel conditions which permit fire suppression and prescribed fire to maintain habitat needed for selected species or species population levels.
- **Silvicultural Treatments:** manage to achieve and maintain desired thermal and hiding cover, cover-opening ratios and other habitat needs associated with tree cover.

- **Transportation System:** prohibit off-road vehicle use and manage non-motorized use to prevent stress on big game animals.

MA 6B – Livestock Grazing Emphasis
(Approximately 4,784 acres in the analysis area)

The area is managed for livestock grazing. Investments are made in compatible resource activities. Range condition is maintained through use of forage improvement practices, livestock management, and regulation of other resource activities. Nonstructural restoration and forage improvement practices available are seeding, planting, burning, fertilizing, pitting, furrowing, spraying, crushing, and plowing. Cutting of encroaching trees may also occur. Management activities are evident but harmonize and blend with the natural setting.

- **Wildlife:** maintain habitat capability for management indicator species; provide adequate forage to sustain big-game population levels agreed to in the Statewide comprehensive Wildlife Management Plan on NFS lands.

- **Silvicultural Treatments:** maintain and manage forested inclusions to provide a high level of forage production, wildlife habitat, and diversity.

MA 9A - Riparian Area Management Emphasis
(Acres included in other Management Areas)

Management of all the riparian area ecosystem components is emphasized. These components include the aquatic and riparian ecosystems and adjacent ecosystems that remain in approximately 100 feet 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.

The goals of this Management Area 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 water-body shorelines.

- **Wildlife:** maintain habitat capability for management indicator species; provide habitat diversity through vegetation treatments, in conjunction with other resource activities, designed to maintain or improve wildlife or fisheries habitat.

- **Silvicultural Treatments:** manage forest cover types to perpetuate tree cover and provide healthy stands, high water quality and wildlife and fish habitat.

- **Water Resource Improvement or Maintenance:** prevent stream channel instability, loss of channel cross-sectional areas, and loss of water quality resulting from activities that alter vegetative cover; stabilize stream banks which are damaged beyond natural recovery in a reasonable time period with appropriate methods or procedures that emphasize control by vegetation.

2. National Fire Plan - Cohesive Strategy

The National Fire Plan (2001) provides direction to reduce wildland fire risks. Linked to the National Fire Plan, the Cohesive Strategy (GAO/RCED-99-65, 2000) provides guidance for prioritization and planning of projects to reduce wildland fire risks. Priorities for projects include risk reduction to:

- Wildland – Urban Interface
- Soil, Air and Water
- Wildlife Species Habitat
- Wildland Sustainability

The general restoration strategy involves reducing departure from natural fire regimes and HRV. Fire regime departure is measured using condition classes 2 and 3, which generally equate to moderate and high HRV departure respectively. Condition class 1 generally represents the natural fire regime and low HRV departure.

E. Decisions to be Made

The Forest Service San Carlos District Ranger will make a number of decisions to address the identified issues and to improve the overall health of the forest and public lands. The decision maker may select any alternative, or a combination of the alternatives. The selected alternative will address acres and type of treatment, and any mitigation measures.

Although non-Forest System lands are included in the analysis area, the decision to be made is only for National Forest System Lands.

F. Public Involvement

On March 21, 2003 a project proposal scoping letter was sent to 76 interested or potentially affected individuals, groups, organizations, state and other Federal agencies, describing the proposal and encouraging comments and participation in the planning process. The letter also offered a future public meeting if there was interest.

The list included surrounding property owners, the general public, citizen organizations, government agencies, and local media. A list of individuals, groups, organizations, and agencies who were notified of the proposed project and invited to comment on it, may be found in the project files located at the San Carlos District Office.

The project was listed in the Schedule of Proposed Actions (SOPA), a Pike and San Isabel National Forests publication distributed four times a year to approximately 300 parties from 2002 to 2003.

G. Key Issues

Issues are defined as concerns about the potential effects of the proposed action. Issues about the proposal were solicited from all interested parties as well as from the agencies' interdisciplinary (ID) planning team of resource specialists. From the comments, key issues were identified.

Air Quality/Smoke

Smoke from prescribed fires may impact nearby communities, particularly late in the day and at night. Smoke from the burns may collect in downslope valleys at night, which might affect visibility on roads and air quality around homes in areas downslope from the burns.

Livestock Grazing

Vegetation treatments may affect livestock grazing rotation and improvements during the duration of the project. In the long term, forage quality and distribution patterns may be changed.

Big Game Winter Range

Vegetation treatments may change cover and forage for big game species such as deer and elk. Short-term disturbance of animals may occur during the time the treatments occur.

Canada Lynx

Treatments may affect lynx travel corridor if security cover is not protected or provided.

Fire Management

There are risks involved in the Forest Service's ability to contain prescribed fires in the targeted areas, and prevent a wildfire from escaping onto adjoining private lands and non-targeted federal lands.

Increasing vegetative fuels build-up may cause larger and more destructive wildfires.

Noxious Weeds

Ground disturbing activities combined with equipment and people moving from location to location may transport noxious weeds to currently uninfected areas.

H. Other Issues

The ID team reviewed the Forest Plan along with public comments and developed a broader list of the issues, concerns, and opportunities associated with the proposed action. This broader list of concerns is addressed in Chapter 3, but they are not key criteria in the analysis and comparison of the alternatives.

I. Issues Not Selected for Detailed Analysis

The following elements are not carried forward into the analysis for the reasons described below:

Prime and Unique Farmlands

There are no "prime and unique" farmlands in the project area.

Environmental Justice

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low Income Populations, requires all Federal agencies to incorporate environmental justice into their mission. The proposed action would not disproportionately affect minority or low-income populations. Therefore, an environmental justice analysis is not triggered and the concept is not discussed further in this document.

Cultural Resources

The project area has been surveyed for cultural resources. Design Criteria 50 will eliminate impact to significant cultural resources, and is built into the proposed action.

II. Alternatives Including the Proposed Action

This section describes two alternatives: No Action and Proposed Action. No other alternatives were proposed by internal or public comments, and the issues are addressed by these two actions.

A. No Action Alternative

The No Action Alternative is used as a baseline to compare the proposed action for environmental impacts. In this analysis, the No Action Alternative describes the current, on-the-ground situation. No vegetation treatments or watershed restoration work would take place. Successional processes would continue without Forest Service vegetation management. Any wildfires in the area would be suppressed.

B. Proposed Action

This proposal was designed to meet the purpose and needs listed in Chapter 1. The prescribed fire and mechanical treatments are outlined by vegetation type and are shown on the Proposed Action Map.

The treatment acres that follow are for a general area. Actual treatment acres will be somewhat less after exclusion of riparian areas, slope restrictions for treatments, unsuitable soils, and other factors as described in this proposed action. Acreages are approximate.

It is anticipated that this project will begin in 2004 and be completed by 2010.

Grasslands

Treated Acres: 2500

Use low intensity prescribed fires to maintain, restore, and improve grass and sedge species vigor and reduce the numbers of encroaching trees. Small trees would be targeted for removal. After initial treatment, a prescribed fire rotation would occur every 4 – 6 years, depending on grass and forb growth.

Pinyon-Juniper

Treated Acres: 1300

Treatment includes mechanical thinning of existing stands. In most cases, this may be followed by prescribed fire use at varying intensities. Canopy densities will be reduced through mechanical methods that would remove pinyon pine and juniper moving into adjoining grassland types, and create small openings in the canopy by removing smaller trees and brush, which can carry surface fires into the canopy.

Ponderosa Pine Savannas

Treated Acres: 2800

Low intensity prescribed fire and thinning of small trees and shrubs will be used to maintain openings and increase base/crown height ratios. In general, trees over 8 inches diameter at breast height (dbh) would be protected. Larger diameter trees with good health and vigor would not be removed.

Ponderosa Pine Plantations

Treated Acres: 2300

Approximately 400 acres of older plantations would be treated with a low intensity burn to maintain existing openings and tree spacing.

The remaining 1900 acres would be thinned, using chainsaws or chipping equipment, to a spacing varying from 16 to 22 feet between trees. In most areas, thinning would be followed by a low intensity prescribed fire to reduce ground fuels. Thinning in plantations with a large component of oak will be limited to mechanical treatments using chipping or chopping equipment. Some areas of group selection cuts would break up the canopy continuity. A variety of methods would be used to keep created slash close to the ground and away from the crowns of the remaining trees.

Wildland-Urban Interface Areas

Approximately 14 miles of public / private land boundaries are in the project area. Using a quarter mile buffer, this amounts to 1800 acres. Many of these acres are already included in other treatments, but in areas near homes, this treatment would take priority. Acres not been counted in other treatments are approximately 3 miles of boundary and roughly 400 acres.

Highest priority treatment areas are public lands in a quarter mile of private property. In these areas, mechanical treatments such as thinning, piling, burning, and chipping would be implemented where there are high densities of small trees and large accumulations of dead standing and down trees. Prescribed fire would be implemented after treatment in areas that have feasible fire control features. Areas adjacent to private property with houses would have individual tree removal and thinning to reduce fuel ladders, separate tree crowns to reduce crown fire potential and increase health and vigor of residual trees.

Insect Infestation pockets

Pockets of trees infected with Mountain Pine Beetles, Ips beetles, and other related insects will be treated mechanically using one or more of the methods listed below.

In wildland urban interface areas, all dead trees may be removed. In all other areas, dead trees in excess of those needed for snag requirements may be removed.

Watershed Improvement Treatments

Watershed improvements may be implemented in the project area. These treatments could include fencing, seeding or planting riparian areas, riprapping or rocking stream banks, building check dams to stabilize, prevent or fix active head cutting in gullies.

1. Design Criteria

Design Criteria are practices or criteria the ID team has decided will be part of the project. These items are "designed" in the proposed action so all of the resources and issues can be analyzed with these criteria in place. This list includes some of the key Forest Plan standards and guidelines and other guidance key to understanding how the proposed action would be implemented on the ground.

General

1. Watershed improvement projects will have timing limitations for aquatic species such as the tiger salamander; will have site-specific surveys for cultural, Threatened, Endangered, and Sensitive (TES) flora and fauna before implementation takes place.

Prescribed Fires

2. Will be conducted by utilizing hand-firing techniques along the burn perimeter, and possible helicopter firing techniques for interior fuels where ground force access is limited. It is estimated that each ignition event may take several days to complete. Due to the patchy nature of the fuels, a mosaic of burned and unburned vegetation is expected.

3. The burns will utilize constructed and natural control features, such as roads, rock out-croppings, streams, snowbanks, and constructed firelines. Hand crews and engines will contain and control the burns as specified in the "Prescribed Fire Burn Plan", which is prepared before implementation.

4. Ignition will only be conducted when smoke dispersal conditions are predicted to be fair or better as outlined in the Colorado Department of Health and Environment, Air Pollution Control Division's Regulation Number 9. This regulation applies to all open burning throughout the state. Planned Ignition Burning permits are the basic permits for prescribed burning activities. These permits require that the applicant use best smoke management techniques to reduce or eliminate smoke impacts on the health and welfare of the public. These factors focus on identifying and minimizing impacts to smoke sensitive receptors.

5. Mimic the natural fire cycles for the project area in relation to timing and intensities of burning, to the maximum extent reasonable and practical (all proposed burn areas)

Mechanical Treatments

6. Mechanical treatment tools include: Hydro-Axe (trade name for an industrial front-end loader with a large mowing/chipping attachment), crews with chainsaws, or mechanized thinning machines, such as a feller/buncher. The type of mechanized treatment selected will depend on terrain and/or recommended best management practices. Management options for this treatment may include commercial and noncommercial methods.

7. If necessary, slash created by thinning will be burned the following winter/spring to achieve fuel reduction options. Mulch resulting from chipping operations will be allowed to decompose into the on-site soils.

8. Treatments would include pruning, thinning of small diameter trees, brush, or other ladder fuels; piling, burning or chipping of fuel accumulations; cutting, chipping or removing dead standing trees; and subsequent prescribed fire.

9. Shredded wood or chips will be scattered. The maximum allowable depth will be less than 3 inches, with a preferred average depth of 1½ inches. Chips left after effective ground cover is achieved (see soil and water criteria), will be available for commercial purposes.

10. Most woody debris, or slash, will be lopped and scattered, with a maximum allowable height of 18 inches. If the slash is hand piled, the piles will be no more than 6 feet square by 4 feet high.

11. Hand piling will be preferred over machine piling. If machine piling is done, which may occur in some of the wildland-urban interface zone, using a grapple to pile will be preferred to limit soil disturbance. These piles will be no more than 12 feet square by 6 feet high, and the wood diameter will be no more than 8 inches. Machine piles will be burned or treated with an air curtain incinerator.

12. Post-prescribed fire mechanical treatment may occur on a case-by-case basis pending site stability and climatic conditions, such as low soil moisture (below the plastic limit). Also, see Forest Plan standards and guidelines, and guidance from the Watershed Conservation Practices (WCP) Handbook (Appendix A).

13. No temporary roads are anticipated for this project, however existing roads or user created roads may be used. If skid trails are needed, they will be laid out as (add in from timber contract clauses), should be laid out with sale administrator and soil scientist or hydrologist.

Snags
(These criteria do not apply to the grassland treatment areas)

14. In forested Diversity Units (DU) maintain (where present) >= 80 snags/10 ac. average (Forest Plan standard is 2 snags/ acre); largest sizes and numbers available, (all stages of development).

15. Retain all soft snags except for safety hazards to the greatest extent reasonable and practical.

16. In ponderosa pine types, provide hard snags (when they are present) >= 12" dbh (diameter at breast height) (>= 20 snags/10 ac.); >= 10" dbh (>= 30 snags/10 ac.); >= 6" dbh (30 snags/10 ac.), or as large as available.

17. If above snag levels are not available, create new recruitment snags, by burn plan design, in the above category sizes at densities sufficient to bring snag levels up to the above mentioned levels in a well distributed manner of both clumps and individual trees, favoring larger sized ponderosa pine and pinyon-juniper trees with defects such as "wolfy" appearance, cankers, heartrot, knarls, diseases, and broken tops and limbs.

18. Protect existing snags (>= 6 in. dbh) from firewood cutting, mechanical and fire treatment to the greatest extent reasonable and practical.

Coarse Woody Material (CWM)
(These criteria do not apply to the grassland treatment areas)

NOTE: The project area is generally deficient of quantities and qualities of snags and Coarse Woody Material (CWM). General objectives are to retain existing levels and create new recruitment of snags and CWM to bring them up to historical levels where their levels are below Historical Range of Variability for the respective vegetation types.

19. In ponderosa pine types; maintain 200 linear feet/acre of >=12 in. diameter, or largest and longest available

20. Protect existing CWM (>= 12 in. diameter) from firewood cutting, mechanical treatment, and fire treatment to the greatest extent reasonable and practical.

Wildlife

21. Protect/provide one Abert's squirrel nest tree clump (0.1 ac. of 9-22" dbh ponderosa pine and an interlocking canopy) per 6 ac. of ponderosa pine savannah maintenance burn areas, if available.

22. Protect two turkey roost tree clumps per section (sq. mi.) in ponderosa pine savannah maintenance burn areas, if available (clump is >= 0.1 ac.)

23. Close roads in the Big Game Winter Range Management Area (5B) from approximately December 15 to March 15 to provide wildlife habitat security. These seasonal road closure dates may be extended based on local snow and road conditions. Refer to the Proposed Action Map for the locations of the closures. Approximately 22 miles will be seasonally closed.

24. Restrict mechanical treatments from May 1 to August 15 (Management Indicator Species (MIS) Virginia's warbler breeding season) to avoid disrupting the breeding period of migratory birds. This excludes ponderosa pine plantations since they are poor habitat for TES and MIS birds. Also, restrict prescribed burning, to the above dates, with some flexibility if burning windows are not available outside of this period.

25. -Avoid implementing project activities in and near all raptor nest sites that show signs of recent activity over the last 0-3 years (i.e., fecal whitewash, feathers, bolus pellets, skeletal bones, or fur of prey species present at or around the base of a tree).

26. -Contact a qualified wildlife biologist if any active/inactive raptor nests are located during project implementation. Establish a nest area no activity buffer zone (30 acre area; ~650' radius) around any active raptor nest.

Canada Lynx Corridor (non-lynx habitat)

27. -Maintain adequate cover in the corridor (retain 20-25 percent of understory shrub component post burn and mechanical treatment; well distributed in a mosaic pattern of clumps and individual shrubs) so as not to impede lynx movement or create a "barrier" to movement through it.

28. Treatment units will be designed to provide connective linkages of untreated areas to facilitate east-west lynx travel through the project area. These lynx travel corridors will include untreated areas such as riparian areas, areas with steeper slopes, the mosaic pattern intended by most treatments, and those areas outside vegetation treatment units.

Riparian/Wetland Area Management

29. -Keep treatments outside of perennial or intermittent stream corridors and wetland/spring areas (primarily Wylie Gulch area); restricted activities above do not apply to ephemeral flowing drainages with no defined channel bottom scouring. Riparian/wetland areas are best identified by topographical breaks and/or vegetation communities present (buffers will range from 25 to 100 feet from channel edge, depending on site; Wylie Gulch will generally have a 100 foot buffer).

30. -No fire ignition in identified riparian areas (minor incidental fire creeping into riparian area is acceptable as long as no mature riparian vegetation is burned up).

Threatened, endangered, or sensitive (TES) Plants

31. If TES plant species are discovered during surveys or implementation, a qualified botanist will be contacted. The proposed treatment would then avoid sensitive or special-interest plant populations, or the proposed treatments would be modified or mitigated to address the plant's ecological needs.

32. No pile burning would take place in occurrences of sensitive plants.

33. Mechanical treatment grasslands and pinyon juniper could not take place before surveys are completed. Prescribed burning and mechanical treatment in other vegetation types may occur during plant dormancy (late fall to early spring usually) before surveys are complete.

34. Further research and analysis of the project area has shown that potential habitat for dwarf milkweed (*Asclepias uncialis*- a FS and BLM sensitive species) exists in the treatment area. Additional field surveys of potential habitat (pinyon-juniper and associated shortgrass prairie) for

dwarf milkweed will be performed before project implementation. Any occurrences found during surveys will be protected by not burning during the flowering season (April-May), and no ground disturbing (mechanical) activities taking place in those locations.

Rangelands

35. Determine grazing use on a case-by-case basis on burn units. Typically this means restricting grazing for up to one year before to allow fine fuel build-up to carry the management ignition; and for up to one year after the burn, and to allow for one season of growth and seed-set for the graminoid species.

36. Areas will be evaluated after treatment for vegetative conditions, especially grass, sedge and forb species. If necessary, areas may be seeded with native species to supplement natural regeneration. A non-persistent, non-native cover crop may be added to the mix to aid in higher seeding success.

37. Protect range improvements when conducting prescribed fire and mechanical treatment projects. The Forest Service or contractor will repair or replace any range improvements damaged during treatment activities.

38. Select burn conditions that forage species will respond favorably to.

39. To avoid mortality in bunchgrass areas, use cooler fires to avoid burning all material above the root crown.

Soil and Water

The following is a guide to identify the approximate extent of adjacent upland areas:

Slope of upland areas adj. to 9A Area - % Slope Range	Upslope distance from the bdry. of 9A Area –Feet
0-20	100
20-30	180
30-40	280
40-50	400
50-60	520
60-70	640
70-80	760
80-90	880
90-100	1000
100-150	1000-1300

40. Reduce, through designed management practices and appropriate erosion mitigation and vegetation/restoration measures, the project caused on-site erosion rates by 75 percent in the first year after disturbance. Reduce project caused on-site erosion by 95 percent in 5 years of initial disturbance.

41. Design continuing mitigation/restoration practices and follow-up maintenance activities to insure that 80 percent original ground cover (vegetation) recovery occurs after disturbance.

42. Effective Ground Cover. Required Minimum Percent Effective Groundcover for the first and second year after disturbance:

Erosion Hazard Class	1st Year (%)	2nd Year (%)
Low	50	70
Moderate	40	60
High	30	50
Very High	30	50

Noxious Weeds

43. Avoid known weed infestation areas when locating fire lines and use of mechanical equipment.

44. Ensure all vehicles and equipment used off-road in projects are cleaned and washed and free of weed seed or other vegetative weed parts capable of regenerating the species.

45. Re-establish vegetation, preferably native species, on bare ground caused by project disturbance as soon as possible to prevent conditions favoring weed establishment.

46. Use appropriate burning preparation and fire suppression tactics to reduce disturbances to soil and vegetation.

47. Pre-inventory project area and evaluate and control weeds present, especially if treatment is likely to favor weed spread.

48. Inspection of seed and straw mulch to be used for rehabilitation so that they are certified weed-free.

49. If weeds are found, treat as soon as possible to prevent spread.

Cultural Resources

50. Different types of vegetation management treatments proposed for the project will require different types of resource protection:

- For prescribed fire in savannah areas (low intensity burn), burning over the heritage site is permitted unless the site is a historic site with wood structures or features, or contains high densities of surface refuse and debris. Also, if the site report notes extreme vulnerability to erosion, and active erosion on the site, the site will be avoided.
- For prescribed burns in forested areas (ponderosa pine), avoid significant (eligible or potentially eligible sites), through black lining or hand line, as required.
- For areas proposed for hydro-axe. Avoid significant cultural sites; install a 150-foot buffer around the site area.
- For hand thinning and trimming with no ground disturbance other than foot traffic, it is not necessary to avoid significant sites.
- For clearing small-forested areas to create holes in the pinyon-juniper canopy: plan such areas so that significant sites are avoided.

Air Quality

51. Smoke impacts shall be mitigated by:

- Complying with the State Open Burning Permit process,
- Notifying residents of pending burning so they can limit their smoke exposure by leaving the area for a time, or closing their home to limit smoke infiltration,
- Curtailing major fire ignition operations by 4:00 pm on burn days,
- Actively mopping-up smoldering fuels larger than 3 inches in diameter.

III. Affected Environment and Environmental Consequences

This section describes the resources of the area, and the potential effects the proposed action and its alternatives may have on these resources.

Direct and indirect effects tend to focus on the impacts of implementing proposed activities (or in the case of the No Action alternative, the impacts of not implementing the proposed actions). Cumulative effects discussions focus on the incremental impacts of the proposed activities when added to other past, present, and foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Some of the miles and/or acreages in this analysis vary by resource. This variation often depends on the criteria selected to run the analysis. For example, to determine cumulative impacts, or to better display the effects of roads on a resource, all roads, including private, state, and county, may have been included in a particular analysis.

A. General Background

The analysis area is located at the southwestern end of the Wet Mountains in the Southern Rocky Mountain Province. Elevation ranges from 7000 to 9500 feet, and includes riparian, valley, lower montane, and montane environments.

