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Environmental Assessment (final)

WILDLAND FIRE USE

in the Wet Mountains, Sangre de Cristo Range and Spanish Peaks

San Carlos and Salida Ranger Districts, San Isabel National Forest
Custer, Fremont, Huerfano, Las Animas, and Pueblo Counties, Colorado

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SUMMARY

The San Carlos and Salida Ranger Districts of the San Isabel National Forest propose to manage lightning ignited fires to accomplish specific resource management objectives in pre-determined areas and under pre-approved conditions as outlined in a Fire Management Plan. This management concept is referred to as Wildland Fire Use (or WFU). The proposed WFU area encompasses National Forest lands in the Wet Mountains, along the east slope of the Sangre de Cristo Range, and in the Spanish Peaks. The purpose of this action is to reintroduce, where desirable and feasible, the natural role of fire in maintaining the proper functioning and health of natural communities, and to reduce the long-term threat of catastrophic wildfires. The proposed action may allow some naturally ignited fires to reduce fuel loading and reintroduce lower-intensity fires back into forest and grassland ecosystems. This action is needed, because the existing fuel loads within many areas of the National Forest are at levels that could devastate the existing forest if a wildfire started when conditions were hot and dry.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- *Alternative A looks at every lightning-ignited wildfire as a potential WFU fire.*
- *Alternative B limits the potential WFU fires to those within specified environmental conditions.*
- *Alternative C strives to suppress every wildfire. This is our current mode of operations for dealing with wildfires.*

Based upon the effects of the alternatives, the responsible official will decide which alternative will best meet future wildfire management objectives.

The EA was prepared in accordance with the President's Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), and the environmental policy and procedures established in Forest Service Manual (FSM) 1950 and Forest Service Handbook (FSH) 1909.15. Data, information, and documents supporting the analyses presented in the EA may be reviewed at the San Carlos Ranger District office, 3028 Main Street, Canon City, Colorado.

CHAPTER 1: INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the San Carlos Ranger District Office in Canon City, Colorado.

Background

Wildland fires have played a significant role in the mountains of Southern Colorado. Individual plants and plant communities have evolved with fire and have adapted to it in various ways. Fires occurred naturally at certain average time intervals, which varied by vegetation and climatic conditions. These fires created and maintained a mosaic of different vegetative age classes and species mixtures across the landscape. Periodic fires are essential to sustaining proper functioning of the ecosystem and maintaining the health and diversity of vegetative communities.

The current fire management policy for the Pike and San Isabel National Forests strives to suppress all wildfires as soon as possible, both lightning ignited and human caused. Since the 1920s, the Forest Service has been very successful in achieving this fire suppression objective. Decades of aggressive fire suppression actions have allowed forest fuels to build up to unnatural levels and altered the ecological composition and structure of the fire dependent ecosystems in the area.

Lightning ignites approximately 75% of all wildfires occurring on National Forest lands in the Sangre de Cristo Range, Spanish Peaks, and Wet Mountains. Of the 237 lightning ignited wildfires occurring within the analysis area over the past 35 years, 150 were contained at less than 1 acre. Fewer than 20 fires exceeded 10 acres in size before they were controlled. Since 1970, less than 15,000 acres have burned (from both human and lightning caused fires) within the 475,000-acre analysis area.

Recent analytical evaluations in fire science have shown that reintroducing fire into the environment can have decidedly beneficial effects. The Forest Service has treated large areas of the National Forest by intentionally igniting prescribed fires under tightly monitored conditions to mimic the beneficial effects of wildfire without some of the catastrophic losses in plants or soils. By using prescribed fire, thousands of acres have been thinned, tons of natural fuels have been reduced to ash, and many areas of the National Forest are now safer from the effects of a devastating wildfire. However, there are still many thousands of acres that could benefit from fire.

Over the past 40 years, land management agencies have been implementing and refining the practice of allowing lightning ignited fires to burn uncontrolled, or partially controlled, as long as predetermined conditions are met. Those conditions can include temperature, humidity, fuel moisture, access, and distance from private property or other resources that need protection. The use of lightning ignited fires to achieve resource management objectives has typically occurred on lands that are not suitable for prescribed (management ignited) firing or forest thinning methods.

Proposed Action

The San Carlos and Salida Ranger Districts of the San Isabel National Forest propose to manage lightning ignited fires to accomplish specific resource management objectives in pre-determined areas and under pre-approved conditions as outlined in a Fire Management Plan. This management concept is referred to as Wildland Fire Use (or WFU). The proposed WFU area encompasses National Forest lands in the Wet Mountains, along the east slope of the Sangre de Cristo Range, and in the Spanish Peaks.

Alternatives A and B reflect two different ways that the WFU concept can work (see Alternatives on page 6 for more detail). Both of these alternatives would provide opportunities to reduce fuel loading in the National Forest and reintroduce fire into fire-dependent ecosystems.

Purpose and Need for Action

The purpose of this action is to reintroduce, where desirable and feasible, the natural role of fire in maintaining the proper functioning and health of natural communities, and to reduce the long-term threat of catastrophic wildfires.

The benefits of managing naturally ignited fires for WFU are:

- WFU fires can be used to maintain or restore the ecological composition and structure of the fire dependent ecosystems in the area.
- WFU fires can be used to accomplish resource management objectives, such as reducing fuel load buildup, wildlife habitat improvement, range improvement etc.
- WFU can provide opportunities for the public to observe and interpret fire's natural role in the ecosystem.
- WFU can decrease firefighters' exposure to risk of injury.
- WFU can reduce the cost of fire suppression actions.
- Permitting WFU on the San Isabel National Forest would allow for consistent fire management policies across agency boundaries, resulting in improved landscape level fire planning. The Royal Gorge Resource Area (BLM), the Rio Grande National Forest and the Great Sand Dunes National Park and Preserve currently manage WFU fires on public lands adjoining the San Isabel National Forest.

Based on the national Fire Regime Condition Class (FRCC) rating system, roughly 35% of the plant communities on the Pike and San Isabel Forests fall into Condition Class 2 or 3. Condition Classes 2 and 3 represent plant communities that have been moderately to significantly altered from their historical range of variability, with regard to species composition and structural arrangement. This alteration is generally attributed to decreased fire frequency, arising from 80+ years of aggressive fire suppression. A moderate to high risk of losing key ecosystem components has been identified for these landscapes.

The build up of forest fuels over the past 80 years is annually inflating the potential for explosive fire growth during drought years, and decreasing the Forest Service's ability to control them when high to extreme fire conditions exist. By allowing some lightning ignited fires to burn at low to moderate fire intensity levels, we hope to reduce the proportion of acres burned under high to extreme conditions.

This action responds to the goals and objectives outlined in the Land and Resource Management Plan for the Pike and San Isabel Forests (Forest Plan), and helps move the project area towards desired conditions described in that plan.

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives in order to make the following decisions:

1. What conditions must be met before a wildfire can be used to achieve WFU objectives?
2. Which of the alternatives best mitigate the risk of large and severe wildfires for the short term, and over the long term?
3. Do the alternatives reduce forest fuel loading, and restore the natural composition, structure and ecological functioning of the ecosystems in the area?
4. How will we best protect sensitive natural resources, public improvements or private property, now and in the future?

Public Involvement

One of the first steps in the scoping process for this Wildland Fire Use proposal was to identify representative members of the public who could be affected by this proposal, or who might have an interest in the decisions made for this proposed project. Using the comments from the public, other agencies, and team specialists, the interdisciplinary team developed a list of issues to address.

Scoping letters were sent to roughly 120 individuals and organizations on June 10, 2005, notifying them of a proposed change in the Forest Service's fire suppression policy, which would allow some lightning-ignited fires to burn generally unimpeded to achieve natural resource objectives. The nature of the decisions to be made and the issues involved were discussed in the 6 pages of correspondence. A list of individuals, groups, organizations, and agencies that were notified of the proposed project and invited to comment on it, may be found in the project files located at the San Carlos Ranger District office.

Notification of this proposed change in fire suppression policy has been included in the Schedule of Proposed Actions for the Pike and San Isabel National Forests since July of 2005. These schedules are available on the Forest's website and are mailed quarterly to the approximately 300 individuals and organizations that have asked to be included on this mailing list.