The Wet Mountains are somewhat isolated from other mountain ranges by the Wet Mountain valley on the west, by the Huerfano River valley on the south and by the Arkansas River valley on the north. The eastern flank of the Wet Mountains grades into plains grasslands.

The area is very diverse with pinyon-juniper, Gambel oak, ponderosa pine, aspen, Douglas-fir, white fir, subalpine fir, Engelmann spruce, and alpine tundra. The highest peak is Greenhorn Mountain at 12,347 feet elevation.

Climate and Broad, Vegetative Types

Based on the major soil types in the project area, three climatic zones exist. They are semi-arid; lower montane, dry; and lower montane. The descriptions for each zone as reported in the Soil and Ecological Land Unit Survey for the Wet Mountains and Spanish Peaks Area (1995) follow:

The **semi-arid** climatic zone occurs from approximately 6,000 to 9,000 feet elevation (higher on south slopes and lower on north slopes). The mean annual air temperature is 48 to 52° Fahrenheit and the mean annual soil temperature is 46 to 50° Fahrenheit. The frost-free season is 90 to110 days and occurs during mid-May through mid-September.

Mean annual precipitation is 12 to 16 inches. Rainfall occurs April through October and accounts for 60 percent of the mean annual precipitation. Snowfall occurs October through April and accounts for 40 percent of the mean annual precipitation.

Mean annual snowfall accumulation ranges 50 to 100 inches. Snow on north facing slopes begins melting in March and ends melting in April. Snow on planar slopes begins melting in February and

ends melting in April. Snow on south facing slopes begins melting in January and ends melting in March.

Per the soil survey, the following broad, vegetative types are typically associated with and found in a semi-arid climatic zone:

- Blue grama and needlegrass
- One seed juniper and blue grama
- Pinyon and blue grama
- Pinyon and mountain-mahogany

The **lower montane, dry** climatic zone occurs from approximately 6,000 to 9,500 feet elevation (higher on south slopes and lower on north slopes). The mean annual air temperature is 40 to 48° Fahrenheit and the mean annual soil temperature is 38 to 46° Fahrenheit. The frost-free season is 70 to 90 days and occurs during mid-June through mid-September.

Mean annual precipitation is 12 to 16 inches. Rainfall occurs May through September and accounts for 50 percent of the mean annual precipitation. Snowfall occurs September through May and accounts for 50 percent of the mean annual precipitation.

Mean annual snowfall accumulation ranges 50 to 100 inches. Snow on north facing slopes begins melting in May and ends melting in June. Snow on planar slopes begins melting in April and ends melting May. Snow on south facing slopes begins melting in March and ends melting in May.

Per the soil survey, the following broad, vegetative types are typically associated with and found in a low montane, dry climatic zone:

- Arizona Fescue and mountain muhly
- Blue grama and needlegrass
- Ponderosa pine and Arizona fescue

The **lower montane** climatic zone occurs from approximately 6,000 to 9,500 feet elevation (higher on south slopes and lower on north slopes). The mean annual air temperature is 40 to 48° Fahrenheit and the mean annual soil temperature is 38 to 46° Fahrenheit. The frost-free season is 70 to 90 days and occurs during mid-June through mid-September.

Mean annual precipitation is 16 to 25 inches. Rainfall occurs May through September and accounts for 50 percent of the mean annual precipitation. Snowfall occurs September through May and accounts for 50 percent of the mean annual precipitation.

Mean annual snowfall accumulation ranges 100 to 200 inches. Snow on north facing slopes begins melting in May and ends melting in June. Snow on planar slopes begins melting in April and ends melting May. Snow on south facing slopes begins melting in March and ends melting in May.

Per the soil survey, the following broad, vegetative types are typically associated with and found in a lower montane climatic zone:

- Gambel oak
- Gambel oak and snowberry
- Pinyon and Gambel oak
- Ponderosa pine and Gambel oak
- Ponderosa pine, pinyon and Gambel oak

The western half of the project area is dominated by the semi-arid and lower montane, dry climatic zones. The lower montane, dry and lower montane climatic zones dominate the eastern half of the project area.

Climate data for the Westcliffe, Colorado station is summarized in the following table. Mean precipitation for this site averages 14.54 inches per year. Fifty-eight percent of the total occurs between May 1 and September 30; these data correspond well to the three climatic zones described previously for the project area. On average, July and August are the wettest months.

Table 1.

Climate Data for Project Area (a)				
Month	**Mean Maximum Temperature (degrees F)**	**Mean Minimum Temperature (degrees F)**	**Mean Precipitation (inches)**	**% Mean Precipitation by Month**
January	39.3	11.8	0.45	3.1
February	42.3	13.4	0.61	4.2
March	47.3	17.9	1.12	7.7
April	56.6	25	1.22	8.4
May	65.8	32.7	1.6	11.0
June	76.5	39.8	0.96	6.6
July	81.1	44.5	2.37	16.3
August	78.6	43.1	2.49	17.1
September	72.6	35.8	1.08	7.4
October	62.8	25.5	1.07	7.4
November	48.6	16.9	0.92	6.3
December	41	11.9	0.65	4.5
Annual			**14.54**	

a) Compiled by WEPP:Road model for the Westcliffe, CO site for 45 years of record.

A remote automated weather station was installed on Black Mountain in mid-July, 2003. Data collected at this site will aid the Forest Service in developing a better understanding of the weather and climatic conditions for the project area.

B. Physical Resources

1. Soils and Hydrology

a. Affected Environment

The geology in the project area includes sedimentary sandstones from the Tertiary, Cretaceous, and Jurassic Ages and granites of the Precambrian Age. Landforms are primarily mountain slopes, but also include floodplains, valley slopes, and some plateaus, mesas, and benches. Most of the soils are rocky, ranging from less than 15 percent to above 60 percent. The surface soils range from sandy loams with around 45 percent gravels or stones to loams with about 25 percent gravels. Coarse fragments in the soils in the project area average 40 percent.

Table 2.

Soil mapping unit	Name	% slope	Avg. coarse fragment %	Approx. acre %
101F	Silas-Family-Cryaquolls association	0-15	<15	0.1
102F	Jodero Family	0-15	<15	9
103F	Collegiate loam	1-3	<15	0.1
520M	Boyle-Jodero families association	0-15	25	24
521M	Ring Family, dry	5-40	75	20
522S	Ustic Torriorthents, very stony	40-60	45	11
524M	Brownsto Family- UsticTorriorthents - complex, extremely stony	5-40	75	10
525S	Ring Family, dry	40-60	75	8
715M	Teaspoon-Trag families complex	5-25	75	8
other	Miscellaneous	***	***	10

The project area covers approximately 18,252 acres in portions of three, sixth-level watersheds. In general, the west half of the project is in the Sand Gulch watershed, primarily in the Reed Creek, Ute Log Gulch, and Wylie Gulch sub-watersheds. The east half of the project area is in the Turkey Creek and Williams Creek watersheds, primarily in the Reveille Canyon, Custer Creek, Williams Creek, Deer Lick Creek, Bear Creek and Pole Creek sub-watersheds. Approximately 64 percent of the project area lies in the Sand Gulch watershed, 21 percent in the Turkey Creek watershed, and 15 percent in the Williams Creek watershed. Table 3 illustrates the project and watershed boundaries, and the following table provides some general information on the same.

Table 3.

Black Mountain Area 6th Level Watersheds					
Watershed	**6th Level HUC (a)**	**Area (acres)**	**Acres on NFS lands (b)**	**NFS Acres In Project Boundary**	**% of Project Area by Watershed**
Williams Creek Headwaters	110200060201	24404	18446	3764	20.6
Sand Gulch	110200060202	18302	14813	11720	64.2
Turkey Creek	110200060205	45088	27571	2768	15.2
Total		**87794**	**60830**	**18252**	
(a) HUC = hydrologic unit code **(b) NFS = National Forest System**					

Historically, the watersheds in the project area have been used for multiple purposes, primarily for timber harvesting and grazing. At times, these watersheds reached thresholds where overuse resulted in excessive erosion. Gully plugs and ponderosa pine plantations (1960s) were employed to reduce erosion and sedimentation. Erosion processes in the project area currently are attributed to sedimentation from roads and past land use activities. While little monitoring data exist, local knowledge of the area along with pictures indicates the conditions of these watersheds, including the uplands have improved. Upland forested slopes are now mostly stable and soils exhibit nutrient cycling.

The three 6th level watersheds in the project area are tributary to the Huerfano River. Each portion of these watersheds is comprised of several smaller subwatersheds. In Sand Gulch and the lower part of Williams Creek (below the Williams Creek Road), these subwatersheds tend to be more ephemeral and intermittent in nature. In the balance of the project area, these subwatersheds tend to be more intermittent and perennial. In general, the western half of the project area is drier than the eastern half. The range of elevation of the contributing watersheds in the western half is considerably lower than those in the eastern half of the project area. In addition, large portions (see map) of the Williams Creek and Turkey Creek drainages are outside and upslope of the project area and extend up to 11,200 feet in elevation. No stream discharge records exist for any of the streams in the project area.

Riparian corridors exist in the project area in the ephemeral, intermittent, and perennial drainages. Vegetative types currently present in these drainages are in part a function of the drainage's condition, available moisture, soil type, level of land usage and type of activity.

The following subwatersheds were identified during the Inland West Water Initiative (IWWI) as having degraded stream segments:

- Sand Gulch 6th level subwatersheds: Cottonwood Creek, Reed Creek, Wylie Gulch, and Ute Log Gulch. Stream segments in these subwatersheds were identified as having bank damage and excessive sediment.
- Williams Creek 6th level subwatersheds: Williams Creek (mainstem) was identified as having excessive sediment, and Deer Lick Creek was identified as having bank damage and excessive sediment.

The Colorado Department of Public Health and Environment's 2002 303(d) List and Monitoring and Evaluation List were checked for the project area. No streams in the project area were reported on either list.

As mentioned previously, grazing by domestic and non-domestic, animals and timber harvesting have affected the project area; in particular, the Sand Creek and Williams Gulch watersheds, as indicated by IWWI data. In addition, the road and trail network has impacted watershed conditions. The following table summarizes the length and area (in miles and acres) of the USDA Forest Service system roads in the project area. In addition, the road density in the project area has been calculated. Approximately, 60 miles of roads cover the project area at an average road density of 4 acres per square mile. The following table summarizes these data.

Table 4.

Black Mountain System Roads (Miles of Roads)			
Road Type	**Williams Creek**	**Sand Gulch**	**Turkey Creek**
4-WD (CL5) & Unimproved (CL4)	6.8	24.4	0.2
Light, Dirt (CL 3c)	0.0	8.0	5.2
Light, Gravel (CL 3b)	4.3	8.2	1.4
Total	**11.1**	**40.6**	**6.8**
Black Mountain System Roads (Acres of Roads)			
Road Type	**Williams Creek**	**Sand Gulch**	**Turkey Creek**
4-WD(CL5) & Unimproved (CL4)	8.2	29.6	0.2
Light, Dirt (CL 3c)	0.0	19.4	12.6
Light, Gravel (CL 3b)	14.6	27.8	4.8
Total	**22.8**	**76.8**	**17.6**
Road Density (acres/mi2)			
	Williams Creek	**Sand Gulch**	**Turkey Creek**
Watershed Area (mi2)	**5.9**	**18.3**	**4.3**
All Road Types	**3.88**	**4.19**	**4.07**

From a hydrologic point of view, the watershed in the project area will be subject to the naturally occurring physical, biological, and chemical processes. Some of these processes include: precipitation, interception, evapotranspiration, infiltration, groundwater recharge and movement, runoff, hillslope processes, delivery of sediment and water to the stream network, in-channel processes, and their general effects on changes in water quality.

Water Erosion Prediction Project (WEPP) modeling was conducted to predict sediment yield from the system road surfaces and buffers. The following table summarizes the erosion loss (tons/year) from the surface area of the roads and subsequently from the system buffers. These numbers describe a range of erosion rates for the modeled conditions. Buffer lengths of 200 to 500 feet were used to capture different situations in each road type.

Table 5.

Erosion from Road Prisms on Black Mountain System Roads (Tons/year)				
Road Type	**Williams Creek**	**Sand Gulch**	**Turkey Creek**	**All**
4-WD(CL5) & Unimproved (CL4)	136.8	491.0	4.0	631.8
Light, Dirt (CL 3c)	0.0	83.4	54.2	137.6
Light, Gravel (CL 3b)	51.1	97.4	16.6	165.1
Total	**187.9**	**671.8**	**74.9**	**934.5**
Erosion Leaving Buffers from Black Mountain System Roads (Tons/year)				
Road Type	**Williams Creek**	**Sand Gulch**	**Turkey Creek**	**All**
4-WD(CL5) & Unimproved (CL4)	9.9	35.5	0.3	45.7
Light, Dirt (CL 3c)	0.0	17.5	11.3	28.8
Light, Gravel (CL 3b)	2.9	5.6	1.0	9.4
Total	**12.8**	**58.5**	**12.6**	**83.9**
Erosion Rate Summary (tons/mi2/year)				
	Williams Creek	**Sand Gulch**	**Turkey Creek**	**All**
Watershed Area (mi2)	**5.9**	**18.3**	**4.3**	**28.5**
From road prisms	**31.9**	**36.7**	**17.3**	**85.9**
Leaving buffers	**2.18**	**3.20**	**2.91**	**8.29**

Based on these results, Sand Gulch has the highest predicted rate of erosion. This is to be expected, as this watershed has the most miles of road in each class type. Numerous studies have indicated that unimproved roads are the primary source of sediment in forested areas (Reid, 1993).

b. Environmental Consequences

(1) No Action Alternative

Direct and Indirect Effects

Watershed conditions and trends will continue as described in the Affected Environment section above, including sediment being contributed to streams via roads, trails, and dispersed camping. Soil functions on forested uplands are expected to remain stable if no treatments occur in the Black Mountain project area. Many of the sites impacted by past grazing are trending back towards revegetated, stable conditions. Soil productivity and nutrient cycling will continue as is; however, favored high-use areas in grazing allotments may continue to see a downward trend in site capabilities overall. This occurs mainly in the valley bottoms in and around riparian areas.

Cumulative Effects

Effects of past grazing and sedimentation from roads will continue to be experienced in the project area. The magnitude of these effects will depend on future grazing rotation plans and the implementation of scheduled road maintenance. Again, the watershed in the project area are subject to naturally occurring processes that will perpetuate natural, or background levels of sediment and other possible natural sources of contaminants, debris, and so on.

(2) Proposed Action

Direct and Indirect Effects

The vegetation being stimulated by mechanical treatments and low intensity fire will add effective ground cover, either via an increase in herbaceous species or by the addition if slash or chips. This will aid in lessening erosion rates and trapping sediment. Limited grazing the year leading up to prescribed burning and a year after will give the grassland sites a chance to revegetate. Increased plant growth will help reduce erosion and sedimentation from these sites. Evapotranspiration would be reduced proportionately to the amount of vegetation removed, but is a temporary effect in burn units where herbaceous species will respond.

On forested sites where Hydro-Axing is proposed, ground disturbance form tracked equipment is expected to be negligible, and any increase in erosion to be minimal and short-lived. Ground and canopy cover will be reduced in these areas initially; however, chip and slash residue from this treatment and the use of Best Management Practices should mitigate any small erosion increase. No measurable increase in bulk density will result from tracked equipment in these rocky, forested soils, particularly during the dry season. Tracked equipment, when making one to two passes over any given spot on the ground, will not compact soils appreciably because the pressure exerted on the ground is distributed evenly over the tracks, as opposed to the concentrated pressure under livestock's hooves, for example. Compaction in the project area is a factor mainly in and around riparian areas.

Any areas receiving a light burn will get a "jump start" on nutrient cycling. This is true of both forest and grassland ecotypes. Those forested treatment areas that are not burned will still see an

upward trend in nutrient cycling and soil productivity with the increase in understory species, though this will take 3-5 years to be realized. This includes areas where other mechanical treatments will leave behind slash.

The proposed action also allows for watershed improvements in the project area, for example, armoring stream crossings and planting willows on unstable stream banks. Any watershed improvement will likely increase in-stream sedimentation for the short-term, but all Best Management Practices will be employed to ensure that this is minimal. Once in place, improvement structures or other methods will stabilize and cease to erode above natural levels.

Road closures implemented for habitat protection reasons will reduce erosion contributed to streams by the road system, however minimal this benefit may be.

Cumulative Effects

Prescribed burning and mechanical treatments in this project area will not add to past negative effects to soils via logging operations, grazing practices, and recreational usage (past, present, and future). Reducing fuel loads translates into a quicker return of organic matter and a reduction in species that may be shading out understory growth. These two factors contribute to ground cover proliferation, which can aid in increasing surface soil stability at a site while acting as a sediment trap. Historic compaction from logging (on forested soils) is unknown due to a lack of baseline data from before these harvests as early as the late 1800's. This existing compaction will not be reduced under the proposed action.

In the short term (1 to 2 years), erosion from the project area could be additive to the existing impacts in the watershed. Over the long-term, the planned activities will reduce erosion and increase watershed health. Watershed improvements will contribute to watershed stabilization where past uses have lead to unstable conditions in watersheds such as Wiley Gulch.

2. Recreation

a. Affected Environment

The primary recreation activity on public lands in the Devils Hole / Black Mountain area is hunting for deer and elk during the fall. Dispersed camping, backcountry driving, and ATV riding are the other recreational activities here. In years when there is a good pinyon cone crop, this is a time-honored area for many families to gather pinyon nuts as a part of a continuing family and cultural tradition.

The main Ophir – Gardener road (FS Road 634) is kept plowed throughout the winter to provide access to private residences in and surrounding the National Forest. During the winter, snowdrifts intermittently close many of the side roads. Winter recreation use is very low, consisting of an occasional lion hunter, cross-country skier, or snowmobiler.

Total recreation use in the Devils Hole / Black Mountain project area is estimated to be less than 3000 recreation visitor days per year. However, overall recreation use is beginning an upward trend due to the many new vacation homes being built adjacent to the public lands in the project area.

Many of these new residents use the adjoining public lands for wildlife viewing, evening strolls, and ATV riding. Some of the closed and revegetated logging roads in the project area are being reopened (illegally) to provide access and ATV riding opportunities for adjoining private residences.

b. Environmental Consequences

(1) No Action Alternative

Direct and Indirect Effects

The No Action alternative would not change the character and quantity of existing or future recreational uses in the Devils Hole / Black Mountain area.

(2) Proposed Action Alternative

Direct and Indirect Effects

The Proposed Action may increase opportunities for turkey and big game hunting as prescribed burning and forest thinning will likely increase the quantity and quality of foraging habitats for these species. During the spring months, some turkey hunters may choose to relocate to different hunting areas to avoid the smoke, fire equipment, and fire operations associated with prescribed burning.

The Proposed Action will have little effect on traditional pinyon nut gathering, as long as mature pinyon trees are adequately protected from crown torching during prescribed firing activities. Pruning and clearing brush from under mature pinyons, before prescribed burning, will help protect the trees from torching. Thinning, pruning, and prescribed burning around mature pinyon trees may stimulate larger cone crops and help protect the trees from loss due to wildfire or insects.

Seasonal road closures will restrict motorized access in parts of the project area during the winter season. Many of these areas are currently only lightly used due to snow patterns (large snowbanks in spots followed by areas of no snow – which limits both wheeled vehicles and snowmobiles). Therefore, the road closures are not anticipated to greatly reduce these motorized uses.

Cumulative Effects

Agency projects and public activities that would occur simultaneously with the proposed prescribed burning and timber thinning alternatives are road maintenance and relatively low intensity recreational use. There are no changes planned for recreation facilities or recreation activities in the project area.

These recreation activities would not create a major effect to the environment when combined with either the No Action or the prescribed burning and timber thinning activities in the Proposed Action.

3. Air Quality

a. Affected Environment

Wildland fires (both prescribed fire and wildfire) are a potentially significant source of air pollutant emissions because of the combustion process which burns various ages, sizes, and types of vegetation. The amount of emissions depends on the size and intensity of the fire (determined by meteorological conditions such as temperatures and wind speed and direction); the fuel type and moisture content (including age class, size, and mixture of vegetation types); and the available fuel loading (the total mass of combustible material, typically reported in tons of fuel per acre.

Dry fuels (e.g., dead/down or dry vegetation) are consumed first in the beginning stages of burning. As fire progresses, green/live vegetation is dried through heat convection and then consumed as well. Under extreme conditions, this process may result in a large, uncontrollable crown fire.

The most effective means of controlling air pollutant emissions from wildfire is to reduce the risk of large, catastrophic fires through vegetation treatments that break up heavy, continuous fuels. There are many fuel treatment methods available to land managers to improve vegetation and reduce hazardous fuel loadings. Depending on conditions, managed ignitions (i.e., prescribed fires) can be effective methods to reduce heavy fuels and to create vegetation mosaics.

However, any fire, either a managed natural ignition or a prescribed fire, must be continually monitored to assure the burning conditions remain in the previously determined prescriptions for desired fire behavior and smoke management. When properly executed, a managed fire would be expected to result in fewer air quality impacts in both the short term and the long term.

Prescribed fires are normally much smaller than uncontrolled wildfires and involve less combustion, since they can only be used when the fuel type and fuel loading meet preset management prescriptions for conducting the burns, and under weather conditions that enhance efficient fuel consumption and smoke dispersal.

Although there is no known historical air quality data for natural ecosystems in Colorado, fire has historically played a major part in the vegetation dynamic of the Wet Mountains evidenced by the burn mosaics of the forested lands. The amount of smoke generated from forest fires has generally decreased since the mid to late 1800's in the analysis area. Before European settlement, there were probably several fires annually in the Wet Mountains and Sangre de Cristo mountains to the west. Those fires generated smoke from a few hours up to 60-90 days. Since then, smoke has been reduced considerably because of effective fire suppression.

Seasonal Effects On Air Quality

The project area is located northwest of Gardner and the local air quality is affected by wood smoke and dust generated from increased vehicle traffic on the many gravel roads in this rural area.

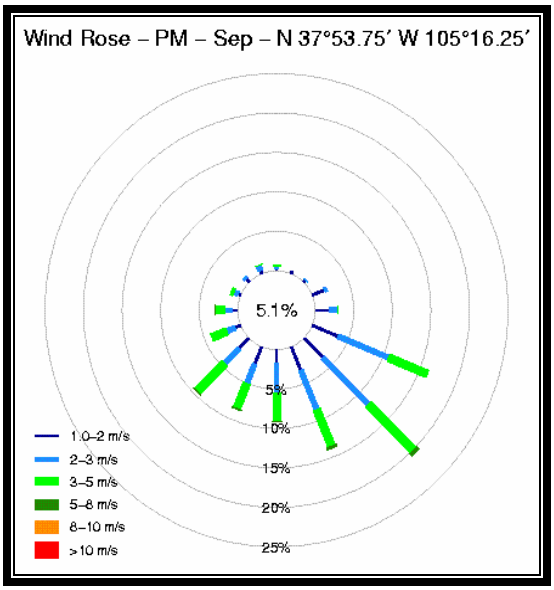
Air quality in the Sand Gulch and Williams Creek Watershed is considered good-to-excellent most of the year. Smoke from wildland and management ignited fires and dust from native-surfaced roads are the principle factors affecting air quality.

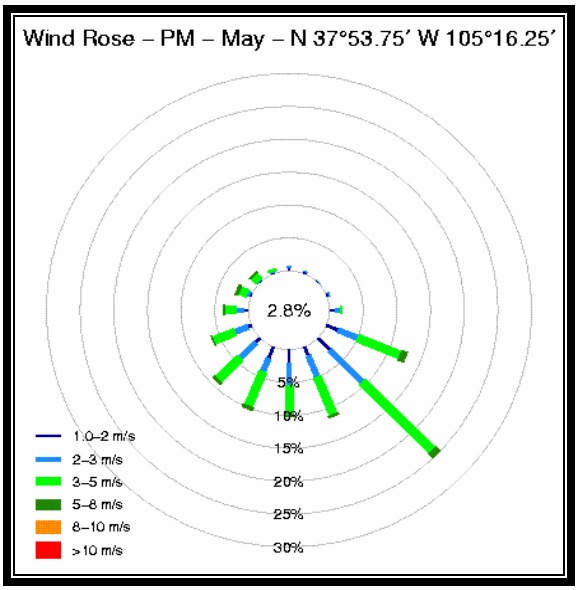
To mitigate for air quality concerns, wildland fires have been suppressed by the fastest, safest, most cost-effective means. Prescribed fires are scheduled when atmospheric conditions allow. This may be due to relatively low emissions from stationary and mobile sources. The entire area is considered as attainment for all six criteria pollutants.

Cold winters and moderate summers, light precipitation, and much sunshine mark the climate of the Wet Mountain Valley. At Gardner, about 80 percent of the annual precipitation occurs from April to October, most of it in scattered snow showers and thunderstorms that develop over the mountains and move into the valley during afternoon. Annual precipitation averages 14.41 inches at Westcliffe, and 11.53 inches at Gardner.

Based on data from the Western Region Climate Center, for the period 1961-2000, the average first occurrence of 32 degrees Fahrenheit in the fall is September 26, and the average last occurrence is in the spring is May 16. June and July are the wettest months and generally the period November through February is the driest.

Topography and weather patterns determine the extent to which airborne particulate matter accumulates in the local air shed. Diurnal temperature changes affect how pollutants in the region are dispersed. The cooling of the earth's surface at night creates down slope winds, carrying pollutants from higher terrain to low-lying areas where they may concentrate or exit the region along river valleys to the southeast. The heating of the earth's surface during the day causes pollutants to rise with the heated air where they are diluted and can be carried away with the air passing over the Rocky Mountains.

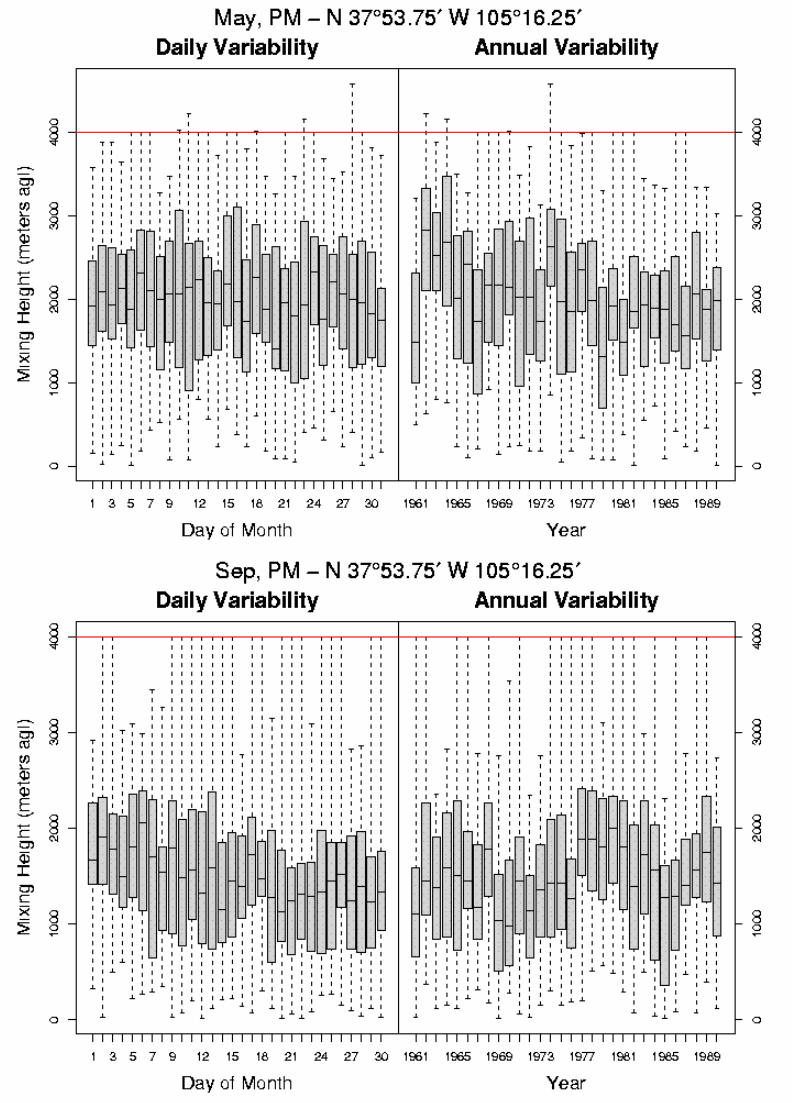




An excellent source for wind, mixing heights and dispersion characteristics modeled on historic weather information is from a website called Ventilation Climate Information System (USFS 2002).

By selecting a location in the center of the planning area the following historic wind speeds and direction provide information for a prescribed burn in the fall (September) and in the spring (May).

The left wind rose shows that winds predominately blow from the southeast at 6 to 11 miles per hour or less, however winds can occasionally blow from the southwest and this pattern is similar in both wind roses.



The upper box plot represents the daily and annual variability in mixing heights for May on top and September on the bottom. Mixing heights generally are above 200 meters or 66oo feet above ground level. The lower box plot representing September shows that mixing heights this time of year are somewhat lower than in the spring as one might expect.

During winter months, weather conditions can trap emissions in a layer of cold surface air. This happens when snow covers the ground and keeps the earth's surface from heating or when easterly winds trap cold air in the Wet Mountain valley. Under these winter conditions, pollutants will concentrate in the local air shed and along the foothills surrounding the project area.

Particulate Matter And Public Health

Air pollutants called particulate matter include dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as sulfur dioxide (SO_2) and VOCs are particulate matter.

Based on studies of human populations exposed to high concentrations of particles (sometimes in the presence of SO_2) and laboratory studies of animals and humans, there are major effects of concern for human health.

These include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogenesis, and premature death. The major subgroups of the population appearing to be most sensitive to particulate matter include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter also soils and damages materials, and is a major cause of visibility impairment in the United States.

Annual and 24-hour National Ambient Air Quality Standards (NAAQS) for particulate matter were first set in 1971. Total suspended particulate (TSP) was the first indicator used to represent suspended particles in the ambient air. Since July 1, 1987, however, EPA has used the indicator PM_{10}, which includes only those particles with aerodynamic diameter smaller than 10 micrometers. These smaller particles are likely responsible for most of the adverse health effects of particulate matter because of their ability to reach the thoracic or lower regions of the respiratory tract.

Particulate matter is defined as tiny particles of solid or semi-solid material suspended in the air. Particles may range in size from less than 0.1 microns to 50 microns. Particles larger than 50 microns tend to settle out of the air quickly are not likely to affect public health. Particles 10 microns and smaller are considered inhalable and have the greatest health effects. Coarse particles, from 2.5 microns to 10 microns in diameter, come from many sources.

Although we currently have a national standard for PM 2.5, Colorado currently has no non-attainment areas identified. As required by the Clean Air Act, in the next 2-3 years, EPA will complete the next periodic review of the PM air quality standards, including review by the Clean Air Scientific Committee. EPA will have completed its statutory determination before any designations of non-attainment are made for the PM 2.5 standards and before imposition of any control strategies directed at PM 2.5.

In many cases windblown dust and dust kicked up on unpaved roads by vehicle traffic account for much of this fine particulate matter. These fine particles are major contributors to visibility problems because of their ability to scatter light.

Non-Attainment Designation

There are currently no non-attainment areas in Huerfano County. The closest Class II area is the Greenhorn Wilderness to the east of the Black Mountain analysis Area.

There is currently no commercial source producing more than 100 tons per year of PM_{10} in Huerfano County. The greatest contributor to annual PM_{10} production is fugitive dust from unpaved roads (US EPA, 2001).

Visibility

Visibility is unique among air pollution effects in that it involves human perception and judgment. It has been described as the maximum distance that an object can be perceived against the background sky.

The fabricated sources of these particulates include wood burning, electric power generation, industrial combustion of coal or oil, and emissions from cars, trucks, and buses. Visibility conditions vary considerably across the state. Usually, visibility in Colorado is very good because of low humidity and minimal levels of visibility-degrading pollution. Nevertheless, visibility problems occur periodically through the state.

Wood burning haze is a concern in several mountain communities each winter. Denver and other major population centers in Colorado are concerned about the potential for worsening visibility. Monitoring performed in and near national parks, monuments, and wilderness areas shows pollution-related visibility impairment occurring in these areas in Colorado. The type of impairment most often affecting Colorado's important scenic mountain views is known as regional haze. It is characterized by having many sources and interstate or even regional scale transport between source areas and areas of impact.

The visibility problems across the state have raised public concern and spurred research. The goal of Colorado's visibility program is to protect visual air quality where it is presently good and improve visibility where it is degraded.

Fuel Loadings and Characteristics

Fuel materials typically include downed trees, fallen branches, decayed matter on the forest floor (duff), and small trees and shrubs. Tree crowns (i.e., branch wood and foliage) can also be burned in wildfires and prescribed fires. The fuel consumption in a fire will depend not only on the total pre-burn fuel loading, but also on the relative amounts of the different fuel types, and on the fuel condition. In prescribed fire, fuel loading and characteristics will be strongly affected by the type of burn (e.g., pile fire, windrows, understory burning, and concentration burning) and by fuel reduction treatments before burning. Therefore, inventories should differentiate among different types of burn.

b. Environmental Consequences

(1) No Action Alternative

Direct and Indirect Effects

Decades of suppressing fire have led to increased fuel loading and more frequent and devastating larger fires are occurring. If all ignitions could be suppressed when small, then the issue of smoke emissions from wildfire would be minimal. This is not always possible with the current fuel loadings.

This alternative will not add new emissions to the air shed in the short term. However, long term increased fuel loads will allow new wildfire ignitions to have potential to become large fires and would produce more emissions. Recent fire seasons in 2000 and 2002 have shown how uncontrolled wildfire emissions can be high, of long duration, and detrimental to public health. 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.

Cumulative Effects

Since no prescribed burning is proposed in this alternative, there would not be a cumulative increase in the demand for air shed when combined with other projects. This alternative would have no effect on the scheduling of other prescribed burns in the adjacent National Forest or BLM areas.

(2) Proposed Action

Direct and Indirect Effects

The Proposed Action would help to restore fire-adapted ecosystems, reduce the likelihood of uncharacteristic high intensity fire potential, and manage for a healthy forest concerning insect and disease populations.

The prescribed burning proposed by each of the Action Alternatives would have a direct, short-term effect on air quality in the Sand Gulch and Williams Creek Watersheds. SASEM Modeling 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. The estimates for emissions are based on the acres treated in each alternative and the assumption all areas proposed for burning would be treated, and ground fuels are continuous across the area burned. 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.

By conducting burning over time and burning only under fair to excellent dispersion days, this alternative would meet the guidelines and standards for PM_{10} in Colorado. 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.

Fire management activities on public lands must also meet the State standards for air and water quality. Activities must be conducted in accordance with Colorado Regulation 9,the current State of Colorado Smoke Management Plan and Memorandum of Understanding (MOU) and have an approved open burning permit issued by the Colorado Department of Public Health and Environment, Air Pollution Control Division. Therefore, none of the alternatives would be expected to result in a violation of NAAQS.

An indirect effect of the Action Alternatives is a reduction in emissions should a wildfire occur in the area. Crown fires tend to release high levels of PM_{10} because of the amount of live fuel that typically burns at crown fire intensities. As discussed in previous chapters, these alternatives reduce the risk of crown fires by changing the stand structure. Prescribed fires implemented under the Action Alternatives would generally burn at lower intensity (less than 100 British thermal units (BTUs) /sq ft/sec, and less than 4 foot flame lengths), producing lower emissions than would be

produced under wildfire conditions. Using this treatment method reduces the potential for future, higher emission wildfires. 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.

Prescribed burning would produce 83 tons per year of PM_{10} emissions. 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.

The prescribed burning proposed in the Action Alternatives would increase the number of smoky days in the local area, affecting local communities such as Gardner, Redwing, and adjacent subdivisions such as Centennial Ranches directly west of the analysis area.

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 Huerfano 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 when weather conditions are predicted to be fair to excellent for smoke dispersal. 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 piles composed of small tree thinning slash. Depending on weather conditions at the time of pile burning, smoke sensitive areas could be affected in locations downwind of the project areas. Smoke sensitive areas would be identified in the Prescribed Fire Burn Plan and associated permits.

Cumulative Effects

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. This is also true for future emissions released after emissions from the proposed actions have dispersed. The greatest cumulative effects would be from activities that might be releasing emissions at the same time as the proposed actions or from sources continually emitting PM_{10} into the local air shed. Activities that could have a cumulative effect on air quality include other prescribed burns scheduled for the same time.

Air resources are somewhat unique in that past impacts to air quality are not usually evident. The emissions produced through this action would be cumulative only with the local emission sources described in the affected environment occurring at the time of burning.

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. The

additional emissions from the proposed actions, even in the short term should not violate NAAQS (National Ambient Air Quality Standards) or the State of Colorado's air quality standards and cause minimal degradation to visibility and Regional haze.

C. Biological Resources

1. Wildlife – General and Management Indicator Species

a. Affected Environment

Wildlife habitat in the Black Mountain project area is in diversity units 308 and 309 and is in management areas 5B (winter range) and 6B (grazing). The project area lies in the montane forest zone at the upper elevations to the lower montane forest at mid elevations to the short-grass steppe at the lower elevations. The dominant vegetation is a mixture of grasses, mountain mahogany, pinyon-juniper, and ponderosa pine in a warm-hot arid landscape. Streams in the project area are either intermittent or ephemeral, limiting the aquatic species that the area can support. Elevations range from 7,300 to 9,400 feet.

Old Growth and Snags

This project will not be treating any late successional or old growth stands and will therefore not have any direct effects on old growth habitat. However, some of the prescribed treatments such as thinning and underburning are meant to promote future development of old growth forests in the project area that should increase the potential for old growth recruitment in the future for stands thinned and/or burned.

Habitat Fragmentation

The project area lies in the montane forest zone at the upper elevations to the lower montane forest at mid elevations to the short-grass steppe at the lower elevations. The mosaic created by large open grasslands and pinyon-juniper stands with ponderosa pine plantations and ponderosa pine-Douglas fir forest makes this area naturally fragmented from a vegetation standpoint. The major impact on habitat fragmentation occurs from roads and the associated motorized recreation activities.

Management Indicator Species

Management indicator species for the area are those associated with pinyon-juniper and ponderosa pine communities. Species considered for this analysis: elk, Abert's squirrel, and Virginia's warbler.

The Forest Plan habitat capability standard of 40 percent applies to the planning area, which is the entire Forest. Individual management area prescriptions also have different habitat capability levels as identified above. Because each Diversity Unit is made up of more than one management area prescription as shown below, it is clear that in combined Diversity Units 308 and 309 the Forest Plan standard for Habitat Capability should be higher than 40 percent overall. Table 6 shows the amount of acres in Management Area (MA) 5B and MA 6B for Diversity Units 308 and 309.

Table 6. Number of acres by Management Area Prescription (MA) for each Diversity Unit (DU) in the Black Mountain Project Area (includes National Forest lands only).

Management Area	DU 308	DU 309	FP Habitat Capability Standard
5B	540	4,155	80% of potential; 90% effectiveness for winter range
6B	167	3,614	60% of potential

The Habitat Capability Model Version 4.00 (HABCAP) was used to evaluate habitat capability for MIS. Habitat capability was determined for the existing condition (pre-thinning, hydro-axing, and burning) and for post thinning, hydro-axing, and burning alternative. The HABCAP model was developed to be used at the Diversity Unit level. A total of 36,650 acres were modeled for both Diversity Units. Miles of open road were also evaluated with the model to determine elk habitat effectiveness. Table 7 shows the difference between the existing situation (No action alternative) and the proposed action for habitat capability in the Diversity Units 308 and 309.

Table 7. Habitat Capability for Diversity Units 308 and 309.

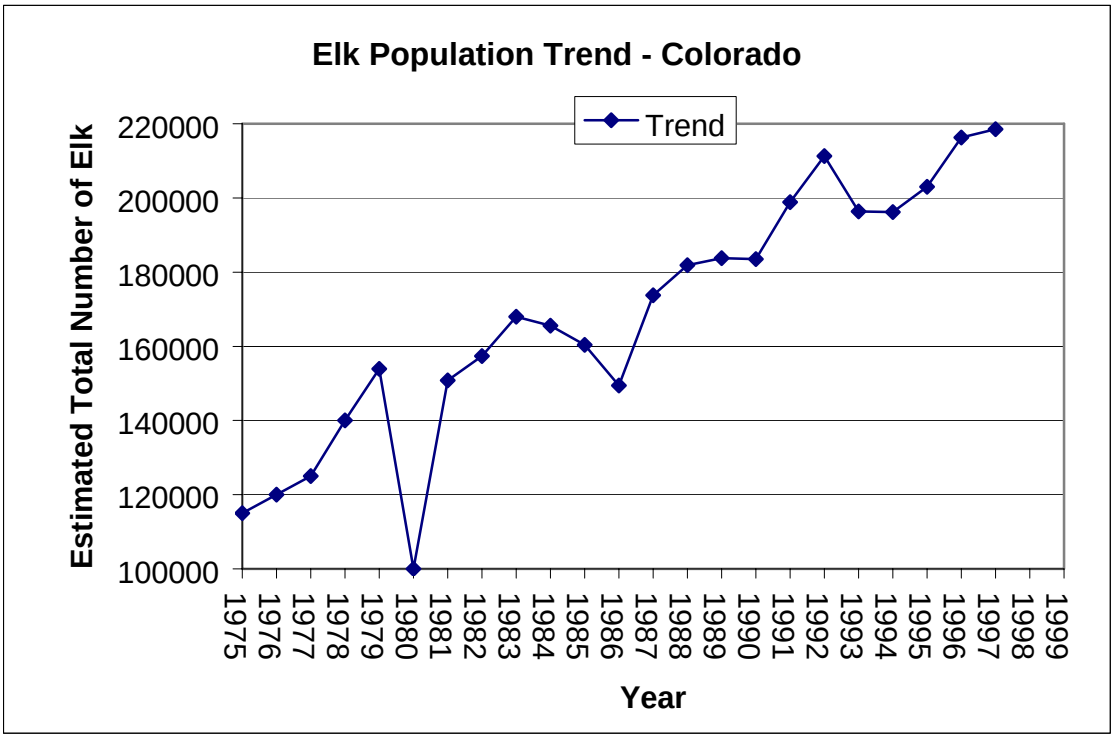
SPECIES	SEASON	HABITAT CAPABILITY INDEX	
		EXISTING	PROPOSED ACTION
Diversity Unit 308			
Elk	Summer	0.38	0.38
Elk	Winter	0.30	0.30
Abert's squirrel	Summer	0.01	0.01
Abert's squirrel	Winter	0.01	0.01
Virginia's warbler	Summer	0.17	0.17
Diversity Unit 309			
Elk	Summer	0.35	0.35
Elk	Winter	0.32	0.34
Abert's squirrel	Summer	0.08	0.08
Abert's squirrel	Winter	0.09	0.09
Virginia's warbler	Summer	0.26	0.26

Elk

There are no designated calving areas in the project boundaries.

Population Trends: Global and Colorado Elk populations are known to be increasing (COVERS 2001). Elk are widespread throughout northern United States and southern Canada. They are intensively managed and there are good data on population size and trends (Fitzgerald et al. 1994; Zeveloff 1988; and Peek 1982). Elk are expanding their range due to reintroductions, management, and habitat conversion (COVERS 2001). Figure 1 shows the elk population increasing in Colorado (population data from CDOW 1997). Even more recently, in 2001, the post-harvest population estimate was 305,000. No elk population studies have been conducted on the Pike and San Isabel National Forests to measure the direct effects of forest management activities on elk population numbers.

Figure 1. Elk population trends for Colorado in 1975-1999.



The Black Mountain project area provides both summer and winter range habitat for elk and the existing situation is described further in the environmental consequences section.

Abert's Squirrel

Population trends: The state population trend is suspected to be stable or increasing (COVERS 2001). Populations are sufficiently abundant to withstand some hunting in Colorado, Arizona, and New Mexico (USDA Forest Service 2001). The NDIS database states that the species is "fairly common" in all seven counties in the Forest where habitat is suitable and sufficient information is known (NDIS 2000). Extensions of the known range have occurred in recent years in southwest and western Colorado. Population dynamics are poorly known. Population estimates range from 12 to 30 animals per km2 in the Black Forest of El Paso, Colorado, and from 82 to 114 km^2, near Boulder, Colorado. Spring populations are lowest (Fitzgerald et al 1994 and Farentinos 1972). Populations fluctuate widely over time and space, possibly in response due to cyclic variations in biomass of pinecone crops (COVERS 2001 and Nash and Seaman 1977).