The July 20, 2005 edition of the Pueblo Chieftain included a quarter-page article detailing this Wildland Fire Use policy change. On July 20, 2005 the Canon City Daily Record referenced this Wildland Fire Use proposal in a full front-page article covering the Mason Gulch fire. KRCC-FM radio (a National Public Radio affiliate) aired a feature story on Wildland Fire Use on July 23, 2005. Articles highlighting the proposed Wildland Fire Use policy change have appeared in the October 20, November 3, and November 10, 2005 editions of the Wet Mountain Tribune. The Pueblo Chieftain ran a follow-up article about Wildland Fire Use on February 5, 2006. Notice that the EA was available for public review and comment appeared in the Salida Mountain Mail on May 20, 2008.

Articles outlining the proposed change in fire suppression policy also appeared in the Buena Vista and Trinidad media.

The Forest Service hosted a series of public meetings to discuss this Wildland Fire Use proposal in: Westcliffe on October 26, 2005 and November 28, 2006, Canon City on October 27, 2005, Rye on November 2, 2005 and in Walsenburg on November 9, 2005. Notice of these public meetings was published in the Pueblo Chieftain and local papers for each town. Attendance at these meetings included key county and fire officials from each of these geographic areas, but attendance by the general public was sparse.

Written or electronic comments were received from 13 individuals and organizations in response to this proposal. These public comments, scoping letters, news articles, and meeting notes are part of the project file. The project file is located at the San Carlos Ranger District office; 3028 Main Street; Canon City, CO 81212.

The legal notice announcing the availability of the EA for a 30-day public review and comment period was published in the *Pueblo Chieftain* on April 30, 2008. The EA was mailed to local fire departments, local government officials, state and federal agencies, the media, and to all individuals and organizations that provided comments in response to the scoping. The EA was also available for public review on the San Carlos Ranger District website. Three written responses were received during the 30-day public comment period for the EA.

Issues

The Forest Service separates issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" The interdisciplinary team identified 3 significant issues during the scoping process. These issues include:

Issue #1: *Threats to improvements and private property* - There is a concern that a WFU fire could become an uncontrolled wildfire that burns or threatens private lands, property values, local communities, and public or private improvement.

Issue #2: *Threats to sensitive natural and cultural resources* - There is a concern that a WFU fire could affect watershed conditions by reducing vegetative cover, and increasing the potential for erosion or mass soil movement in burned areas. Rare and sensitive plant or animal populations or their habitat could be further endangered by fire. Potential impacts to cultural resources include flammable properties such as cabins, homesteads, and prehistoric ruins and features that might be vulnerable to damage by fire, such as rock art and friable stone features.

Issue #3: *Air quality degradation* - Air quality degradation due to WFU smoke production issue has four aspects. First is the potential to degrade long-range visibility across scenic mountain and valley landscapes. Second, some publics could become irritated with smelling smoke, seeing smoke, breathing smoke over long periods of time. Third, there is a segment of the public that has respiratory problems that are aggravated by the irritants in wood smoke. Fourth, smoke can cause public safety concerns along road corridors.

CHAPTER 2: ALTERNATIVES

This chapter describes and compares the alternatives considered for the WFU proposal. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a basis for choice by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., trigger points for managing a fire for WFU objectives or initiating suppression actions) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., the specific effects on individual resources).

Alternative Description

Alternative A – The Proposed Action – This alternative would allow all lightning fires occurring on National Forest lands to be evaluated for WFU. Lightning fires would be managed for WFU objectives subsequent to meeting the decision checklist contained in Stage I of the National Wildland Fire Use Guide and the additional restrictions listed on pages 7 thru 10 of this document. See attached Map #1 – Alternative A. Approximately 35% of all lightning fires each decade (2-3 fires per year on average) are likely to be managed for WFU objectives under Alternative A. From 4500 to 6000 acres are projected to burn under WFU management over the next decade. While 95% of fires managed for WFU objectives are expected to be smaller than 500 acres in size, approximately two fires per decade could grow to between 500 and 2000 acres in size.

Alternative B – Modified Action – This alternative would allow lightning fires to be evaluated for WFU only when the ERC value (3-day average) on the date of ignition is less than 63 (for fuel model "G"). When the ERC value is less than 63, lightning fires would be managed for WFU objectives subsequent to meeting the decision checklist criteria contained in Stage I of the National Wildland Fire Use Guide and the additional restrictions listed on pages 7 thru 10 of this document. As a further constraint, lightning fires occurring on the east side of the Wet Mountains and most of the Spanish Peaks will be evaluated for WFU only when the ERC value is less than 53. See attached Map #2 – Alternative B. Approximately 20% of all lightning fires each decade (1-2 fires per year on average) are likely to be managed for WFU objectives under Alternative B. From 3000 to 4500 acres are projected to burn under WFU management over the next decade. While 95% of fires managed for WFU objectives are expected to be smaller than 500 acres in size, approximately one or two fires per decade could grow to between 500 and 2000 acres in size.