Virginia's Warbler

Population Trend: Breeding Bird Survey (BBS) trend data indicate a slight decrease in Colorado, but no indication of decline throughout their range. Due to its small breeding range, Colorado has a moderate responsibility in protecting this species. In the Southern Rocky Mountain province in Colorado, BBS returns are too sparse for meaningful analysis. This species was present on an average of 23 BBS routes from 1988-1997 at an average abundance of 1.2 individuals per route

(Colorado Bird Observatory website). This species is monitored by Colorado Bird Observatory's "Monitoring Colorado's Birds" program using point transects.

b. Environmental Consequences

(1) No Action Alternative

Direct and Indirect Effects

Elk

The existing situation for elk does not meet Forest Plan direction for either of the diversity units. The impacts on elk habitat capability are from a combination of factors such as the miles of existing open roads and the lack of cover and forage in the area. When the HABCAP model is run only looking at vegetation (road miles entered as 0), the habitat capability index rises from 0.38 and 0.30 to 0.70 and 0.56 for summer and winter, respectively, for diversity unit 308 while it rises from 0.35 and 0.32 to 0.73 and 0.65 for summer and winter, respectively, for diversity unit 309. Therefore, the existing situation does not appear to be meeting habitat capability for elk due to a combination of open road densities and the lack of thermal cover and forage provided by the existing vegetation types and structures. Also, it should be noted that the area historically probably never had the cover component necessary to meet cover requirements for elk, as defined by the model, and that elk numbers (100-150 winter/600-700 summer residents) in the project area are at the carrying capacity (D. Crawford, pers. comm.). It should be noted that the elk population is doing fine in the area in spite of the high open road densities and lack of winter (thermal) cover.

Abert's Squirrel

Abert's squirrels require uneven aged stands of ponderosa pine with large diameter trees (11-36 in. diameter at breast height), densely stocked stands (200 stems per acre), canopy closure greater than 80 percent with interlocking branches, and tree crowns 30 to 50 feet above the forest floor. Trees meeting these requirements also need to be in contiguous stands of 1 to 2 acres (Hoover and Wills 1984). Even though the project area contains significant amounts of the ponderosa pine vegetation type, there is very little that meets the above habitat requirements for Abert's squirrel. Consequently, the reason for the poor habitat capability index in both diversity units (ranging from 0.01 to 0.09) is due to a lack of adequate habitat structure in the ponderosa pine stands present and the vegetative diversity of the area.

Virginia's Warbler

Virginia's warblers utilize pinyon-juniper and Gamble oak ecosystems in the summer and cottonwood riparian ecosystems in the spring and fall (Hoover and Wills 1987). The low habitat capability index for Virginia's warbler (0.17 and 0.26 in diversity unit 308 and 309, respectively) is probably due to the vegetative diversity of the area. Only a portion of the area is pinyon-juniper, Gambel oak, or cottonwood riparian. Some of the other dominant vegetation types such as mountain grassland, ponderosa pine, spruce-fir, and aspen have very little value for Virginia's warbler. When HABCAP is run using total acres of Gamble oak and pinyon-juniper, the habitat capability rating increases to 0.91 and 0.85 for diversity units 308 and 309, respectively.

(2) Proposed Action Alternative

Direct and Indirect Effects

Elk

The proposed treatments will not change the habitat capability for Diversity Unit 308. The habitat capability of Diversity Unit 309 remains constant for summer habitat post-project implementation and rises 0.02 up to 0.34 for winter habitat. This is primarily because the amount of vegetation treatment and seasonal road closures (37/40 miles occur in Diversity Unit 309) are not of the magnitude and habitat structural types where they can significantly affect elk foraging or cover habitat at the diversity unit level. As stated above, it is a combination of open road densities, lack of cover and forage in the area that reduce the habitat capability and habitat effectiveness for elk. Thinning and burning should improve the foraging opportunities for elk in the near future. Cover values will improve slightly in the long-term as the forested areas mature and increase in canopy closure, providing better thermal and hiding cover as they develop into more mature forests. The habitat capability index of the area will most likely never meet forest plan standards under natural conditions due to the vegetative diversity of the area.

Abert's Squirrel

Proposed thinning and burning of the ponderosa pine plantation will improve Abert's squirrel habitat in the long-term by reducing the competition for light, moisture, and nutrients to the ponderosa pine trees in the plantations, and thereby improving their health and vigor and likelihood of maturing into larger trees that will be able to develop interlocking branches in the future and provide the habitat characteristics that are desired by Abert's squirrels.

Virginia's Warbler

Thinning and pruning of a portion of the pinyon-juniper stands that are greater than 30 percent crown closure will make some small increases in the habitat capability for Virginia's warbler since the pinyon-juniper habitat with less than 30 percent crown closure provides a higher habitat effectiveness for them.

Habitat Fragmentation

The Black Mountain project does not include clearcuts. The treatment prescriptions include thinning the smaller diameter trees in the ponderosa pine plantations and in part of the pinyon-juniper forests as well as underburning in the ponderosa pine savannah and grasslands. Thinning in forested areas will reduce the canopy cover of the stand but will not remove all cover in any stands. The proposed action should not increase fragmentation in the area. Seasonal winter road closures should reduce the fragmentation in those areas adjacent to the seasonally closed roads.

Cumulative Effects Common to All Alternatives

The Black Mountain project does not include clearcuts. The treatment prescriptions include thinning the smaller diameter trees in the ponderosa pine plantations and in part of the pinyon-juniper forests as well as underburning in the ponderosa pine savannah and grasslands. Thinning in forested areas

will reduce the canopy cover of the stand but will not remove all cover in any stands. The proposed action should not increase fragmentation in the area. Seasonal winter road closures should reduce the fragmentation in those areas adjacent to the seasonally closed roads.

2. Threatened, Endangered, Proposed, Candidate, and Sensitive Species

a. Affected Environment

In addition to the general concepts discussed in the Wildlife section, this section considers the Threatened, Endangered, Sensitive (TES) Proposed, and Candidate species for both flora and fauna.

Review of element occurrence records from Colorado Natural Heritage Program, species lists from the U. S. Fish and Wildlife Service (FWS) and research of other species records were used to determine the species that could potentially occur in the project area. Threatened, endangered, proposed, and sensitive species that could occur in the project area are listed below.

Canada lynx (threatened)

The Canada lynx was listed as a threatened species as a distinct population segment (DPS) in portions of the lower 48 states by the FWS on March 24, 2000 (FWS 2000). Lynx are medium-sized cats with long legs adapted for hunting in deep snow. Lynx inhabit dense coniferous forests in the subalpine zone and timberline where they use caves, rock crevices, overhanging banks or hollow logs for denning (Ryke et al. 1994). Kittens are typically born in May or June, and the mother has been found to move the den to an alternative site if danger threatens (Washington Dept. of Fish and Wildlife 1993, unpubl.) They are dependent on the snowshoe hare as their primary food source. In the boreal forest of northern latitudes, the snowshoe hare and lynx populations are cyclic. These cycles are not found in Colorado. The reason may be due to the disjunct, small lynx populations and the presence of other competitors (bobcat, wolverine, coyote), which also prey upon snowshoe hares (Ruggiero et al. 1994). Early successional forests with plenty of shrubs, saplings, and seedlings create suitable snowshoe habitat because they provide both cover and forage. This vegetation type also provides favorable hunting habitat for lynx. Conifer stands are an important component because they provide greater cover and warmer temperatures for the hare and stalking cover for the lynx (Fuller and Heisey 1986).

Lynx Analysis Units (LAU) have been developed for the Forest (Forest Service 2001). Potential lynx habitat has been modeled based on vegetation type, precipitation, winter precipitation, topography, and snowshoe hare habitat. Vegetation types representative of suitable habitat include dense spruce/fir and mixed conifer with spruce, Douglas-fir, early seral lodgepole pine, mature lodgepole pine with developing understory of spruce/fir and aspen (Ruediger et al. 2000). Dry forest types (ponderosa pine) were excluded and not mapped as lynx habitat. Potential habitat is defined as having the capability to provide necessary habitat components. Existing condition of suitable habitat may or may not meet the needs of a lynx for denning or winter foraging. Changes in condition of suitable habitat can occur from disturbances such as fire, wind events, harvesting, or the lack of disturbances.

The project area is in the Wet Mountains LAU (see attached Maps). Potential lynx habitat acres (i.e., potential denning, summer forage, and winter forage) listed below are for National Forest lands only in the Wet Mountains LAU. There is an additional 1,134 (0.36 percent of the LAU) and 34, 512 ac (10.95 percent of the LAU) of Bureau of Land Management (BLM) and private/State lands, respectively, classified as potential lynx habitat in the LAU. There is no data available on what category of lynx habitat this is. The State lands are not delineated out from private lands in the Forest lynx habitat database.

There are approximately 314,941 ac in this LAU, with 111,721 ac of potential lynx habitat on National Forest (NF) lands (35.4 percent of LAU). Potential lynx habitat in this LAU is broken down into the following: potential denning (74,411 ac; 66.6 percent of NF lynx habitat in the LAU); summer foraging (100,977 ac; 90.3 percent of NF lynx habitat in the LAU); and winter foraging habitat (81,329 ac; 72.7 percent of NF lynx habitat in the LAU). Many areas can function as more than one habitat type. The project area does not have suitable lynx habitat but it is in a lynx corridor that is meant to provide a secure means of movement between the Sangre de Cristo and Wet Mountains LAUs.

Rock-loving aletes (sensitive)

Rock-loving aletes is a perennial herb in the carrot family (Apiaceae). It flowers from May to early July, and fruits from late June to September. This plant is found in pinyon-juniper woodlands on north-facing ledges, cliffs and canyons associated with volcanic dikes composed of igneous outcrops or sedimentary rock. It is found at elevations ranging from 7,000 to 10,000 feet. Rock-loving aletes is endemic to south-central Colorado. Rock-loving aletes is ranked G3 by NatureServe (2003).

Narrow-leaved moonwort (federal candidate and sensitive)

Narrow-leaved moonwort is a perennial herb in the adder's-tongue fern family (Ophioglossaceae). Spores are produced in June. It is found in deep grass and forb meadows, under trees in woods, and on shelves on limestone cliffs. Locally, it occurs in coarse, decomposed granite. It has been found among the riparian transition vegetation associated with aspen. This species is found at elevations ranging from 7,900 to 11,000 feet. Narrow-leaved moonwort ranges from Washington and Montana south to California and Colorado, with known occurrences in areas of eastern North America. Narrow-leaved moonwort is ranked G1 by NatureServe (2003). It is a candidate for federal listing as an endangered or threatened species (67 FR 39035). It is rare range-wide with only nine known populations. This plant is small and easily over-looked, and may not be present every year.

Smith's whitlow-grass (sensitive)

Smith's whitlow-grass is a perennial herb in the mustard family (Brassicaceae). It flowers and fruits during June and July. This species is found in cliffs and canyons, talus slopes, crevices, and between rocks in shaded, protected sites in upper montane and lower subalpine areas. Elevations range from 8,000 to 11,000 feet. Smith's whitlow-grass is endemic to south-central Colorado. Smith's whitlow-grass is ranked G2 by NatureServe (2003).

Brandegee wild buckwheat (sensitive)

Brandegee wild buckwheat is a perennial herb in the knotweed family (Polygonaceae) flowering in July and August. Fruiting occurs in August and September. This species grows in association with open sagebrush or pinyon-juniper stands, on white to grayish limestone-shale soils. It is found at elevations ranging from 5,700 to 7,600 feet (Spackman et al. 1997). Brandegee wild buckwheat is endemic to Fremont and Chaffee counties in Colorado. There are single records on the Pikes Peak, Salida, and South Park or South Platte Ranger Districts (Colorado Natural Heritage Program 2003).

Sites for Brandegee wild buckwheat are in the Northern Parks and Ranges Section of the Temperate Steppe Regime Mountains (McNab and Avers 1994). This species is found in the Dry Union and Morrison formations. Brandegees wild buckwheat is ranked G1G2 by NatureServe (2003). It is tracked by the Colorado Natural Heritage Program and is ranked S1S2. It is endemic to CO.

Degener's beardtongue (sensitive)

Degener's beardtongue is a perennial herb in the figwort family (Scrophulariaceae), flowering in June and July, and fruiting in late July. It is found in pinyon-juniper woodlands, montane grasslands, and mountain meadows on rocky soils with igneous bedrock (Spackman et al. 1997). It is found at elevations ranging from 6,000 to 9,500 feet. Degener's beardtongue associates with Parry's oatgrass, prairie sagewort, mountain goldenbanner, and mountain muhly. Degener's beardtongue is endemic to central Colorado. Degener's beardtongue is ranked G2 by NatureServe (2003).

Front Range cinquefoil (sensitive)

Front Range cinquefoil is a perennial herb in the rose family (Rosaceae). It flowers from mid June through August. It is found on granitic outcrops or on thin, gravelly granitic soils, at elevations of 6,900 to 10,500 feet (Spackman et al. 1997). Front Range cinquefoil has been found in association with bristlecone pine, ponderosa pine, Douglas-fir, James' telesonix, early bluetop fleabane, cutleaf daisy, prairie sagewort, matted saxifrage, bracted alumroot, and two-lobe larkspur. Front Range cinquefoil is endemic to Colorado. Front Range cinquefoil is ranked as G5T2 by NatureServe (2003).

Dwarf raspberry (sensitive)

Dwarf raspberry is an herbaceous perennial plant in the rose family (Rosaceae). It flowers from late June to early July, fruiting late July to August; however, the species seldom sets fruit in Colorado. It is a wetland species found in willow carrs and on mossy streamsides (Spackman et al. 1997). It is found at elevations ranging from 8,600 to 9,700 feet. Wetland indicator status for this species has been rated as OBL in the mountains (USDA, NRCS 2002). Species that have been found in association with dwarf raspberry include shrubby cinquefoil, dwarf birch, diamondleaf willow, water sedge, and alpine meadow-rue. Dwarf raspberry is circumboreal, south in North America to Oregon, Colorado, Michigan, and Maine. Dwarf raspberry is ranked as G5T5 by NatureServe (2003). Populations in this area are at the southern extreme of the species range.

Northern leopard frog (sensitive)

Typical habitats for northern leopard frogs include wet meadows and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, streams, reservoirs, and irrigation ditches. Leopard frogs are usually found at the water's edge, but they have also been known to roam far from permanent water in wet meadows and mild wet weather. Winter periods are spent at the bottom of a water body such as a stream or pond. Elevational ranges extent from below 3,500 ft in northeastern Colorado to above 11,000 ft in southern Colorado. Northern leopard frogs were once abundant in Colorado. Some populations have disappeared in part because of habitat alterations. Breeding sites change in suitability in response to climatic variation and flooding; some sites may become unsuitable while others are created by the climatic events. Competition with non-native bullfrogs is likely another factor in the decline of leopard frogs (Hammerson 1999). There is poor leopard frog habitat in the Wylie Gulch drainage.

Tiger salamander (sensitive)

Tiger salamanders occur in most any habitat in their elevational range, which is up to 12,000 ft in southwestern Colorado, provided there is a suitable water body nearby for breeding. They inhabit ponds, lakes, and impoundments ranging in size from a few feet in diameter to several acres. Suitable mountain habitat includes clear lake waters, glacial kettle ponds, and beaver ponds, though many beaver ponds with cold flowing water are devoid of salamanders. Tiger salamanders are most common in permanent or semi-permanent ponds, but they can also utilize ephemeral ponds as moisture regimes change over time. Vegetation may or may not be present in the ponds. Sunny, mud-bottomed ponds at least 18 to 24 inches deep with a shallow beach-like shore are preferred. Salamanders are usually scarce or absent in waters that are inhabited by predatory fishes, turtles, bullfrogs, and crayfish. Suitable temperature ranges for tiger salamanders range from near freezing to above 86º Fahrenheit. Metamorphosed salamanders usually spend the winter in rodent burrows, which are also important areas for summer retreats. In Colorado, winter retreats are often on gentle south-facing slopes of the breeding ponds. The largest salamander populations are frequently located in ponds with evidence of substantial nearby populations of burrowing rodents (Hammerson 1999). Tiger salamanders prefer ponds and other types of impounded waters overflowing streams. Tiger salamander larvae were observed in the Wylie Gulch drainage.

Milk snake (sensitive)

Milk snakes occur over a large variety of habitats in Colorado, including short grass prairie, sandhills, shrubby hillsides, canyons, and open stands of ponderosa pine in the foothills, pinyon/juniper woodlands, and arid river valleys. Milk snakes generally stay hidden during the daytime and are infrequently encountered, even during intensive surveys. One specimen was found under a rotting log near the mouth of a canyon wooded with pine and Gambel oak in Archuleta County. Hibernacula are sometimes shared with other snake species such as gopher, western terrestrial garter, and western rattlesnakes. The milk snake's status in most of Colorado is uncertain, but moderate habitat alteration typical of rural human communities seems to be tolerated well. Overall, most of their habitat remains suitable and not significantly threatened (Hammerson 1999). The project area contains milk snake habitat in the open shrubby oak brush/mountain mahogany/grassy areas, as well as in the open ponderosa pine stands.

Northern goshawk (sensitive)

Northern goshawks are resident in foothills and mountains (Andrews and Righter 1992) and associated with coniferous and mixed forests through much of the Northern Hemisphere (Wattel 1981). Studies of nesting habitat show that goshawks nest in older-aged forests with variable tree species (Reynolds et al. 1982, Saunders 1982, Moore and Henny 1983). The most consistent vegetative characteristic of goshawk nest sites is a high canopy closure. Studies on habitat characteristics at goshawk sites have reported average canopy closure measurements ranging from 60 percent in eastern Oregon, 77 percent in northern California, and 94 percent in northwestern California (Reynolds et al. 1982, Saunders 1982). Stand structure ranges from dense multi-layered stands in Oregon (Reynolds 1975, Reynolds et al. 1982) to open park-like understories in Colorado and California (Saunders 1982). Average tree size is just as variable, ranging from 8 to 20 inches dbh in Colorado (Shuster 1980), and 20 inches dbh in Oregon (Moore and Henny 1983). Goshawks appear to prefer north to east aspects for nest sites, as stands on these aspects are typically denser and more suitable (Reynolds 1983, Reynolds et al. 1982, Saunders 1982). Slope also appears important as nests are usually placed on flat to moderately sloped land where trees are able to grow larger and at a higher density (1 to 39 percent) (Reynolds 1983). The importance of the proximity of the nest area to water is not known. Saunders (1982) and Moore and Henny (1983) found that the distances of water from nests averaged approximately 650 ft.

Knowledge of the foraging habitat is poor. Reynolds and Meslow (1984) found that the goshawk is a height zone generalist, taking prey from the ground-shrub, shrub-canopy, and canopy layers. Bloom et al. (1986) stressed the importance of meadows, streams, and aspen stands, which all may be important to prey species on which the goshawk feeds. However, Reynolds (1979) observed that goshawks forage in a variety of habitats probably along edge as well as in deep forests, if there is available prey and the vegetation is not too dense to prevent flight. Prey plucking sites in the nesting territory is also a habitat characteristic related to foraging. Plucking sites usually consist of stumps, fallen logs, snags, arched trees, rocks, or horizontal tree limbs below the canopy (Bartelt 1974). Available evidence suggests that two important resources, food and nest habitat, are the principle mechanisms limiting goshawk densities (Newton 1989, 1991). Specifically, populations may be limited by shortage of nest sites; and where nest sites are readily available, densities may be limited by food abundance and availability.

There project area contains very limited large diameter ponderosa pine and Douglas-fir habitat types that could possibly be utilized by goshawks. The potential goshawk habitat areas consist of a relatively dense overstory (50-70 percent canopy closure) of middle-aged to near mature forests, with a relatively open understory. Many of these areas are isolated patches of poor-marginally suitable habitat in a matrix of non-goshawk habitat.

Flammulated owl (sensitive)

Flammulated owls primarily utilize old growth (>200 years) or mature (>150 years) ponderosa pine and Douglas-fir forests, often mixed with mature aspen. These owls are dependent on cavities for nesting, open forests for insect gathering, and brush or dense foliage for roosting. They roost in sprawling ponderosa pine and Douglas-firs. The attraction to aspen may arise from the plentiful flicker (*Colatpes* sp.) holes and possibly from greater prey abundance (Kingery 1998, Andrews and Righter 1992). Kingery (1998) states that flammulated owls are definitely not ponderosa obligates

and that they reportedly use old growth pinyon-juniper woodlands occurring regularly from 6,000 to 10,000 ft in elevation and are found throughout Colorado montane forests. They are insectivorous and migratory, spending the winters in Mexico and Central America (Ryke et al. 1994). The activity area contains poor-marginal flammulated owl habitat.

Pygmy nuthatch (sensitive)

The pygmy nuthatch lives year-round from the interior of southern British Columbia south to Baja California. The furthest eastern distribution of this species in the United States is western Oklahoma. In Colorado, pygmy nuthatches are a common resident of the foothills and lower mountains along the Front Range and other portions of Colorado. This species is considered a ponderosa pine obligate, and is common throughout suitable habitats in Colorado. They are less common in pinyon/juniper forests. Pygmy nuthatches populations fluctuate widely from year to the next, depending on the abundance of the pine seed crop. Although they primarily occur in ponderosa pine forests with undergrowth of bunchgrass, they may also inhabit aspen. In Grand and Summit counties, they are commonly found in lodgepole pine forests, but seem to be rare elsewhere on the forest in that habitat. Pygmy nuthatches rarely are found in Douglas-fir and pinyon/juniper woodlands, and even more rarely into the spruce/fir forests and lowland riparian forests. Pygmy nuthatches are most common found between 5,500 and 9,000 ft (Andrews and Righter 1992).

The nuthatch requires cavities for nesting that are excavated in March or early April. Nuthatches need mature healthy ponderosa pine trees to excavate cavities in and ideal habitat consists of park-like open forests of ponderosa pine that have broken-off stubs of branches or treetops (Kingery 1998). Two broods are raised during the summer. The species has been described as a weak cavity excavator, partly because of their tendency to select soft snags (Degraaf et al. 1980). Cavities tend to be constructed in snags in excess of 20-inch dbh at an average height of 20 ft. The breeding unit for this species consists of 2 to 5 birds, which includes "helper" individuals who are unmated males, and usually related to the breeding pair. These helpers assist in nest building, maintenance, and feeding of the brooding female and the nestlings. The more helpers a pair has, the more young are fledged. In winter, this species will often forage and roost communally in groups of up to fifteen and have been noted joining multi-species foraging flocks as well.

Pygmy nuthatches narrow ecological niche, ponderosa pine, which makes them vulnerable to human activities. Over the last few years, rural development and cutting of firewood in ponderosa pine forests have caused a loss of trees with suitable nest sites and may be contributing to population decline for this species. In addition, effects of fire suppression activities over the past several decades have resulted in larger scale stand replacement fires that adversely affect this species' habitat. The project area has limited suitable pygmy nuthatch habitat with an active nest found in the Wylie Gulch drainage.

Lewis's woodpecker (sensitive)

The Lewis' woodpecker prefers open pine forests, burnt-over areas with abundant snags and stumps, riparian and rural cottonwoods, and pinyon/juniper woodlands (Kuenning 1998). Andrews and Righter (1992) stated that Lewis' woodpeckers are year round residents in the foothills of southern Colorado and using lowland and foothill riparian forests, agricultural areas and urban areas with tall deciduous trees, but rarely in pinyon/juniper woodlands. Their elevation preferences appear to be

between 3,500 and 7,000 ft, with rare or accidental records as high as 12,000 ft in the Wet Mountains of Custer and Pueblo counties. Early in the 1900s, they were primarily mountain birds in Colorado, preferring ponderosa pine habitat for breeding. By the late 1950s, they had expanded their nesting onto the plains as cottonwoods in the stream bottoms and around farms matured. Data from the Colorado Breeding Bird Atlas work (CBAP 1998) shows this species typically breeding in riparian habitats, using old decadent cottonwoods to nest in (Kuenning 1998). Most of the riparian areas chosen lie in close proximity or near pinyon/juniper or ponderosa pine zones. During the breeding season, Lewis' woodpeckers feed almost exclusively on emergent insects versus grubs, unlike other woodpeckers. The project area has poor-marginal Lewis' woodpecker habitat in the lower elevation riparian forest areas, especially where deciduous trees are present.

Loggerhead shrike (sensitive)

Loggerhead shrikes are migrant and summer residents and primarily inhabit open riparian areas, agricultural areas, grasslands, and shrublands, especially semi-desert shrublands, and sometimes pinyon-juniper woodlands. Breeding birds are typically near isolated trees or shrubs (Andrews and Righter 1992). Shrikes eat mostly insects, but vertebrates such as birds, reptiles (lizards), frogs, and toads also make up a significant portion of their diet. Shrikes are found to have breeding sites at elevations ranging from below 4,000 to possibly as high as 8,900 ft. (Kingery 1998). Loggerheads are listed as uncommon in the project vicinity by Andrews and Righter (1992). The project area has some poor-marginal loggerhead shrike habitat in the pinyon-juniper stands.

Ringtail (sensitive)

The ringtail inhabits arid and semiarid habitats throughout the southwestern United States. Ringtail habitat in Colorado is typically rocky canyon country and foothills areas of pinyon/juniper woodlands, montane shrublands, or mixed conifer/oak brush. Colorado studies suggest that ringtails do not require free water (i.e., they can meet their bodily water requirements from their dietary preferences alone and by practicing urine concentration). Ringtail ecology is poorly known. Ringtails are omnivorous and their diet varies depending upon food availability. They feed on various small mammals, such as deer mice, ground squirrels, wood rats, lagomorphs, and bats. Birds, lizards, and insects may also compose a portion of their diet (Fitzgerald et al. 1994). Armstrong (1972) simply describes ringtail habitat as rough, broken terrain and notes that specimens from the Western Slope that were examined were found at elevations between 6,000 and 9,200 ft. The project area contains poor-marginal ringtail habitat scattered throughout in the rocky, rough country with a variety of vegetation types.

Hog-nosed skunk (sensitive)

Hog-nosed skunks () are primarily a mammal of Mexico and the southwestern United States, with records from southeastern Colorado marking the northern extreme of the species' range. Colorado records are from canyon lands, frequently about pinyon stands (Armstrong 1972). Fitzgerald et al. (1994) identifies the hog-nosed skunk's habitat to be that of rocky canyon country in pinyon/juniper woodlands and montane shrublands of the Southwest; it has also been reported from desert and grassland environments. Colorado records are associated with oak brush and pinyon/juniper woodland in the southeastern portion of the state. Hog-nosed skunks use rocky ledges, caves, abandoned mines, abandoned burrows, woo drat nests, and similar sites for denning. Little

information exists on the life history of the species. In Texas, they were found to feed mostly on terrestrial insects. However, they also consumed small reptiles and mammals, carrion, and vegetable matter such as prickly pear fruits, berries, and nuts. They appear to spend a large portion of their time rooting for insects with their snout and long front claws. A confirmed hog-nosed skunk skull was located in the Babcock Hole area about 18 miles northeast of the project area in June 2000. It was located in ponderosa pine/oak brush woodlands with rock outcroppings and rimrock [Mellaci (White) 2000]. The project area contains marginal hog-nosed skunk habitat.

Fringed-tailed bat (sensitive)

Fringed-tailed bat () status in Colorado is poorly known and they are apparently not common in the state. They are found in ponderosa pine woodlands, greasewood, oak brush, and saltbrush shrublands; preferring coniferous woodlands and desert scrub habitats. Individuals utilize crevices, mines, caves, or buildings for both day and night roosts. Hibernation sights include both caves and buildings. Fringed-tailed bats' winter range is not known in Colorado. Fringed-tailed bats are gleaners, where they pick prey off the vegetation while maneuvering close to the plant canopy. They have a relatively broad diet, feeding on moths, beetles, caddis flies, ants, wasps, bees, and other insects (Fitzgerald et al. 1994, Armstrong 1972). The project area contains suitable fringed-tailed bat foraging habitat scattered throughout the ponderosa pine vegetation types. Tree cavities, mines, and caves for roosting, maternity, and hibernacula sites are all limited in the project area.

Townsend's big-eared bat (sensitive)

Townsend's big-eared bat () is a cave dwelling bat in a wide variety of habitats. It has been known to inhabit mines, caves, and abandoned buildings. It occasionally roosts in tree cavities (Ryke et al. 1994). In Colorado, this bat inhabits the rough, broken country vegetation typically of brush or open woodland (Armstrong 1987) at elevations up to 9,500 ft (Fitzgerald et al. 1994). Edge habitat seems to be a preferred habitat of some big-eared bats. The reason for this may be it is easier to feed where there are fewer branches to avoid while pursuing prey, and it is able to discriminate insects at greater distances. Big-eared bats glean insects from leaves, with a majority of their foraging occurring over water (Fitzgerald et al. 1994). The edge habitat also provides nearby cover and an abundance of moths for bats (Clark et al. 1993). The activity area has marginal habitat for the big-eared bat.

Dwarf shrew (sensitive)

Very little is known about the ecology, reproduction, or behavior of the dwarf shrew (). Fitzgerald et al. (1994) stated that dwarf shrews consume mostly insects and have been taken from a variety of habitat types in the Southern Rocky Mountains, ranging from the edges of alpine and subalpine rockslides to spruce-fir bogs; sedge marsh; coniferous forest; dry, brushy hillsides; and open woodland. Dwarf shrews have not been captured at low elevations in Colorado on either side of the mountains. Dwarf shrews can apparently tolerate arid to semi-arid environments since captures have been made up to 0.8 km (0.5 mi.) from water sources. The wide diversity of habitats occupied suggests that they are more widely distributed than records indicate. Dwarf shrew specimens have been collected from elevations ranging from 5,500 to 10,000 ft, with specimens from transects near the Canon City area being caught at the 6,200 to nearly 9,800 ft (Fitzgerald et al. 1994, Armstrong 1972). The activity area has marginal dwarf shrew habitat.

Field Reconnaissance

Goshawk surveys were conducted during July and August of 2002 in the project area in parts of the ponderosa pine ponderosa pine/Douglas fir forested areas. Approximately 1,200 acres were surveyed in the Wylie Gulch area. Several raptors were seen in the area, but no goshawks or goshawk nests were confirmed.

Three tiger salamander larvae were located in the waters of Wylie Gulch in May 2002, while an Abert's squirrel was seen in the Wylie Gulch drainage just off National Forest land the same day. An active pygmy nuthatch nest was found in the Wylie Gulch drainage in July 2003.

Numerous field visits have been made to the project area by the District biologist and technicians to conduct surveys and inventories. Leslie Ellwood (USFWS) made a couple of field visits to the area with District personnel to evaluate the management strategy for the designated lynx corridor that goes through the area.

b. Environmental Consequences

The Forest Plan does not have specific standards for the evaluation of impacts to sensitive species. The current direction for evaluating the effects to lynx is to meet or follow the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) directions. This analysis will evaluate how well the proposal meets Forest Plan guidelines where appropriate standards exist and include an evaluation based on threatened, candidate, and sensitive species habitat quality and availability. Habitat structural stages were used to evaluate habitat conditions in the area, the habitat available for threatened, candidate, and sensitive species, how much of it there is and how the project will modify the habitat conditions.

This analysis focuses on determining existing habitat components for threatened, candidate, and sensitive in the local area. The species are primarily those ponderosa pine, pinyon-juniper, and grasslands.

Direct and Indirect Effects

Under the proposed action, there will be shifts in the structural stages of Douglas-fir (25 acres of sapling/pole and 30 acres of mature forest moving from 30-70 percent crown closure to 10-30 percent crown closure), ponderosa pine (300 acres of sapling/pole and 100 acres of mature forest moving from 30-70 percent crown closure to 10-30 percent crown closure), pinyon-juniper (20 acres mature forest moving from 30-70 percent crown closure to 10-30 percent crown closure), and Gambel oak (100 acres going from shrub/seedling structure to grass/forb) vegetation. There will not be any changes to the late successional staged (old-growth) forested areas. The proposed action also includes some stream restoration techniques such as in-channel rock placement to stop head cutting and other streambank restoration techniques such as planting, reinforcement of banks with natural materials, resloping/recontouring of banks, log/rock armoring of banks, etc.

Canada Lynx

No action alternative – Under this alternative, plant community succession (barring any natural disturbances) will continue and younger more open habitat types will tend to close in with trees and become more favorable for species that are dependent upon denser forested areas. Eventually, as trees die, more snags and coarse woody material should be recruited into the landscape providing habitat for snag and coarse woody material dependent species, but larger snags will probably be fewer than what occurred under natural conditions since the trees in stands of fire-adapted forest types tend to be smaller and densely stocked when fires are not allowed to act as a disturbance agent. Forested stands may develop somewhat more toward old growth, but probably not in large quantities since many of the forested areas are not at natural tree densities for the area and competition for light, nutrients, and moisture will most likely inhibit stands from achieving their natural potential growth and stand structures.

Additional recruitment of down woody material will provide hiding cover for potential lynx prey species such as rabbits and rodents that could be taken by lynx passing through the non-lynx habitat corridor contained in the project area. This alternative would make the eventually provide more cover and potential habitat for prey species in the lynx corridor and therefore provide some benefits to lynx passing through it. This alternative meets the Canada Lynx Conservation Assessment Strategy guidelines.

Proposed action – The proposed action will not be affecting lynx habitat, but there is a lynx corridor in the project area. Thinning and burning in the corridor could have direct effects to lynx such as temporary displacement due to the disturbance created by smoke and noise from personnel and equipment. In the short to mid-term, some of the forested stands of pinyon-juniper and ponderosa pine plantations will have reduced canopy closure and fewer trees per acre from the thinning, and there will probably be some loss of coarse woody material from prescribed burning. The short to mid-term effects of reduced canopy closure will slightly reduce the cover values of the treated areas. The loss of coarse woody material will cause a minor short to mid term reduction in habitat for potential lynx prey species dependent upon downed wood. Although there will be loss of cover in some of the corridor from the proposed thinning, there will still be areas (identified and mapped) in the corridor that provide adequate cover for lynx migrating through. In the long-term, coarse woody materials and canopy cover will increase and provide additional potential lynx prey species habitat. This alternative meets the Canada Lynx Conservation Assessment Strategy guidelines.

Rock-loving aletes, Narrow-leaved moonwart, Smith's whitlow-grass, Brandegee wild buck wheat, Degener's beardtongue, Front Range cinquefoil, and Dwarf raspberry

No action alternative – The sensitive plants that have potential to occur in the project area are found over a variety of habitats varying from dry, rocky, cliffy, brushy, habitat to grass and forb meadows and willow carrs and mossy streamsides. Ecological processes as described under No action alternative for lynx would continue to occur. This alternative would not have any additional effects on the sensitive species above.

Proposed action – No sensitive plants were located in the project area while conducting surveys. The riparian corridors, pinyon-juniper woodlands, and montane grasslands may contain suitable habitat. Thinning and burning in the pinyon-juniper woodlands could possibly destroy individual

sensitive plants present but this is unlikely, since no evidence of any existed in the area. The riparian woodlands are not scheduled to have any treatment activities, except for one or more of the stream restoration techniques listed above, occurring in them, but there is a small potential for some incidental fire to creep in from adjacent areas ignited.

Northern leopard frog, tiger salamander, and Lewis's woodpecker

No action alternative – The above species are dependent upon aquatic and riparian habitat. This alternative would not have any direct effects on the above species, but, indirectly, as habitat changes and trees fill in the open meadows and forested stands continue to develop (where site conditions allow), there could be a reduction in the water quantities in the intermittent streams that could reduce or eliminate habitat for aquatic and riparian cottonwood species such as the tiger salamander, leopard frog, and Lewis's woodpecker.

Proposed action – There is no scheduled treatments in the riparian areas as mentioned above, except for one or more of the stream restoration techniques listed above, but the proposed thinning treatments could slightly increase water quantities in the intermittent streams, which would most likely increase the habitat effectiveness for the above listed species. There is a small chance that project activities such as thinning and burning adjacent to the riparian forests could temporarily disturb or displace Lewis's woodpeckers in the vicinity. There would not be any direct effects to leopard frogs or tiger salamanders from the thinning or burning activities. Stream restoration work could potentially affect leopard frogs or tiger salamander if they were in the water or streambank areas while the equipment was actively working. There is a small possibility that tiger salamander or leopard frog larvae or adults could be killed by equipment working in the area but late summer project implementation in this intermittent stream would reduce the likelihood of them being in the area since the channel is mostly dry during that period of the year. In-stream restoration activities are only to occur in the channel during periods that the work and access area is dry (typically September-October; need to evaluate appropriate work periods on a site by site basis, Mark Jones, CDOW, pers. comm.).

Northern goshawk, Flammulated owl, and Pygmy nuthatch

No action alternative – The above species are generally dependent upon mature forests, particularly ponderosa pine, for their habitat needs. Ecological processes as described under No action alternative for lynx would continue to occur. This alternative would not have any additional effects on the sensitive species above.

Proposed action – Thinning, burning, and stream restoration activities could cause short-term effects on the above species such as disturbance and displacement from noise and smoke if the activities were to occur in close proximity to nesting, roosting, or foraging sites. The pygmy nuthatch nest that was found in the project area was in a riparian buffer area that is not scheduled to have any vegetative treatment. It is unlikely that the area supports viable populations of flammulated owls or goshawks due to the habitat quality being poor-marginal for them.

Habitat for the above species will improve in the long-term since thinning the ponderosa pine and pinyon-juniper stands will promote healthier and more vigorous stands that have more potential to

mature into old-growth forests with less dense understory trees and shrubs. As stated in the above species' accounts, mature and old-growth habitat is preferred by the above species.

Milk snake, Loggerhead shrike, Hog-nosed skunk, Fringed-tailed bat, Townsend's big-eared bat, and Dwarf shrew

No action alternative – The above species utilize drier habitat types such as pinyon-juniper woodlands, shrublands, mixed conifer/oak brush, grasslands, rocky, canyon-like country. Ecological processes as described under No action alternative for lynx would continue to occur. This alternative would not have any additional effects on the sensitive species above.

Proposed action - Thinning and burning could cause short-term effects on the above species such as disturbance and displacement from noise and smoke in those treatment areas that are in the above species' habitat. There could also be a reduction in available food (i.e., insects, small mammals, and grasses and forbs). There is the remote possibility that individuals from the above species could be killed by the fire (primarily milk snake and dwarf shrew since the other species could easily fly or out run the ground fires). Some potential habitat in the form of snags and coarse woody material will be incidentally burnt up or destroyed from mechanical equipment, but it will most likely not be a significant amount. The stream restoration activities are unlikely to have any impact on the above species since they are not riparian dependent species and their presence there would be more incidental or casual than intentional.

Conflict Determination

Proposed action is not expected to have any adverse effects to any federally threatened species or adverse impacts on Forest Service sensitive species. The lynx is not likely to be adversely affected by the action alternative. The project area is not in lynx habitat and therefore the project activities will not be affecting lynx habitat. However, there is a lynx corridor that runs through the project area that was set up to provide a migrational access route between the Sangres and Wet Mountains LAUs. Individual sensitive species may be affected but the project is not expected to lead to a trend to federal listing or loss of viability range-wide.

Habitat Fragmentation

The Black Mountain project area is in the Wet Mountains of Colorado along the eastern flank of the Rocky Mountains. The Wet Mountains are somewhat isolated from other mountain ranges by the Wet Mountain valley on the west, by the Huerfano River valley on the south and by the Arkansas River valley on the north. The eastern flank of the Wet Mountains grades into plains grasslands. The area is very diverse with pinyon-juniper, Gambel oak, ponderosa pine, aspen, Douglas-fir, white fir, subalpine fir, Engelmann spruce, and alpine tundra. The highest peak is Greenhorn Mountain at 12,347 feet elevation.

No action alternative – The project area lies in the montane forest zone at the upper elevations to the lower montane forest at mid elevations to the short-grass steppe at the lower elevations. The dominant vegetation is a mixture of grasses, mountain mahogany, pinyon-juniper, and ponderosa pine in a warm-hot arid landscape. The mosaic created by large open grasslands and pinyon-juniper stands with ponderosa pine plantations and ponderosa pine-Douglas fir forest makes this area

naturally fragmented from a vegetation standpoint. The major impact on habitat fragmentation occurs from roads and the associated motorized recreation activities.

Proposed action – The Black Mountain project does not include clearcuts. The treatment prescriptions include thinning the smaller diameter trees in the ponderosa pine plantations and in part of the pinyon-juniper forests as well as underburning in the ponderosa pine savannah and grasslands. Thinning in forested areas will reduce the canopy cover of the stand but will not remove all cover in any stands. The proposed action should not increase fragmentation in the area. Seasonal winter road closures should reduce the fragmentation in those areas adjacent to the seasonally closed roads.

Cumulative Effects

The Black Mountain area receives light vegetation management and light to moderate recreation pressure. The flat terrain and numerous roads provide easy access to the public. Overall, road densities in the area are very high. The area is primarily used for motorized recreation in the spring-fall seasons, since patchy snow coverage in the winter months discourages either snowmobile or off-highway vehicle use. Numerous areas were planted with ponderosa pine plantations in the 1950s to 1960s. The area is in several cattle grazing allotments that have had very heavy use in the past (1900 to 1950) causing streambank erosion, sloughing, and gully formations. The area gets moderate use by elk in the summer and heavy use by them in the winter. There are still large roadless areas in the Greenhorn Wilderness/Mountain area to the east of the project area. This vegetation treatment will modify an additional 9,642 acres of grasslands, ponderosa pine plantations, and pinyon-juniper forests, and it should provide some beneficial cumulative effects to most of the sensitive species of wildlife found in the area, with discountable cumulative effects to the lynx. High road densities, forested monoculture propagation (plantations), and fire suppression most are likely the limiting factors to sensitive species, while low prey base (snowshoe hare) density is likely the greatest limiting factor for lynx in the Wet Mountains.

Sometimes the combined effects of several projects are more substantial and of a different nature, than the incremental impact of each project viewed separately. Cumulative impacts can result from individually minor, but collectively significant actions taking place over time. Potential sources of cumulative effects are:

- Natural Trends – These are naturally occurring changes in existing physical and biological systems. Natural trends may have the effect of compounding the effects caused by the proposed action.

- Past Human Actions – The effects of the proposed action when added to past developmental project and human activities, may create significant effects to the environment.

- Concurrent Actions – Other projects and human activities, which if occurring simultaneously with the proposed action could create significant effects.

- Foreseeable Future Actions – Projects and human activities which are scheduled or reasonably likely to occur in the foreseeable future, and which when combined with the proposed action, may create significant effects to the environment.

When analyzing the additive effects of the proposed action with the combined effects of past, present, and future human activities and natural trends, the potentially affected environment extends beyond the immediate project area. The area analyzed for cumulative effects includes the entire Wet Mountains LAU for lynx, the Game Management Unit for Elk, and the home range or diversity unit for sensitive species.

Natural Trends – Unless there is a change to the Forest Service policy of suppressing wildfires in the area, the forested areas will continue to undergo succession and develop into older stands that may very well be outside the HRV for densities, stocking levels, and species composition due to lack of disturbances that would limit fire intolerant species development. Many portions of the area are experiencing insect infestations at levels that may be approaching epidemic. This could kill off thousands of trees and facilitate a catastrophic wildfire in the area as well as create a significant disturbance on the landscape. Conifer encroachment upon the grasslands will continue to fill in the grasslands wherever ecologically possible, changing the plant communities and the species that inhabit those areas, as well as potentially changing (reducing) the water available for the already intermittent streams in the area. Further loss of water to the streams could potentially dry many of the intermittent streams up during most of the year making the aquatic environment unsuitable for species that presently inhabit them.

The No Action alternative would continue the above natural trends. The proposed action alternative would act as a disturbance in the ecosystem and retard successional trends in the grassland burning and ponderosa pine savannah maintenance burning areas while the thinning of the plantations would promote succession of a more natural stand of ponderosa pine trees.

Past Human Activities – There has been significant increases in the miles of roads, rural development on private lands, and recreational activities occurring in the cumulative effects area in the last 50 years. Along with the creation of roads in area comes a multitude of human activities (i.e., camping, hunting, OHV usage, fishing, hiking access, fuelwood gathering, etc). Nearly all human impacts occur in a half mile of a road. The greatest effect to the environment has probably been on the deer and elk herds. The deer herds have declined while the elk herds have rebounded dramatically. Game management that has emphasized big game in conjunction with enforcement of hunting regulations has enabled elk herds to increase in the Wet Mountains. Mule deer numbers are most likely lower than desired due to competition with elk.

Concurrent Actions – The only projects or activities that would be occurring simultaneously with the burning/thinning activities from the Black Mountains project would be implementation of the Meadow Divide timber sale up on the Greenhorn Mountain area (includes relocating about 2.5 miles of road), implementation of the Wetmore Forage Improvement and Fuels Reduction Project on the north end of the Wet Mountains, road maintenance, livestock grazing, fuelwood gathering, recreational activities, and subdivision development on private lands nearby. These activities would not create a significant effect to the environment when combined with either the No Action or Proposed Action alternatives.

Foreseeable Future Actions – An assessment is being conducted on the Wet Mountains and it will identify needs and opportunities in the Wet Mountains. Some of the foreseeable future actions are more thinning and burning, stream restoration projects, trail improvements/relocations, interpretive

site development, and road closures and/or relocations. The Environmental Analysis has not been started for any of these potential projects.