Energy Release Component (ERC) is an index related to how hot a fire could potentially burn. It is directly related to total available energy per unit area (BTU's / square feet) within the flaming front at the head of a fire. The ERC is a function of the vegetation type (by fuel model) and live and dead fuel moistures. The ERC values used in Alternative B reference fuel model "G", which is based on the conditions found in a majority of the mixed conifer forests across the project area. Overall fuel loading, woody fuel moistures, and the moisture content of larger diameter fuels directly influence the ERC value. Lighter fuels have less influence on the ERC value and wind speed has none. The ERC can serve as a good characterization of a fire season as it tracks seasonal fire danger trends well. ERC has low variability, and is the best fire danger component for indicating the effects of intermediate to long-term drying on fire behavior.

- The 2005 Mason Gulch Fire ignited and burned 11,350 acres at ERC levels in the low 80's.
- Fires have not escaped initial attack suppression actions in the analysis area when the ERC is less than 63.
- It takes a minimum of 5 days of warm dry weather to cause the ERC to change from 53 to 63.
- Wildland fires in the analysis area typically do not actively burn or spread across the landscape at ERC levels below 40.

Alternative C - Current Management – No lightning fires will be managed for WFU objectives. Generally all lightning fires will continue to be suppressed as soon as possible (7-10 fires per year on average). Current suppression policies allow for some fires to be managed using only monitoring and/or confinement tactics when firefighter safety is a concern, or to minimize suppression costs on large fires that have escaped initial attack. Since 1970, less than 15,000 total acres have burned within the 475,000-acre analysis area from both human and lightning caused fires (typically less than 30 acres per year). Nearly 14,000 of these acres burned during just two wildfire events; the lightning caused Maes Creek fire of 1978 (2600 acres) and the Mason Gulch fire of 2005 (11,350 acres).

Design Criteria for the Action Alternatives

In response to the issues, public comments and participation by agency specialists on the proposal; design criteria were developed to ease some of the potential impacts the various alternatives may cause. The design criteria are mitigation measures that are being built into the structure of each alternative right up front. They all have a high probability of implementation and success. They are also available for public review and specialist analysis throughout the process.

- Use the following Decision Criteria Checklist to assess whether or not the situation warrants initiating or continuing wildland fire use implementation. **A "Yes" response to any element on the checklist indicates that the appropriate management response should be suppression-oriented.**

Decision Checklist for considering WFU		
Is there a threat to life, property, or public and firefighter safety that cannot be mitigated?	Yes	No
Are potential effects on cultural and natural resources outside the range of acceptable effects?	Yes	No
Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?	Yes	No
Is there other proximate fire activity that limits or precludes successful management of this fire?	Yes	No
Are there other Agency Administrator issues that preclude wildland fire use?	Yes	No

In addition to recording a "no" response for each of the above checklist elements, all ignitions managed for WFU must also adhere to the following criteria:

- Ignitions that are candidates for WFU will be monitored and managed under a specific Wildland Fire Implementation Plan (WFIP) and evaluated daily for conformance to that plan. If negative resource impacts start to occur, or if the fire moves into areas where it is not desired; suppression actions will be initiated on all, or portions of the fire.

- Identify in each WFIP any potential threatened private property or privately permitted facilities within the National Forest and develop plans for their protection.

- Lightning fires will not be managed for WFU objectives in "active" Protected Activity Centers (PACs) for the Mexican Spotted Owl. Designated PACs have been identified in the Four-mile Creek drainage, Smith Creek drainage, and St. Charles Canyon. See Map #3 –Sensitive Fisheries, Heritage and Wildlife Resources. A PAC will be considered "active", unless no Mexican Spotted Owls are found to be present during the current and preceding two seasons. Before managing fires for WFU objectives within a PAC, at least two MSO monitoring surveys per season must be conducted to make a determination of "non-occupancy".

- These WFU design criteria will be reassessed, if wildfires (including both WFU and non-WFU fires) burn more than 3500 acres of suitable MSO nesting habitat in the Wet Mountains during the preceding ten years. The USFWS will be consulted as a part of any reassessment.