Neither of the alternatives are precedent setting. The proposed thinning/burning project will not automatically trigger other projects, which might have similar effects on this area of the environment. Future actions, which may be proposed by the Forest Service, will be studied and an independent evaluation will be made of the cumulative effects of those actions.

3. Fuels

a. Affected Environment

Forest and fuel conditions in the Black Mountain area before the 1880s consisted of forests dominated by widely spaced, large diameter ponderosa pine, shrubs and grasses, and various other conifer species such as Douglas-fir, and pinyon and junipers. There were fewer trees per acre but larger individual trees on average compared to current conditions. Studies in the area done by various researchers including Dr. Peter Brown and Wendell Hann (Landscape Ecologist-USFS), indicate that a 10-12 year fire return interval was typical for the area. Fire was very common in the area as evidenced by fire scars sampled, especially during the period 1842 to 1850. A total cessation of fires in the 20th century was also evident in this fire scar analysis. This fire regime of frequent, low intensity ground fires reduced the amount of understory shrubs, shade tolerant tree species, and dead fuel accumulations.

Fire has played an especially active role in the history of the Black Mountain analysis area. Current fire history studies indicate about a 10-year mean fire return interval (Toelle 2003, TFM Paper, Brown et al 2001). Wildland fire still visits the area, but fire and vegetative patterns have been drastically altered over decades because of fire suppression and other activities. (Toelle 2003, TFM Paper). Past wildland fire suppression efforts have essentially eliminated low- and mixed severity fires, increasing the potential for large, higher-severity fires. Because of the past fire suppression efforts, vegetation has changed across the landscape to one of increasing ground fuel "loadings", increasing "ladder" fuels (fuels feeding fire from the ground upward), and denser stands of smaller diameter, non-fire adapted tree species compared to the longer lived fire adapted tree species such as ponderosa pine.

Fire suppression, climate, and grazing over the past 100 years have substantially changed the fuel conditions and fire behavior in the project area. The accumulation of surface and ladder fuels, especially during wet cycles has increased the growth of dense, small diameter suppressed trees, which contribute to an increased crown fire potential. (Toelle and Smith, 2003, TFM Paper).

Tree mortality (primarily from the drought cycle of 1998 – Current), and insect attacks such as the mountain pine beetle and pinyon Ips have added to existing standing and down fuel composition. Current downed surface fuels as determined from inventory plots range from approximately 7-10 tons/acre for ponderosa pine sites, and 20-24 tons/acre for mixed conifer sites. (PSICC Fuel Inventory Baseline Study, Plots 1-40, 2000).

Potential fire behavior on the landscape is analyzed using existing forest stand data, 90th percentile fire weather values, and an assumed average 25 percent slopes in the BEHAVE fire behavior model

software (Remsoft, Inc. 1997) and Fuels Management Analysis Suite, (Fire Program Solutions 2001). Weather data from the Willis Creek weather station was the primary source of information for analyzing fire weather.

Existing conditions in all of the units proposed for treatment fall short of meeting one or both of the desired conditions for fuel ladders and fire behavior described in the PSICC Fire Management Plan. Under an uncontrolled wildfire, most of the stands in the project area are expected to have an active or passive crown fire and a rate of spread of 5 – 30 chains (1 chain = 66 feet)/hour. An active crown fire spreads through the tree canopy and a passive crown fire typically ignites individual or small groups of trees, but is not propagated through the crown. A surface fire, by contrast, is limited to fuels on or near the ground surface such as downed wood, grasses, and shrubs.

When surface fire intensity exceeds critical intensity, crown fires can occur (Van Wagner 1977). Once the fire moves into forest canopy, it can exhibit passive or active characteristics. Thinning proposed for the pine plantations will result in a reduction in stand density (basal area) which correlates to lower crown bulk density values and therefore higher threshold rates for active crowning.

b. Environmental Consequences

(1) No Action Alternative

Direct and Indirect Effects

The No Action Alternative would not change current conditions, which would not meet the intent of current management direction and would not meet management objectives for reducing hazard and risk, nor does the alternative achieve fuels reduction target conducive to non-crown fire behavior commensurate with firefighter safety. This alternative allows natural processes to continue, except for wildland fire. As a result, the following processes would be expected to continue:

- The aging of forest vegetation,
- Increased tree mortality from insects and disease,
- Increased build-up of forest fuels,
- Higher fire intensities, and
- The yearly occurrence of wildland fires.

There would be no direct effects to air quality from this alternative, because no prescribed fire would take place. Indirect effects would be the increased fuel loadings and continued occurrence of wildland fires. Increased fuel accumulations combined with multiple fire starts will eventually produce large, higher intensity wildland fires. Cumulative effects would be the increased effects on air quality, resulting from the increased build-up of forest fuels and the eventual disturbance process.

The existing fuel ladder and overcrowded forest conditions are expected to worsen over time and would result in an increased threat of tree mortality from insects and disease with increased downed fuel loads and high intensity wildland fire potential, and an increased number of suppressed trees.

This alternative eliminates the possibility of an uncontrolled wildfire escaping from prescribed burning operations. A detailed burn plan is required before prescribed burning on National Forest lands. These plans outline specific requirements for carrying out the burning operations. These types of plans are intended to reduce the risk of escape, as well as insure that the desired burn objectives are achieved. However, there are factors that influence the risk of escape that cannot be predicted with absolute certainty. There will always be some degree of risk. The occurrence of wildfires escaping from Forest Service and BLM prescribed burns over the past 5 years is slightly less than 1 percent of the 24,451 burns conducted by these agencies.

Fire exclusion will result in heavier accumulations of dead and live vegetation, altered fuel arrangement, and changes in vegetative structure and composition. When dead fallen material (including tree boles, tree and shrub branches, oak litter, and decaying organic matter) accumulates on the ground, it increases fuel quantity and creates a more continuous arrangement of fuel. When this occurs, surface fires may ignite more quickly, burn with greater intensity, and spread more rapidly and extensively than in the past. Restoration of periodic, low severity, surface fire regimes that are desired, would be further disrupted by the no-action alternative and consequently, future wildfires would be more severe and perhaps larger.

The arrangement of live vegetation also affects the way fires burn. For example, an increase in the density of small trees as a result of the no-action alternative creates a multi-storied forest structure with continuous vertical fuel arrangement. This arrangement would allow a fire normally restricted to the surface to spread into the trees and become a crown fire. In addition to structural changes, vegetation modification resulting from fire exclusion and no-action will eventually cause a shift toward species that are not adapted to fire, and are therefore more susceptible to damage from fire.

Without fire and other proposed treatments, encroachment of small conifers and other woody species would continue in many of the openings, slowly reducing any potential they might offer as natural firebreaks and control features or safety zones for fire suppression forces.

This alternative provides little incentive for cooperative approaches to protection of lives and property. Eliminating or deferring the proposed treatments, may lead to a loss of interest and enthusiasm by adjacent private landowners in reducing the fire risk and hazards on their own property.

Cumulative Effects

The No Action Alternative may contribute to existing adverse cumulative effects on forest health by increasing the probability of catastrophic wildfire losses, disease and pest invasions of stands weakened by competition, slowed tree growth resulting from competition, and hazards and aesthetic impacts because of increased dead and downed stand trees.

(2) Proposed Action Alternative

Direct and Indirect Effects

The area was subdivided into five general treatment categories so that specific landscape management objectives and prescriptions could be developed: (1) grassland maintenance burning, (2) Mechanized individual tree removal in pinyon and juniper forest and grassland areas, (3)

Mechanized thinning in ponderosa pine plantations, (4) pinyon and juniper treatments on BLM lands, and (5) ponderosa pine savanna maintenance burning. The basic concept is that management choices, such as the frequency of prescribed burning or silvicultural treatments can be used to a significant extent on the corresponding attributes of the natural disturbance regime.

The proposed action will result in beneficial direct, indirect, and cumulative effects on fuel conditions and fire behavior. Implementation of the Proposed Action, will meet the desired conditions for fuel and fire behavior under 90th percentile fire weather conditions for the urban defense and threat zones as identified in the for the remainder of the project area (USDA Forest Service 2001), including:

- Fuel conditions allow for efficient and safe suppression of all wildland fire ignitions;
- Fires are controlled through initial attack in all but the most severe weather conditions;
- Flame lengths at the head of the fire are <4 feet in the urban defense zone and <6 feet in the urban threat zone;
- Thinning from below to remove trees <5" DBH and reduce stems per acre.
- Raise the average crown base height to 6 feet over in the treated plantations area and adjacent to the treated urban threat zone areas.
- Fuel loading reduced from 8 to approximately 3 tons/acre.
- Prescribed fire and mechanical treatments would be used in this alternative to create a patchwork of treated and untreated areas across the landscape resulting in an overall reduction in fuel loading and fire hazard over the treated acres.
- Implementation of the proposed action would have the greatest impact in decreasing the risk of large, high intensity wildland fires, and changing vegetative structure. Firefighter safety would be enhanced, and the cost of suppressing future wildland fires could be lowered. Prescribed burning costs generally range from $25 to $300 per acre. The cost of suppressing a wildland fire ranges from $600-$3,000 per acre, not including the probable loss of resources.
- An indirect effect of burning would be the temporary reduction of public use because of safety closures of roads in the vicinity of treatment areas, but this would not be long term, lasting only for a few hours or up to a day now and then depending on the need.

The proposed action is expected to result in a net benefit to fuel conditions and meet current management direction for fire behavior. Surface fuels in all stands will be reduced from an average of 20 tons/acre to 6 tons/acre, and resulting fire behavior would be changed from active or passive crown fire to a surface fire.

This alternative would also result in improved survivability rates of residual stands and plantations from wildland fire and reduce future wildfire suppression costs. Treatments would greatly reduce the potential for crown fire initiation and crown fire sustainability in plantations. These benefits would exist for a period of 8–12 years after implementation. The tables below are shown to display modeling results from Forest Vegetation Simulator (FVS) and illustrate current potential fire behavior with ponderosa pine plantations in the Black Mountain analysis area. (Toelle 2003, TFM Paper) Fuels in the analysis area can be classified into three groups: grasses, shrubs, and timber.

The differences in fire behavior in these groups are basically related to the fuel load and its distribution among the fuel particle size classes. Fuel loading is generally portrayed in tons per acre, taking into account both aerial and surface fuels. Fuels in the analysis area consist of fire behavior prediction system (FBPS) models 8, 9, and a combination of 2 and 9.

Table 8. FBPS Fuel Model 8, predicted fire behavior in the **un-treated** project plantations.

FBPS Fuel Model 8	Black Mountain Stand	Ophir Creek Stand	Resultant Fire Behavior	Flame Length (ft)
97th percentile weather and associated mortality	59% mortality	47% mortality	Surface Fire	0.7
50th percentile weather and associated mortality	49% mortality	47% mortality	Surface Fire	0.4

Table 9. FBPS Fuel Model 9 predicted fire behavior in the **un-treated** project plantations.

FBPS Fuel Model 9	Black Mountain Stand	Ophir Creek Stand	Resultant Fire Behavior	Flame Length (ft)
97th percentile weather and associated mortality	99% mortality	97% mortality	Passive Fire	4.7
50th percentile weather and associated mortality	49% mortality	47% mortality	Surface Fire	1.0

Table 10. FBPS Fuel Model 2/9 predicted fire behavior in the **untreated** project plantations.

***FBPS Fuel Model 2/9**	Black Mountain Stand	Ophir Creek Stand	Resultant Fire Behavior	Flame Length (ft)
97th percentile weather and associated mortality	99% mortality	99% mortality	Passive Fire	6.7
50th percentile weather and associated mortality	54% mortality	67% mortality	Passive Fire	1.7

***FBPS Fuel Model 2=60% and Fuel Model 9=40%**

Table 11. FBPS Fuel Model 8 predicted fire behavior in the **treated** project plantations.

FBPS Fuel Model 8	Black Mountain Stand	Ophir Creek Stand	Resultant Fire Behavior	Flame Length (ft)
97th percentile weather and associated mortality	47% mortality	44% mortality	Surface Fire	0.5
50th percentile weather and associated mortality	47% mortality	44% mortality	Surface Fire	0.3

Table 12. FBPS Fuel Model 9 predicted fire behavior in **treated** project plantations.

FBPS Fuel Model 9	Black Mountain Stand	Ophir Creek Stand	Resultant Fire Behavior	Flame Length (ft)
97th percentile weather and associated mortality	47% mortality	44% mortality	Surface Fire	1.5
50th percentile weather and associated mortality	47% mortality	44% mortality	Surface Fire	0.7

Table 13. FBPS Fuel Models 2 and 9 predicted fire behavior in the **treated** project plantations.

FBPS Fuel Model 2/9	Black Mountain Stand	Ophir Creek Stand	Resultant Fire Behavior	Flame Length (ft)
97th percentile weather and associated mortality	97% mortality	95% mortality	Surface Fire	2.7
50th percentile weather and associated mortality	47% mortality	44% mortality	Surface Fire	1.2

The modeling results indicate a modeled decrease in fire behavior and associated mortality and indicate a need to implement treatments to protect the plantations from a possible wildland fire intrusion.

Risk and Effects to Private Lands and Adjacent Structures

There will be limited to no risk to the adjacent properties and/or structures during the implementation of the mechanical fuels reduction treatments. These treatments when finished will provide firefighters an opportunity to safely suppress most wildland fire intrusions in and adjacent to the adjoining structures.

There may be some associated risk during the implementation of the proposed prescribed burning, but this risk will be carefully assessed. A risk analysis as well as a Go-No-Go Checklist will be completed before ignition. If all prescriptive criteria cannot be adequately met, and mitigation for any potential risk cannot be adequately mitigated, ignition will not commence.

4. Vegetation Condition

a. Affected Environment

The Black Mountain Analysis Area consists primarily of lower montane with some upper montane vegetation zones. Species composition consists of cottonwood, pinyon pine, rocky mountain juniper, gambel oak, ponderosa pine, aspen, limber pine, Douglas fir, Engelmann spruce, bristlecone pine and white fir. Before European settlement, the current ponderosa pine vegetation type had significantly more open growing large diameter ponderosa and Douglas fir as determined by ocular estimates for species and size of stumps. Pre-settlement forests were characterized by open grown ponderosa pine, Douglas fir, limber pine and Engelmann spruce stands, with a varied spacing of large diameter trees and a predominately grass understory. Low intensity fires were frequent and burned in a mosaic pattern due to a grass understory with discontinuous fuels. These frequent fires minimized fuel loading and dense understory development.

In comparing older trees and old stumps to the amount of younger trees and stumps that exist in the various species types, it shows an increase of small diameter trees in species such as ponderosa pine, pinyon pine, Douglas fir, Rocky Mountain juniper and gambel oak, with a decrease amount of disturbances such as historic fires, grazing and logging practices. Various disturbances such as logging and subsequent planting or natural regeneration, combined with a lack of fire in the ecosystem over the past 100 years and lack of forest health thinning practices, have evolved into a high-density forest structure. There are remnant large diameter stumps of both ponderosa pine and Douglas fir in the mid elevation zones of the analysis area, however few large trees currently exist. Currently the majority of the forest consists of small diameter (8.9 in. dbh and less) second/third growth trees with scattered medium diameter (9.0 in. dbh and greater) second growth trees. Through out the analysis area, there are scattered pockets of remnant large diameter late successional trees.

The Black Mountain analysis area was subject to intensive logging activity in the late 1800's through the mid 1900's. Large amounts of the landscape lack any large tree size class. Many acres were planted in the 1930's through the 1960's to compensate for the many years of tree removal. Basal area ranges from 60 sq. ft. per acre to 140 sq. ft. per acre. Average Site Index is low to moderate. Trees are becoming increasingly more susceptible to insect and pathogen attacks with mountain pine beetle mortality on the increase. Current snag populations are low throughout the project area.

Table 14. Existing Vegetation Type and Habitat Structural Stage Values for National Forest lands in the Black Mountain Analysis Area. Data from Common Vegetation Unit (USFS, 2002).

Existing Vegetation Type and Habitat Structural Stage Acres

Habitat Structural Stage	1M	2S	3A	3B	3C	4A	4B	4C	Not classed	Area Totals
Wet Meadow	737		0	0	0	0	0	0	0	737
Dry Meadow	4100	25	0	0	0	0	0	0	0	4125
Cottonwood	85	0	0	0	0	8	0	0	48	141
Conifer/Oak	552	365	698	405	0	184	224		62	2490
Pinyon/Juniper	564	9	1041	1576	0	124	220	0	43	3577
Ponderosa pine	2191		878	609	5	1054	414	4	34	5189
Douglas fir/pine			34	107		69	144	78	14	446
Mix Conifer/Aspen	30	3	44	175	8	5	67	7		339
Forest Total	**8259**	**399**	**2695**	**2872**	**13**	**1444**	**1069**	**89**	**201**	**7262**

The existing vegetation type is a description of the existing vegetation, barren areas, or water in a polygon. Habitat structural stage values are defined as the size class and canopy cover of the vegetation type in a polygon.

Habitat Structural Stage Value Description

1M: grass/forb/ shrub; a composition of grasses, forbs, and shrubs

2S: shrub/tree/ seedling; primary component is seedling/small trees 30 ft. high or less, with a dbh ranging from1.0 to 4.9 inches, and shrubs.

3A: pole/sapling/open; primary component is trees with a dbh ranging from 5.0 to 8.9 inches and a canopy closure of 29 percent or less.

3B: pole/sapling/moderate; primary component is trees with a dbh ranging from 5.0 to 8.9 inches and a canopy closure of 30 to 69 percent.

3C: pole/sapling/closed; primary component is trees with a dbh ranging from 5.0 to 8.9 inches and a canopy closure of 70 percent and greater.

4A: mature tree open; primary component is trees with a dbh ranging from 9.0 to 20.9 inches and a canopy closure of 29 percent or less.

4B: mature tree moderate; primary component is trees with a dbh ranging from 9.0 to 20.9 inches and a canopy closure of 30 to 69 percent.

4C: mature tree closed; primary component is trees with a dbh ranging from 9.0 to 20.9 inches and a canopy closure of 70 percent and greater.

Historic Range of Variability Conditions

Current vegetation composition, structure, and mosaics in the Black Mountain Analysis Area are estimated to be in high departure from Historic Range of Variability (HRV). The analysis area lacks variation in forest tree size class, age, and spatial patterns across the landscape. Understory vegetation is limited in number of species, quality, and quantity. There are over 3,000 acres of small diameter, dense ponderosa pine plantations. Large diameter ponderosa pine has been logged. Current insect and disease populations are estimated to be greater than historic conditions, due in part to sustained fire exclusion. Historic open stands were maintained by mixed regime ground and surface fires.

Mixed conifer, Ponderosa pine forests with grass, forbs understory, historically maintained by frequent mixed surface and crown fires, lack large diameter trees and have developed a dense understory of small diameter trees.

Restoration of Fire Adapted Ecosystems

According to the National Fire Plan condition class rating, current fire regimes are dominated by condition classes 2 and 3; indicating high departure from the natural regimes. Changes in forest structure and species composition over the past 130 years, following human disturbances such as logging and grazing along with fire exclusion, have created forest stands that have increased potential for large high intensity wildland fire events. The small diameter ponderosa and pinyon pine stands creates potential for catastrophic stand replacement fire in an ecosystem that historic fire occurrence was frequent mixed low intensity surface fires. Continuous canopy and lack of structural diversity with increased fuel ladders increase the risk of high intensity wildland fire over large areas of the watershed with increased levels of ladder and aerial fuels. These conditions increase the potential for disturbance events such as high intensity wildfire or beetle infestations to occur across the landscape.

Table 14. Landscape Model: Vegetation, Structure & Disturbance Regimes
DEPARTURE = HRV (historic range of variability) minus current

Results of Landscape Model:

Current Vegetation	Departure Rating	Cause of Departure	% (acres) Watershed in Departure Class (est)
Douglas fir/Ponderosa	None	Structure	40
Mixed Conifer/Aspen	Moderate	Structure	29
Ponderosa pine	High	Structure	45
Conifer/Oak	High	Structure	29
Pinyon/Juniper	Low	Structure	40

Table 15. Percent vegetation cover and structure variation for current, historic, and calculated departure values. H = Historic, C=Current, and D=Departure. Size classes are, Small/Medium: less than 5 inch and Pole 5.0 to 8.9, Large: 9.0 to 15.9 and greater than 15.9 inches.

		DF/PP			***Conifer/Aspen***			***PP***		
Size / Cover		***H***	***C***	***D***	***H***	***C***	***D***	***H***	***C***	***D***
Meadow	<20	12%	27%	H	17%	6%	M	18%	32%	H
Small/Med	>40	8%	13%	M	20%	43%	H	.2%	8%	H
Small/Med	<40	14%	16%	L	8%	8%	L	9%	15%	M
Large	<40	29%	11%	M	8%	4%	M	55%	20%	M
Large	>40	37%	33%	L	46%	39%	L	18%	8%	M
Plantations								17%	?	H

		Oak/Mixed Conifer			***Pinyon/Juniper***		
Size / Cover		***H***	***C***	***D***	***H***	***C***	***D***
Meadow	<20	37%	23%	M	21%	13%	M
Small/Med	>40	21%	9%	M	0%	1%	L
Small/Med	<40	16%	16%	L	18%	1%	H
Large	<40	14%	13%	L	52%	37%	M
Large	>40	12%	10%	L	47%	9%	H
Plantations					1%		H

Table 16. Vegetation Type acres by Common Vegetation Units in the analysis area

CVU	**ACRES***
Conifer/Oak	4691
Douglas-fir	605
Mixed Conifer/Aspen	420
Dry Meadow	4412
Pinyon-Juniper	4529
Ponderosa Pine	5522
Cottonwood	227
Wet Meadow	812

* acres have been rounded

b. Environmental Consequences

(1) No Action Alternative

Direct Effects

No action would result in forest conditions continuing as described under existing condition. Under this alternative, proposed activities would not be carried out at this time. Ongoing or previously approved management activities in the area would continue such as recreation, personal use fuelwood gathering (dead standing and down), grazing and routine road maintenance.

Forest stands and habitat conditions would continue to slowly develop, but would be more susceptible to disturbance events. As a result, stated objectives would not be met. Tree growth would continue to be suppressed in dense stands; the development of different stand structures and age classes would be limited. Ponderosa pine plantations would be susceptible to a high intensity fire. Wildfires would create early seral stage development if they occur. Age class and structural diversity is expected to change little over the short term.

Indirect Effects

The indirect effect of ongoing or previously approved management activities would lead to increased potential for a large fire. Plantations would be extremely susceptible to wildfire. Continued growth of trees and brush would increase ignition potential and wildfire intensity.

Cumulative Effects

If a high intensity wildland fire were to occur, Wildlife habitat and watershed health would be reduced. Wildland fire could move from one vegetation type into another with a continuous vegetation structure. A catastrophic fire would have the potential to lose additional local seed sources for these types, because past logging has already taken a large number of local seed sources away.

Risk potential for high intensity wildfire would increase for moving from National Forest lands to private property. Risk for damage to private property from high intensity wildfire would increase.

(2) Proposed Action Alternative

Direct and Indirect Effects

The proposed action would create treatments that would emphasize growth and vigor, size class, structure and fire resiliency through utilizing such methods as thinning from below, removal of dead and mountain pine beetle infested trees and prescribed fire treatments. These treatments would result in forest resilient stands and habitat conditions that would decrease the risk of a catastrophic fire event. Tree vigor and growth would be improved with thinning removal of suppressed and intermediate trees. The development of different stands structures and age classes would create a mosaic across the landscape depending on treatment applied. As with any disturbance treatment, effects on soil, water and vegetation could be adverse depending on the intensity of prescribed fire..

The plantation thinning prescription would result in residual stands that have increased growth, vigor, and health. Size class and growth would be enhanced through removal of suppressed trees. Fuel ladders would be reduced by removal of intermediate and suppressed trees to reduce potential for high intensity wildfire.

Large tree structure potential would increase, as residual trees would move towards a desired condition of a forest with larger tree characteristics and fire resiliency.

The Wildland Urban Interface Zone prescription adjacent to private property consists of individual tree removal, thinning from below, and salvage prescription that would result in fuel conditions that allow for increased efficiency and safer suppression of wildland fire ignitions. Fires are controlled through initial attack in all but the most severe weather conditions. Thinning, biomass removal, pile burning and low intensity prescribed fire, would result in a reduction in surface fuel loading and fuel ladder conditions. Live crown base height has sufficient separation between surface fuels and live base crowns (minimum average of 10 feet).

Mechanical removal of the small tree boles would reduce overall emissions from smoke and particulate matter when piles are burned. The prescription would improve residual tree survival in the event of a high intensity wildfire and reduce the potential for crown fire occurrence.

The grass maintenance prescribed fire prescription would result in increased restoration of grasses and forbs. A maintenance prescribed fire rotation every 6 -8 years would be necessary to maintain the restoration.

Cumulative Effects

Treating these vegetation types will lessen the possibility of large fires moving from these vegetation types into other types, such as plantations through mixed conifer and damaging watershed health and wildlife habitat.

Modification of the vegetation structure will lessen the potential for high intensity wildland fire to move into private property from National Forest Land.

5. Rangeland

a. Affected Environment

Three active grazing allotments are located in the Black Mountain / Devils Hole Project area. The majority of the Devils Hole Cattle and Horse (C&H) Allotment is located in the project area. A small percentage of the project area is located in southern portion of the Greenhorn Allotment (Pasture 6) and southern portion of the Williams Creek C&H Allotments (Custer, Deer Lick, and West Plantation Pastures). The entire West Plantation Pasture of the Williams Creek Allotment is located in the project area.

The largest numbers of AUM's were grazed on the allotments from the early 1900's to the 1930's. Starting in the 1930's until the 1970's seasons were shortened and numbers reduced on the allotments because of overgrazing. The numbers of AUM's grazed have remained fairly consistent over the last 25 years. Logging in the 1960s and 1970s created openings that improved forage

production and livestock distribution. For the last 3 years, the drought has had significant impacts on forage production on the allotments resulting in shorter seasons and reduced numbers being run on the allotments.

The Devils Hole Allotment has one permittee with a term grazing permit for 220 cow/calf pairs from June 1 to September 15 for a total of 1021 AUM's. The Devils Hole Allotment is currently being managed under a 6 pasture rest rotation grazing system. The Devils Hole Allotment was rested in 2001 and used lightly in 2002. The allotment has received grazing use by trespass livestock from adjacent private lands in the past. Only 60 cow calf pairs were run on the allotment during the 2003 grazing season due to the drought situation. Range inspections conducted over the last two years on the allotment indicate that overall apparent trend on the allotment is upward.

The Williams Creek Allotment has one permittee with a term grazing permit for 735 cow/calf pairs from June 16 to October 30 for a total of 4363AUM's. The permittee on the Greenhorn Allotment has a term grazing permit for 392 cow calf pairs from June 16 to October 7 for a total of 1936 AUM's. Starting in 1993 to 2002, because of concerns with locations of existing pasture boundary fences, grazing use on the allotments was managed primarily by salting (strategic placing and moving of mineral supplement blocks put out for the livestock) and riding (general term meaning moving the livestock to new areas by herding them to different locations). Only portions of existing pasture fences were used to control grazing use. In 1997, the Greenhorn and Williams Creek Allotments were combined and run together under a 14 pasture rest rotation grazing system. In the 2003 grazing season because of concerns with properly controlling grazing use on allotments using only salting and riding, electric fencing was used on an experimental basis. Because of the drought situation in the last two years only 20 percent of the total permitted livestock numbers have been run on these allotments. Range inspections conducted over the last two years on the allotments indicate that overall apparent trend is upward with a few areas in a stable to downward trend because of problems with livestock distribution in the past.

b. Environmental Consequences

(1) No Action Alternative

Direct Effects

Under this alternative loss of forage production in open parks and conifer stands will continue to occur as the result of conifer and shrub encroachment. Benefits of fire on forage species (stimulation and restoration) in the analysis area would not occur.

Indirect Effects

As conifer stands become denser, distribution of livestock on the allotments will become increasingly more difficult. Denser conifer areas will eventually become unusable by livestock. Loss of forage in parks and timber areas will result in concentrated use by livestock in riparian areas. Overall management of livestock on allotments in the project area will become more difficult.

This alternative does not meet desired condition goals as listed in the Forest Plan.

Cumulative Effects

Because of present and future development of adjacent private lands in the project area, use by elk on National Forest lands will be increased. Reduced forage production will result in increased competition for forage between elk and livestock.

(2) Proposed Action Alternative

Direct Effects

Under this alternative forage production in open parks and conifer stands will be increased. Benefits of fire on forage species (stimulation and restoration) in the analysis area would occur resulting in improved vegetative health and vigor.

Indirect Effects

Distribution of livestock on the allotments will be improved. Denser conifer stand areas on allotments will be maintained as suitable grazing lands. Increased forage in parks and timbered areas will result in less use of forage by livestock in riparian areas. Because of increased forage production and improved distribution of livestock on the allotments, overall management of livestock on the allotment will become less difficult.

This alternative meets all desired condition goals as listed in the Forest Plan.

Cumulative Effects

Because of present and future development of adjacent private lands in the project area, use by elk on National Forest lands will be increased. Increased forage production under this alternative will result in reduced competition for forage between elk and livestock.

6. Noxious Weeds

a. Affected Environment

Overall noxious weed infestations in the project area are minimal especially in the Devils Hole Allotment area. Small isolated patches of Canadian thistle are found scattered in the project area on the Williams Creek and Green horn Allotments especially along wetter sites and logging roads. Approximately three acres of Musk thistle are found in the project area north and south of Deer Lick Creek on the Williams Creek Allotment. This patch of Musk thistle was treated in 2003.

b. Environmental Consequences

(1) No Action Alternative

Direct and Indirect Effects

Under this alternative rate of spread of noxious weeds will not change.

Cumulative Effects

Under the no-action alternative livestock grazing and road use by hunters, horseback riders, woodcutters, and recreationists will contribute to the spread of noxious weeds. Forest policy and mitigations (requiring weed-free hay and mulch, washing of equipment, weed inventory and control) prevent new infestations and slow the rate of spread of existing infestations. The no-action alternative will result in no change to the existing rate of spread by noxious weeds.

(2) Proposed Action Alternative

Direct and Indirect Effects

Under this alternative vigor and vegetative health will be improved. This will help native vegetation to compete better with noxious weed species. While opening up the canopy and soil disturbance (from mechanical treatment or prescribed burns) does have the potential to leave soil open for establishment of new populations of noxious weeds, integrated design features incorporated into the proposed action will prevent the introduction of weed seeds.

(3) Cumulative Effects

Cumulative effects under the proposed action will be minimal. Noxious weeds are currently being introduced spread by livestock grazing, hunters, horseback riders, woodcutters, and recreationists. While the proposed action has the potential to introduce and spread noxious weeds (as does all ground disturbing and canopy reducing activities), design features integrated into the proposed action will reduce the risk of noxious weeds. By minimizing direct and indirect effects through integrated design features, cumulative effects are minimized. Project level surveys and monitoring will assist in identifying and controlling noxious weed infestations, leading to little or no additional cumulative effects from noxious weeds over the no-action alternative.

D. Economic

1. Economic

The economic values of implementing the alternatives were evaluated by utilizing the Quicksilver Economic Model. Values were assessed for costs of treatment implementation under the action and no action alternative with corresponding benefits. No treatments would be implemented under the No Action Alternative; however, fire suppression costs were modeled for the predicted size of fire that could occur without treatments. Under the Action Alternative, costs were modeled for treatments and fire suppression costs for the predicted size of fire that could occur after treatments

were implemented. The value results are approximate, as there are cost variables in any out year projection. The only revenues modeled were personal use fuel wood. Historically small tree products are low in value, with firewood the primary product. The results of economic modeling are as follows:

No Action Alternative: This Alternative would continue management activities in the project area that are currently under permits such as grazing, however no fuel wood sales would be offered to generate revenues. Fire suppression values modeled under this alternative were based on an 80% chance of occurrence that one 500 acre fire could occur over an 8 year time span given the current fuel and vegetation conditions:

Costs:

Activity	Years	Quantity	Value
Fire Suppression Costs	One time	500 acres @ 900.00/ ac	$450,000.00
Fire Rehabilitation	One time	300 acres @ 700.00/ ac	$210,000.00

Total cost for the No Action alternative is approximately -$660,000.00 for an eight year time span. However there is potential for more fires to occur given drought conditions in the future, which would increase the cost significantly.

Action Alternative: The action alternative would result fuel reduction and fire behavior modification. The action alternative would produce approximately 50 CCF per year in Personal Use Fuel wood. Due to the high percentage of plantations that need thinning treatment, an additional benefit realized would be an increase in tree growth and vigor along with increased fire resiliency of the stands. Preservation or restoration of habitat values is interpreted as ecosystem-benefiting treatments and identified as a cost in either thinning or prescribed fire. Fire suppression values modeled under this alternative were based on an 80 percent chance of occurrence that one 100 acre fire could occur over an 8 year time span given implementation of treatments that would modify fuel and vegetation conditions and fire intensities.

Costs:

Activity	Years	Quantity	Value
Fire Suppression	One time	100 acres @900.00/ac	$90,000.00
Fire Rehabilitation	One time	20 acres @ 700.00/ac	$14,000.00
Fuel Treatment	Annual 1-8	100 acres	$160.00 /acre
Rx Fire	Annual 1-8	300 acres	$100.00 / acre
Hydro-Ax Thinning/Fuel Rd	Annual 1-8	150 acres	$250.00 / ac
Fuelwood Sale Prep	Annual 1-8	1000 CCF	$46.83 / CCF
Fuelwood Sale Admin	Annual 1-8	1000 CCF	$17.96 / CCF

Benefits:

Activity	Years	Quantity	Value
Personal Use Fire Wood	Annual 1-8	200 CCF	$20.00 / CCF (100 cubic feet)

Total cost for the Treatment Alternative over a span of 8 years is approximately -$794,000.00 for the USFS. Total benefit for the Treatment Alternative over a span of 8 years is approximately $27,000.00. The Present Net Value of the treatments in this alternative would be approximately $-767,000.00 or $-114,000.00 per year in net annual equivalent. The composite rate of return is $-31.87. Fuel hazard reduction treatments, ecosystem restoration treatments, and thinning treatments to improve forest health do not have tangible monetary return benefits.

In the Black Mountain analysis area, there are increasing wildland urban interface risks where houses are being built and property values are increasing. Without vegetative treatment, fires have the potential to grow larger in size thus increasing the potential to destroy life and property. It is important to consider Urban Interface Risk potential when evaluating the cost of treatments and the benefits.

The analysis area, being in high departure from historic vegetation conditions, with increasing fuel loads and tree densities, should have the importance of ecosystem restoration values considered when evaluating costs verses benefits of treatments.

IV. List of Preparers

Mike Smith, co-IDT leader, Recreation, Timber
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Toni Toelle, Fire

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Dennis Cleary, GIS

Jennifer Hall, Soils

Dave Park, Watershed

Steve Segin, Cultural Resources

Stan Vallejos, Range
Brian Elliott, Benjamin Madsen, Botany

V. List of Agencies Consulted

US Fish and Wildlife Service

Colorado Division of Wildlife

VI. Glossary

A

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

Air Quality - Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206:Jan., 1988.

Airshed – A geographic area that, due to topography, meteorology, and climate, shares the same air.

Alternative – A mix of management prescriptions applied to specific land areas to achieve a set of goals and objectives. The alternatives provide management direction for the proposed project that reflects identified public and management concerns for the Decision Area.

Analysis Area – 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 in which the proposed activities will occur.

B

Background - That part of a scene, landscape, etc., which is furthest from the viewer, usually from three miles to infinity from the observer.

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

Best Management Practices (BMPs) – Practices determined by the State to be the most effective and practical means of preventing or reducing the amount of water pollution generated by non-point sources, to meet water quality goals.

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

Biological Assessment - FS or BLM document analyzing the potential effects of federal actions on U.S. 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 in an area.

Biological Evaluation – A documented Forest Service review of activities in sufficient detail to determine how an action may affect sensitive species.

BLM - Bureau of Land Management

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

Broadcast Burn - Allowing a prescribed fire to burn over a designated area in well-defined boundaries for reduction of a fuel hazard or as a silvicultural 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 (FWS) 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 that are left to decay on the forest floor.

Coarse Wood Debris (CWD)/Coarse Woody Material (CWM) - 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).

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.

Condition Class - A grouping of timber stands into size-age-stocking classes for Forest planning.

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

Council on Environmental Quality (CEQ) – An advisory council to the President, established by NEPA. It reviews federal programs for their effect on the environment, conducts environmental studies and advises the President on environmental matters.

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. 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 that 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.

Cultural Resources – The remains of sites, structures, or objects used by humans in the past historic or prehistoric.

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.

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 – Any community of organisms along with its environment, forming an interacting system.

Effective ground cover – Any vegetation, litter, or debris in direct contact with the surface soil. This cover effectively intercepts rain and provides erosion protection.

Effects (or impacts) – Environmental consequences (the scientific and analytical basis for comparison of alternatives) because 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.

Endangered Species – Any plant or animal species that is in danger of extinction throughout all, or a significant portion of its range (Endangered Species Act of 1973).

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, biological, economic, and social 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; c. facilitate preparation of an EIS when necessary.

Environmental Impact Statement (EIS) - 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.

Ephemeral Streams – Streams that flow only as a direct response to rainfall of snowmelt events. They have no base flow.

Erosion – The detachment and transport of individual soil particles by wind, water, or gravity.

ESA - Endangered Species Act of 1973, as amended.

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).

Evenaged 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 seed tree harvest methods produce even-aged stands.

F

Fauna – Animals, including lesser forms such as insects, mites, etc.

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

Floodplain – The lowland and relatively flat areas adjoining inland and coastal waters, including, at a minimum, that area subject to a one percent of greater chance of flooding in any given year.

Flora – Plants

Forage – All browse and non-woody plants that are available to livestock or game animals and used for grazing or harvested for feeding.

Forb - An herbaceous plant that is not a graminoid.

Forest Development Road – A road wholly or partially in or adjacent to a National Forest System boundary that is necessary for the protection, administration, and use of National Forest lands, which the Forest Service has authorized and over which the agency maintains jurisdiction.

FS - USDA Forest Service

Fuel Treatment - Manipulation or reduction of natural or activity fuels (generated by a management activity such as slash left from logging) to reduce fire hazard.

Fuels - Combustible materials present in the forest that potentially contribute a significant fire hazard.

FWS - U.S. Fish and Wildlife Service

G

Graminoid – All grasses and grass-like plants, including sedges and rushes.

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 in a geographic area (See table below). For example, a 4C stand would largely be comprised of trees 9.0 to 20.9 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 ft); generally, any vegetation used by elk for security or escape from danger. Estimated using habitat structural stages 3B, 3C, 4B, 4C, and 5 stands.

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 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.

Indicator Species – See Management Indicator Species.

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

Individual Tree Selection - An uneven aged 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.

Intermittent Streams – A stream that runs water in most months, but does not run water during the dry season of most years.

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

Irretrievable – Applies to losses of production, harvest, or a commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievable lost during a time an area is used as a winter sports (recreation) site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible – Applies primarily to the use of nonrenewable resources, such as minerals, or cultural resources, or to those factors that are renewable only over long-time spans, such as soil productivity. Irreversible also includes loss of future options.

Issue – A subject of question of public discussion of interest to be addressed or discussed in the planning process.

L

Land Allocation - The assignment of a management emphasis to particular land areas with the purpose of achieving goals and objectives. Land allocation decisions are documented in environmental analysis documents such Forest Land and Resource Management Plans.

Landsat Thermatic Mapping - Process used to graphically depict vegetation types in the project area. Data are obtained from photographs taken from satellites. The satellite collects reflected and emitted energy used to discriminate between Earth surface materials (e.g. vegetation) through the development of spectral signatures.

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

Lodgepole Pine - See Timber types.

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

Management Area – Geographic areas, not necessarily contiguous, which have common management direction, consistent with the Forest Plan allocations.

Management Direction – A statement of multiple use and other goals and objectives, along with the associated management prescriptions and standards and guidelines to direct resource management.

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.

Management Prescriptions – A set of land and resource management policies that, as expressed through Standards and Guidelines, creates the Desired Future Condition over time.

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

Mitigation – Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impacts of a management practice.

Mixed Conifer - See Timber Types

Model - A formalized expression of a theory to describe, analyze, or understand a particular concept.

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), which is one of the most destructive insect pests in the intermountain west.

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 decision making 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.

Non-System Road - Road that is not a system road. Usually illegal, user-created roads.

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

Obliteration – Obliteration of an existing road would involve, removal of all culverts, establishing permanent drainages and recontouring of the road surface.

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

Open Road Density – A standard set in the Forest Plan that is applied to most Management Areas important to big game. This road density standard of three-quarter of a mile of open road per square mile of habitat correlates directly to the elk habitat effectiveness of the area (i.e. 68 percent)

Optimum Habitat – The amount and arrangement of cover and forage that results in the greatest level of production that is consistent with other resource requirements.

Overstory - The portion of trees in a forest that 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.

Peak Flow - The greatest flow attained during the melting of the winter snowpack.

Perennial Stream – Streams that flow continuously throughout the year.

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; The plasticity test is simply squeezing a handful of soil; if it sticks together, it is wet and should be avoided.

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

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 - The application of fire to fuels in either a natural or modified state under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce

the intensity of heat and rate of spread required to further certain planned objectives (i.e. silviculture, wildlife management, reduction of fuel hazard, etc.).

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

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

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. Streamsides, lake borders, or marshes are typical riparian areas. Vegetation bordering watercourses, lakes or swamps; it requires a high water table.

Road – A vehicle travel way of over 50 inches.

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.

Route – a road and/or a trail – often used as a collective term for both roads and trails.

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.

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

Scoping – The procedures by which the agencies determines the extent of analysis necessary for a proposed action, i.e. the range of actions, alternatives, and impacts to be addressed, identification of significant issues related to a proposed action, and establishing the depth of environmental analysis, data, and task assignment.

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

Sediment – Any material carried in suspension by water, which will ultimately settle to the bottom. Sediment has two main sources; from the channel itself, and from upslope areas.

Sediment Delivery – The amount of sediment moved from an uphill position by forces of water, wind, or gravity (erosional forces) that reaches a stream that has net been trapped by a buffer, i.e. a riparian area.

Sedimentation – A general term describing both the erosion and sediment delivery processes.

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 uneven aged forest in order to realize yield and establish regeneration or irregular constitution.

Sensitive Species – Those species identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trends in population numbers or density, or habitat capability that would reduce a species' existing distribution.

Seral – A biotic community that is in 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 STRUCTURE	SIZE CLASS	CANOPY STRUCTURE	CANOPY CLOSURE
Grass-forb-shrub	≤ 0.9"	Open (A)	0-29%
Shrub-tree-seedling	1.0-4.9"	Moderate (B)	30-69%
Pole-sapling (3)	5.0-8.9"	Closed (C)	70-100%
Mature (4)	9.0"-20.9"		
Old tree (5)	≥ 21.0"		

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.

Soil Displacement - The movement of the forest floor (litter, duff, and humus layers) and surface soils from one place to another by mechanical forces such as a blade used in piling and windrowing.

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.

Stream Order - It is often convenient to classify streams in a drainage basin by systematically defining the network of branches. Each non-branching channel segment (smallest size) is designated a *first-order stream*. A stream which receives only first-order segments is termed a *second-order stream*, and so on. The order of a particular drainage basin is determined by the order of the principle or largest segment.

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.

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 and BLM Road.

T

Temporary Road –A subset of a road, a temporary road is authorized by contract, permit, lease, other written authorization or emergency operation, not intended to be part of the Forest transportation system and not necessarily for long-term resource management

Thermal Cover - Cover used by animals to ameliorate effects of weather; for elk, a stand of coniferous trees 12 meters (40 ft) or more tall with an average crown closure of 70 percent or more; for deer, cover may include saplings, shrubs, or trees at least 1.5 meters (5 ft) tall with 75 percent crown closure. Estimated using habitat structural stages 3C, 4C, and 5 stands.

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

Threatened Species – Any species of plant or animal that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

Timber Types - A descriptive classification of forestland 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.

Trail – A travel way, either motorized or nonmotorized, less than 50 inches.

U

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 in the planning area.

W

Water Influence Zone (WIZ) - The water influence zone (WIZ) includes 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.

Water Yield – The measured output of the Forest's streams.

Watershed – Entire area that contributes water to a drainage system or stream.

Watershed Classes (IWWI)

Class I (Pristine) – Areas where current and past management activities have not significantly affected the function of stream and riparian areas. These watersheds are

relatively pristine and form the basis from which comparisons to impacted stream and riparian systems could be made.

Class II (Limited) – Areas where there are currently management activities occurring, and are not in a pristine condition. Influences on sediment transport, hydrologic function, and biological communities are present, and are moderately impacted.