- WFU fires in suitable MSO habitats will be monitored to determine the fires' effects on the constituent elements of MSO habitats. This monitoring may result in changes to the design criteria for future applications of WFU in MSO habitats. The USFWS will be consulted prior to changing any WFU guidelines that may affect MSO habitats.

- Appropriate suppression actions will be taken on all fires occurring in drainages containing "pure" genetic strains of the Greenback Cutthroat Trout. These drainages are the South Prong Hayden Creek, North Taylor Creek, Newlin Creek, Graneros Creek, and South Apache Creek. See Map #3 –Sensitive Fisheries, Heritage and Wildlife Resources. Lightning fires starting inside these drainages will not be candidates for WFU. Moreover, if a new native (not stocked) population of Greenback Cutthroat Trout is discovered within the analysis area, that population will be afforded the same protection as existing populations (i.e., natural ignitions in watersheds containing greenbacks will be suppressed). Alternatively, should the U.S. Fish and Wildlife Service determine or designate that some or all greenback populations within the analysis area, and currently afforded protection under ESA, are introgressed (hybridized) and no longer afforded those protections, those watersheds would then become eligible for managing lightning-ignitions under WFU.

- All assigned fire management personnel will follow the standard operating procedures for disinfecting fire suppression equipment to prevent the spread of Whirling Disease in local fish populations.

- Follow the current policies and restrictions on the use of fire retardant chemicals in the vicinity of streams and lakes.

- As the ERC approaches 63, WFU fires in areas with a high potential for crown fires, steep slopes, and erosive soils will be re-evaluated for possible suppression-oriented actions. See the "red zones" on Maps #4, #5 and #6 – Caution Levels in Evaluating Soil and Water Resources.

- Maintain close communication with any potential affected grazing permittee(s) during the WFU fire planning process. Adverse effects on the continued use of grazing allotments by the permittee after a fire can be mitigated by allowing more flexible rotations during vegetation recovery periods, and allowing impacted permittees to use vacant allotments or allotments in a nonuse status until the burned forage on the allotment has substantially recovered and regrown.

- Identify potentially threatened structural range improvements in the WFIP and protect each one appropriately for the fire situation.

- Implement standard operating procedures for disinfecting fire suppression equipment to prevent the spread of noxious weeds. Cleaning vehicles and heavy equipment coming from other locations, before they go onto WFU fires can mitigate the spread of noxious weeds. Known weed infestations should be avoided if possible when locating firelines. Avoid or minimize all types of travel through noxious weed areas if possible. Treat noxious weeds at equipment cleaning sites, fire access roads and all disturbed staging areas. Regulate human, pack animal, and other livestock entry into burned areas at risk for weed invasion until desired vegetation has recovered sufficiently to resist weed invasions

- The following heritage sites must not be adversely affected by WFU fires or associated fire management activities. Identify these and any other potentially threatened heritage sites in the WFIP and develop plans for their protection. See Map #3 –Sensitive Fisheries, Heritage and Wildlife Resources.

Busetti Homestead	Mingus Homestead
Cloverdale Mine Site	Newlin (Herrick) Sawmill Site
Grape Creek Railroad Sites	Squirrel Creek Historic Recreation District
Lake Isabel Recreation Area	Trujillo Creek Cabin
Marion Dam Site	Prehistoric sites in the Devils Hole area

Existing Condition

The WFU analysis area is comprised of a variety of vegetation including coniferous forests, deciduous forests, woodlands, shrublands, and grasslands. The following descriptions represent the major vegetation types in terms of extent, and how they would be affected by the proposed fire management activities. The large area and ranges of elevation across the WFU analysis area allow for a diverse array of vegetation types from lower timberline woodlands and grassland prairies, to subalpine forests and alpine tundra. The vegetation descriptions in this report are named and organized by the species that dominate forest or grassland canopies and have the greatest coverage across the landscape - see Table 1. below.

Table 1. Area occupied by each of the major vegetation types within the WFU analysis area.