Class III (degraded) – Areas where major impacts to the land have resulted in severe damage to stream and riparian function. In many cases, these areas have been identified by the Colorado Department of Health or other agencies as being seriously degraded directly by management activities.

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.

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

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.

VII. References

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VIII. Appendix A – Key Forest Plan and other Guidance

Wildlife

Management Requirements – Management Area 5B (Winter Range)

-Maintain habitat capability for Management Indicator Species (MIS; mule deer/elk, Abert's squirrel, and black-throated gray warbler) (>= 80% of potential capability)

-Provide big game forage/habitat/cover – maintain >= 30% of area in created or natural openings

-Do not eliminate any browse species (mountain mahogany, snowberry, Gambel oak, and current)

-Provide thermal cover (stand of conifer trees >= 40' tall w/an average of 70% canopy closure [Thomas et al. 1979]) for deer/elk on >= 20% of the forested areas

-Maintain hiding cover (90% obstruction of adult standing deer/elk @ 200' from a human) along 75% of all arterial and collector road edges in forested areas

-In DUs dominated by forested ecosystems, maintain >= 50% of DU in hiding cover well distributed over the DU)

-Maintain 30% of the DU in thermal cover (winter or spring/summer); hiding cover can equal thermal cover if they biologically coincide

-Maintain habitat effectiveness during winter of >=90%

-Maintain habitat capability of >=80% of potential capability

Management Requirements – Management Area 6B (Grazing)

-Maintain habitat capability for MIS (60% of potential capability)

Management Requirements – Management Area 6B (Grazing)

-Maintain habitat capability for MIS (60% of potential capability)

Forest Plan Standards and Guidelines

Forest Plan standards for the 5B and 6B management prescription areas are those covered in the general Forest Plan direction and include:

Abert's squirrel habitat – Provide/protect one Abert's squirrel nest tree clump (0.1 ac. of 9-22" dbh ponderosa pine with an interlocking canopy) per 6 ac. of ponderosa pine savannah maintenance burn areas, if available.

Soils

Regional Requirements

Soil quality standards provided by Region 2 are as follows:

- No more than 15 percent of an activity area will be left in a detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition. This does not include the permanent transportation system.

- Required minimum percent effective groundcover for the first and second year after disturbance:

Erosion Hazard Class	1st Year	2nd Year
	(%)	(%)
Low	50	70
Moderate	40	60
High	30	50
Very High	30	50

Management activities will be conducted in such a way as to not exceed the Soil Quality Standards. The emphasis is on protecting the soil resource before excessive damage occurs. Where excessive soil impacts already exist from prior activity, the emphasis shall be on preventing any additional detrimental impact, and on reclamation where feasible.

Additionally, all applicable Watershed Conservation Practices will be followed (Watershed Conservation Practices Handbook, 2002).

State of Colorado

All Best Management Practices that apply to this project will be employed (Colorado Forest Stewardship Guidelines - Best Management Practices(BMPs) for Colorado, 1998).

Forest Plan

Vegetative treatment will not Management Area 9A (Riparian Areas), and buffers have been established in the Forest Plan (LRMP, 1984).

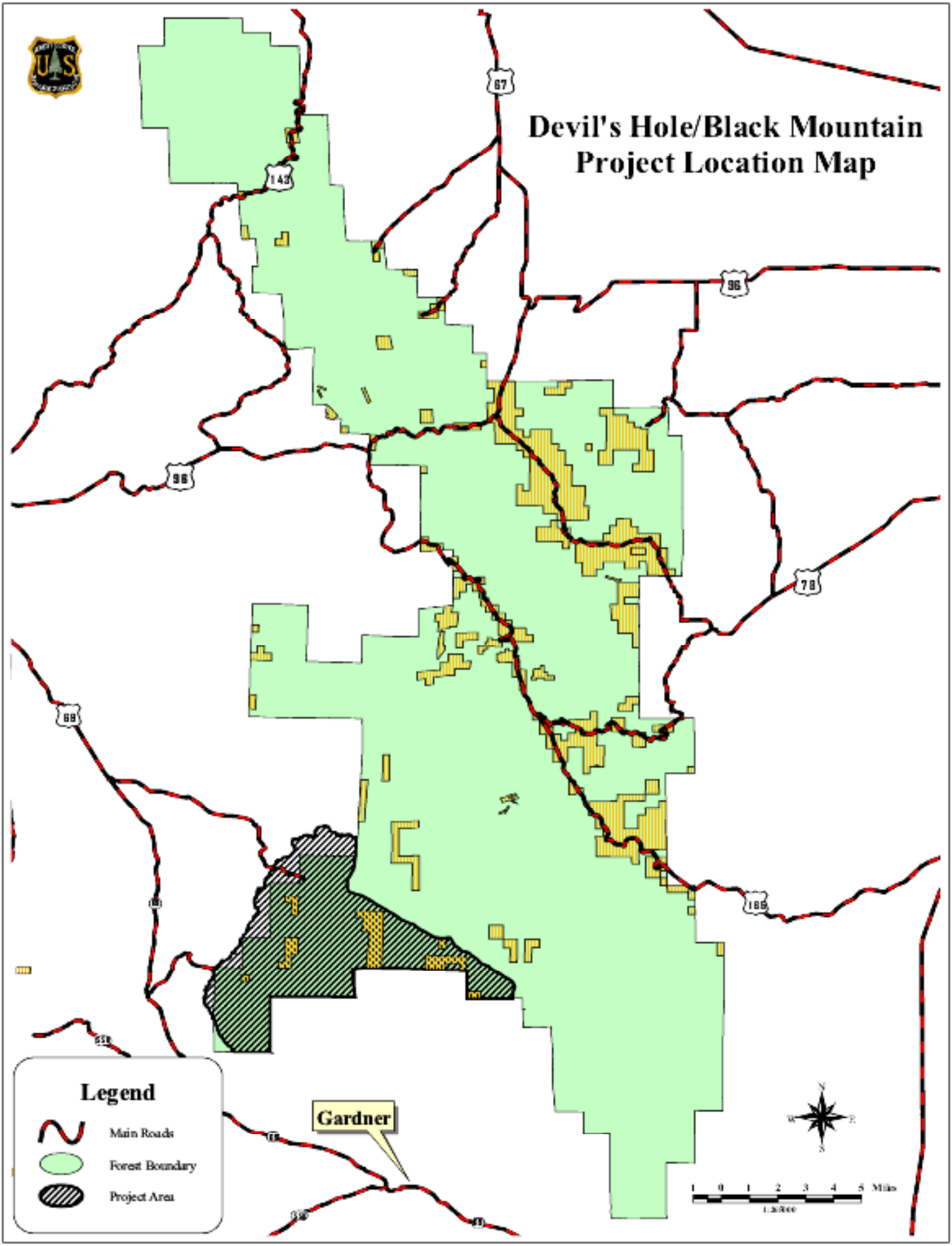
Reduce, through designed management practices and appropriate erosion mitigation and vegetation/restoration measures, the project caused on-site erosion rates by 75% within the first year after disturbance. Reduce project caused on-site erosion by 95% within 5 years of initial disturbance.

Design continuing mitigation/restoration practices and follow-up maintenance activities to insure that 80% original ground cover (vegetation) recovery occurs after disturbance.

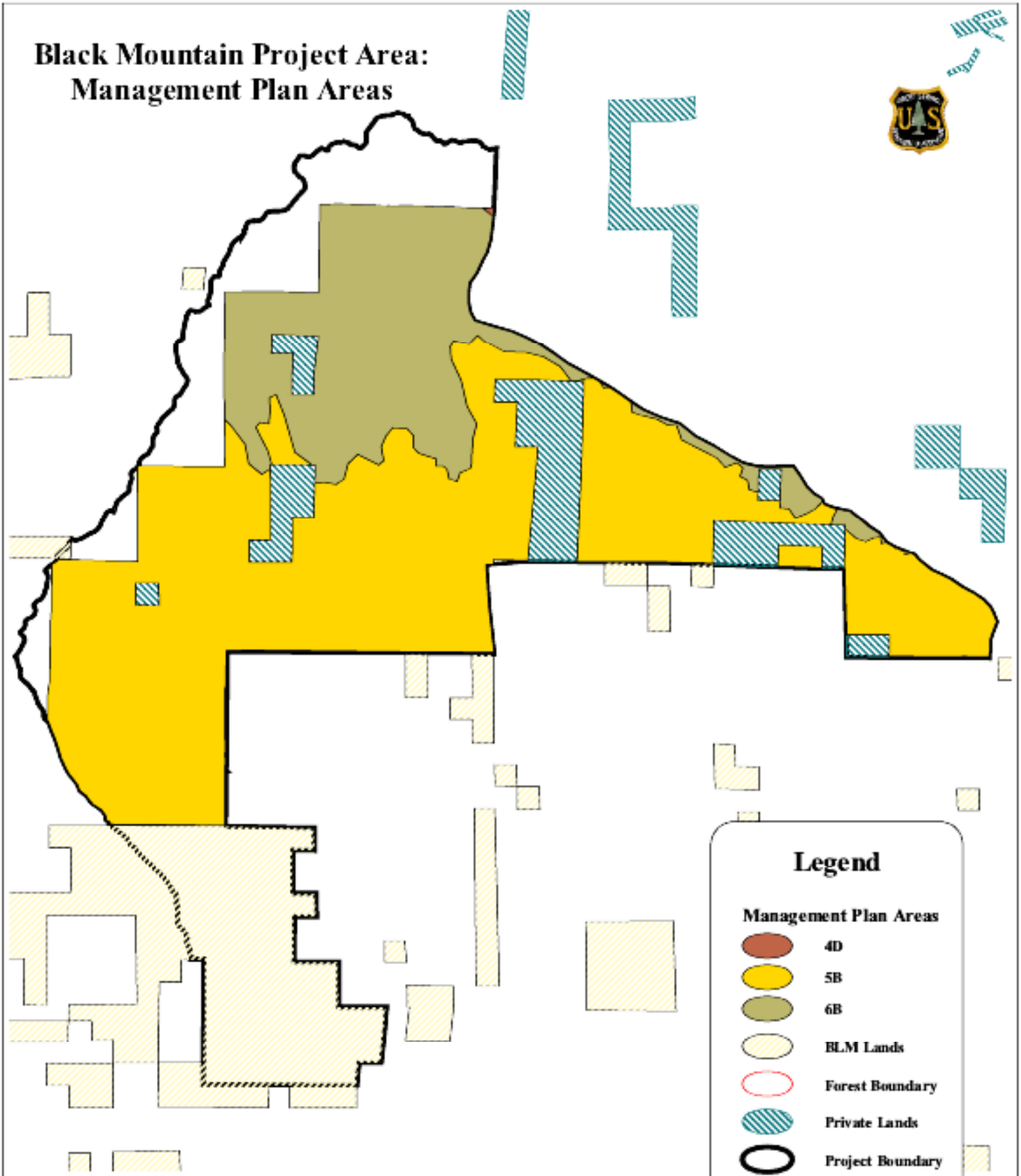
IX. Appendix B – Scientific Name Table

Tree Species or Species Associations	
Aspen	*Populus tremuloides*
Bristlecone pine	*Pinus aristata*
Douglas-fir	*Pseudotsuga menziezii*
Engelmann spruce	*Picea engelmannii*
Gambel oak	*Quercus gambelii*
Pinyon-juniper	*Pinus-Juniperus spp*
Ponderosa pine	*Pinus ponderosa*
Spruce-fir	*Picea-Abies spp.*
Subalpine fir	*Abies lasiocarpa*
White fir	*Abies concolor*
Shrub/forb species	
Bracted alumroot	*Heuchera bracteata*
Brandegee wild buckwheat	*Eriogonum brandegei*
Canada thistle	*Cirsium arvense*
Cutleaf daisy	*Erigeron compositus*
Degener's beardtongue	*Penstemon degeneri*
Dwarf milkweed	*Asclepias uncialis*
Dwarf raspberry	*Rubus arcticus* var. *acaulis* also called *Cylactis arctica* ssp. *acaulis*
Early bluetop fleabane	*Erigeron vetensis*
Front Range cinquefoil	*Potentilla rupincola* also called *P. effusa* var. *rupincola*
James' telesonix	*Telesonix jamesii*
Matted saxifrage	*Ciliaria branchialis*
Mountain goldenbanner	*Thermopsis montana*
Mountain mahogany	*Cercocarpus montanus*
Narrow-leaved moonwort	*Botrychium lineare*
Prairie sagewort	*Artemisia frigida*
Rock-loving aletes	*Neoparrya lithophila* also called *Aletes lithophilus*
Smith's whitlow-grass	*Draba smithii*
Two-lobe larkspur	*Delphinium nuttallianum*
Grass/Sedge Species	
Mountain muhley	*Muhlenbergia montana*
Parry's oatgrass	***Danthonia parryi***

Mammals	
Abert's squirrel	***Sciurus aberti***
Beaver	***Castor canadensis***
Canada lynx	***Lynx canadensis***
Dwarf shrew	***Sorex nanus***
Elk	***Cervus elaphus***
Fringed-tailed bat	***Myotis thysanodes pahasapensis***
Hog-nosed skunk	***Conepatus mesoleucus***
Ringtail	***Bassariscus astutus***
Snowshoe hare	***Lepus americanus***
Townsend's big-eared bat	***Plecotus townsendii***
Birds	
Flammulated owl	***Otus flammeolus***
Lewis's woodpecker	***Melanerpes lewis***
Loggerhead shrike	***Lanius ludovicianus***
Northern goshawks	***Accipiter gentilis***
Pygmy nuthatch	***Sitta pygmaea***
Virginia's warbler	***Vermivora virginiae***
Amphibians	
Bullfrogs	***Rana catesbeiana***
Northern leopard frogs	***Rana pipiens***
Tiger salamanders	***Ambystoma tigrinium***
Reptiles	
Milk snake	***Lampropeltis triangulum***


Devil's Hole/Black Mountain
Project Location Map
67
143
96
93
78
68
188
Gardner
Legend
Main Roads
Forest Boundary
Project Area
N
W
E
S
0 1 2 3 4 5 Miles

Black Mountain Project Area: Management Plan Areas

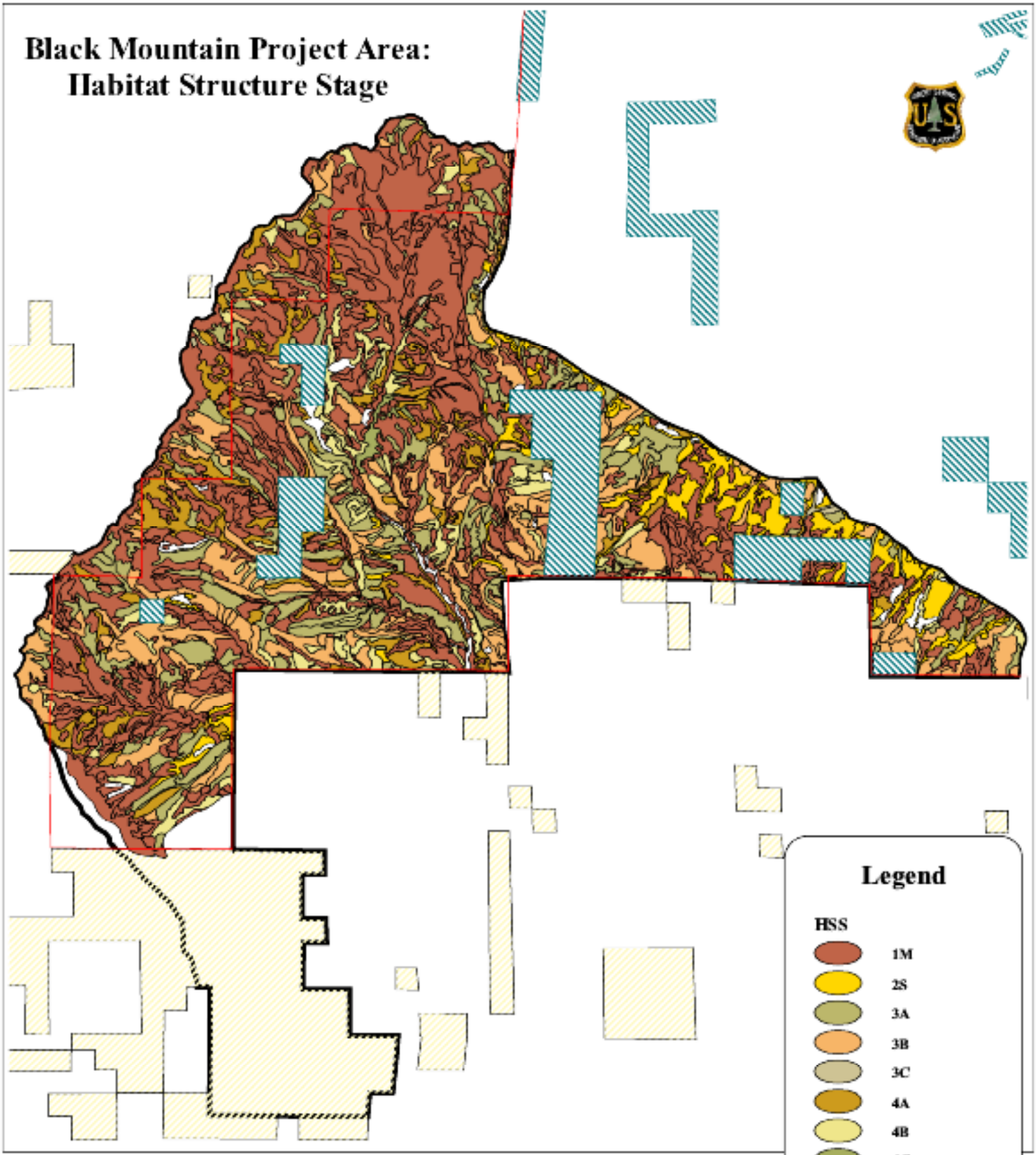


Management Code	Acres
4D	4
5B	12092
6B	4015

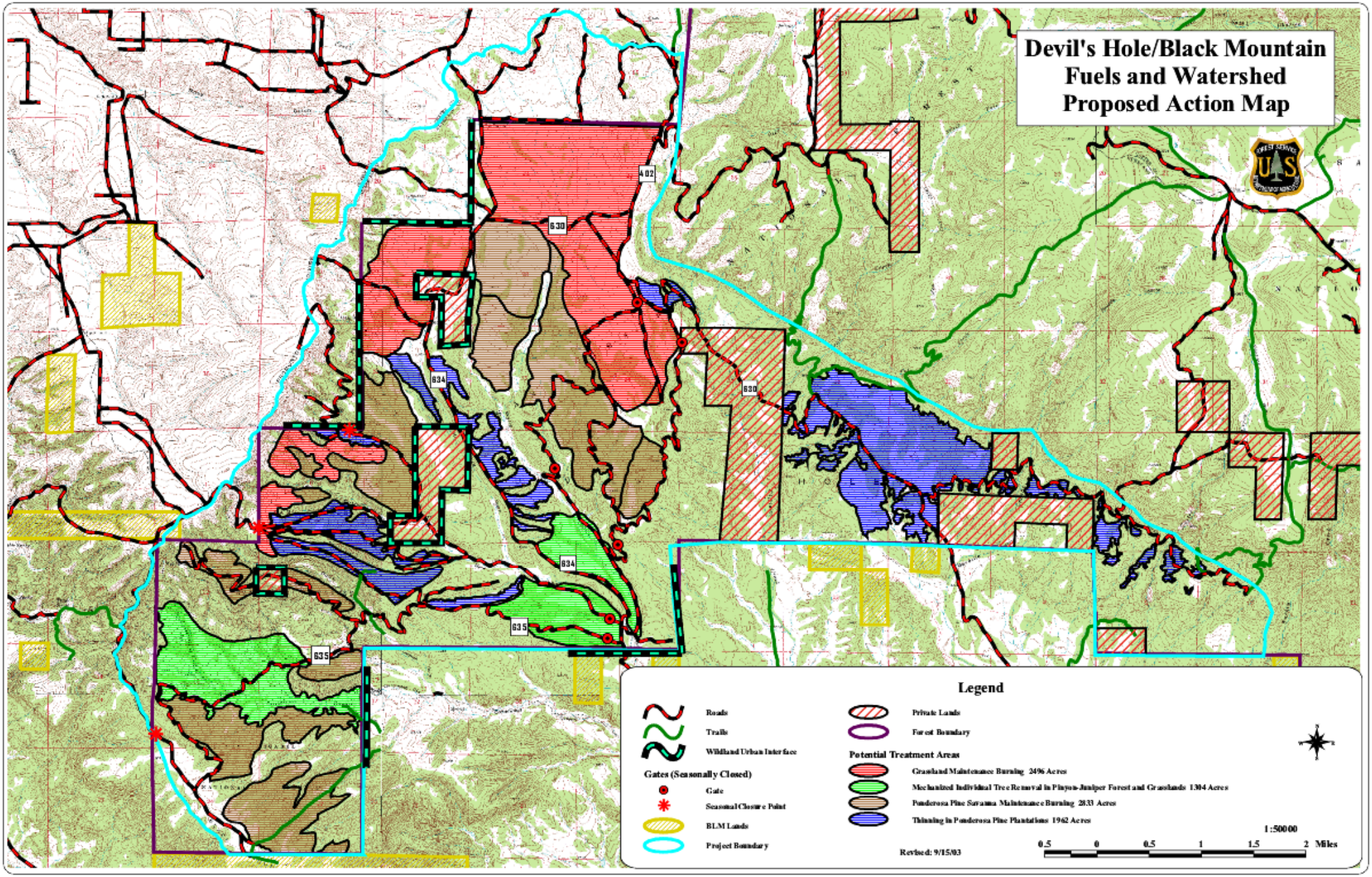
0.5 0 0.5 1 1.5 2 2.5 Miles

1:90000

Black Mountain Project Area: Habitat Structure Stage



HSS	Acres
1M	9156
2S	1133
3A	2872
3B	3224
3C	46
4A	1482
4B	1121


Devil's Hole/Black Mountain
Fuels and Watershed
Proposed Action Map
402
630
834
630
834
635
835
Legend
Roads
Trails
Wildland Urban Interface
Gates (Seasonally Closed)
Gate
Seasonal Closure Point
BLM Lands
Project Boundary
Private Lands
Forest Boundary
Potential Treatment Areas
Grassland Maintenance Burning 2496 Acres
Mechanized Individual Tree Removal in Pinyon-Juniper Forest and Grasslands 1304 Acres
Ponderosa Pine Savanna Maintenance Burning 2833 Acres
Thinning in Ponderosa Pine Plantations 1962 Acres
1:50000
Revised: 9/15/03
0.5 0 0.5 1 1.5 2 Miles