Vegetation Type	Acres	Percentage of the Analysis Area	Level of Fire Adaptation / Dependency
Piñon / Juniper	19,128	4%	Moderate
Gambel Oak	19,681	4%	High
Ponderosa Pine	39,272	8%	High
Douglas Fir / Mixed Conifer	117,268	25%	Moderate
Quaking Aspen	64,253	14%	High
Lodgepole Pine	9,295	2%	High
Limber and Bristlecone Pines	20,583	4%	Moderate
Engelmann Spruce / Subalpine Fir	82,968	17%	Low
Alpine Tundra	14,508	3%	Low
Montane and Subalpine Grasslands	31,574	7%	High
Riparian Communities	13,403	3%	Moderate
Rock	30,495	6%	
Water	416	<1%	
Road and Building dominated	104	<1%	
No Data	11,933	3%	
Total	474,881	100%	

Piñon/Juniper Communities

Piñon/juniper communities dominate approximately 19,000 acres. Piñon/juniper woodlands generally occur on the warmest and driest sites of the WFU analysis area at elevations from 5,500 to 8,000 feet. These woodlands are characterized by piñon pine and Rocky Mountain juniper.

Currently, there are few fire histories for piñon/juniper woodland communities in the area. It is estimated that fires occurred every 15–30 years where piñon and juniper trees merge into open grassland and shrubland communities. This frequent fire cycle helps prevent trees from encroaching into grass and shrublands, because piñons and junipers grow slowly and trees that are less than four feet tall are very susceptible to fire. However, mature stands of closed canopy piñon trees seldom burn. Because of an almost complete lack of understory fuels, the fire return interval is often 200 to 300 years, or more, in mature and old growth stands. These mature stands typically burn only under drought conditions and with strong winds pushing a crown fire from tree-top to tree-top, independent of any flames spreading along the ground.

Gambel Oak and Shrub Communities

Taken together, shrubland communities dominate approximately 20,000 acres of the WFU analysis area. These shrubland communities are grouped into two broad classifications: Gambel oak dominated areas (17,500 acres) and mountain mahogany dominated areas (2,500 acres). Shrublands dominated by Gambel oak and mountain mahogany occur at elevations from 6,000 to 8,500 feet.

Gambel oak and mountain mahogany shrublands often represent the pioneering stages of piñon/juniper, ponderosa pine, and warm mixed conifer forest communities. These oak-dominated communities are often long-lived shrublands, but given enough time without disturbance, they will likely be replaced by coniferous forests, if a coniferous seed source is nearby.

Gambel oak is adapted to survive and reproduce in environments that are regularly impacted by fire. It responds to fire by vegetative sprouting from its rhizomatous root system. The fire frequency in Gambel oak stands varies from 30 to 60 years depending on aspect, elevation, and plant community associates. Fires in Gambel oak typically combine a mixture of crown fires carrying through the shrub canopy and surface fires burning only the litter layer. Years of widespread fire in these shrubland communities depend more on extreme drought than on fuel accumulation. It is unlikely that fire suppression has greatly altered the fire regimes of Gambel oak shrublands.

Ponderosa Pine Communities

Ponderosa pine communities dominate approximately 39,000 acres. Ponderosa pine communities are found at elevations from about 6,500 to 9,000 feet. These forest communities are dominated by a single species in the overstory, ponderosa pine, and are characterized by areas where this shade-intolerant and fire-resistant tree dominates regeneration. Gambel oak is a common associate and is a dominant pioneering species following disturbance.

The current condition of many ponderosa pine forests reflects past timber harvest, fire suppression, and livestock grazing activities, all of which have significantly altered the composition, structure, and likely the function of these forests. Prior to Euro-American settlement (c.1850), fires were of two types: localized surface fires that occurred every 15–30 years, and larger landscape-scale fires of mixed severity every 30-60 years. The periodic low intensity ground fires naturally thinned the vegetation, reducing the density of small trees and shrubs. Fires burned litter layers that helped seeds to reach mineral soil, thus increasing chances for pine germination and regeneration.

Many ponderosa pine stands in the WFU analysis area are denser, have fewer large trees and snags, and are more homogeneous in tree age and size, than occurred during the pre-settlement period. Today, many stands have much higher total fuel loads, greater ladder fuels, and more contiguous crowns so that the potential for stand-replacing fires is much greater than it was during the pre-settlement reference period. Non-lethal (surface) fires have decreased, while lethal (canopy) fires have increased.

Douglas Fir / Mixed Conifer Communities

Douglas fir and white fir communities dominate approximately 117,000 acres of the WFU analysis area. These fir forests are commonly referred to as mixed conifer forest communities. Mixed conifer communities occur at mid elevations from about 7,500 to

9,500 feet. Ponderosa pine and Gambel oak are common components of mixed conifer forests at lower elevations and often dominate the area following disturbance events such as fire. Aspen is the major seral species at mid to upper elevations and often colonizes large areas following disturbance events such as fire.

Prior to Euro-American settlement (c.1850), the median fire intervals in the warm, dry range of mixed conifer forests were about 30-60 years for landscape scale mixed-severity fires. The current condition of many of the warm, dry mixed conifer forests is similar to that described for ponderosa pine forests since past timber harvest, fire suppression, and livestock grazing activities have had similar effects. Median fire intervals in the cool moist range of mixed conifer forests varied from 50 to 100 or more years between landscape-scale fires.

The fire regime in mixed conifer forest communities includes both low severity and high severity fires. Fire events were predominantly 10–250 acres in size, although larger fires occurred during droughts and in areas affected by insects and disease. Fires ignited by lightning strikes during the wet season are more variable and frequently remain as surface fires, burning relatively small areas because of the moisture content of the fuels. Such fires kill smaller trees, reduce fuels, and occasionally flare up to open the canopy. All of these effects help to maintain the mixed composition and structure of the forests. A common result of fire exclusion policies has been the widespread expansion of dense understories of shade-tolerant fir trees.

Quaking Aspen Communities

Quaking aspen forest communities dominate approximately 64,000 acres. Across another 30,000 to 40,000 acres, aspen is now a minor component of the forest canopy, because in the absence of disease, fire, insects, or windthrow it was replaced by maturing conifers. The aspen forest type is widely distributed across the WFU analysis area. It is normally found at an elevational range of 8,000 to 10,500 feet.

Aspen forests usually establish themselves after major disturbance events, such as insect epidemics, logging, or wildfire. Since, most aspen forests will naturally evolve over time into spruce/fir or cool mixed conifer forests, a variety of coniferous trees may be present, mostly as understory or minor overstory components. These species include Engelmann spruce and subalpine fir at higher elevations and white fir and Douglas fir at lower elevations.

While fire is essential to aspen communities, there is little information about fire intervals and fire intensities of aspen forests. The naturally cool, moist environment associated with these forests makes them relatively fire resistant, so most fire starts quickly die out. Under very dry conditions, high intensity fires would occur, particularly in stands with ample amounts of ground fuels, and in stands with a heavy conifer component. For aspen forests, the pre-settlement fire regime (before 1850) was likely one of long return interval (50–150 years) surface fires.

Lodgepole Pine Communities

Lodgepole pine communities dominate approximately 9,000 acres of the WFU analysis area. The lodgepole forest type is commonly found in the upper montane and subalpine zone from 8,500 to 10,500 feet in elevation. While common in the northern part, the occurrence of lodgepole pine forests becomes sporadic across the southern half of the WFU analysis area.

The natural fire regime of lodgepole pine forests is mainly severe, stand-replacing fires that occur every 150–300 years. Low severity surface fires occur infrequently within the same stand and affect only small percentages of lodgepole forests.

Lodgepole pine is frequently very successful at dominating a site following fire, in part because of the plentiful source of prolific seeds provided by its serotinous cones. Serotinous cones stay tightly closed on the tree branches until the heat of a fire, or a fallen branch near the warm ground, causes the cones to open and disperse their seeds across the fertile ash. The extensive and severe fires during the late 19th and early 20th centuries likely increased the occurrence and coverage of lodgepole pine in our present-day upper montane and subalpine forests.

Limber Pine and Bristlecone Pine Communities

Together, limber pine and bristlecone pine communities dominate approximately 21,000 acres of the WFU analysis area. These communities are found on windswept or dry sites across a wide elevational and moisture gradient. Both species compete poorly against other trees, and exist primarily due to their ability to grow on sites where few other species can survive. The harshness of these sites often prevents these species from forming dense stands, with a semi-woodland environment or scattered individuals being the more common forest structure.

Limber pine is physiologically adapted to growing on the driest sites in the montane and subalpine forest zones. Limber pine communities can typically be found along rocky ridgelines and on dry south- and west-facing slopes from 7,500 to 10,500 feet in elevation. On these harsh sites limber pine is often the sole colonist for decades after stand replacement fires.

In the absence of periodic fires (every 35 to100 years), Douglas fir or Engelmann spruce will eventually replace limber pine on all but the driest sites. On the most extreme sites of shallow soils and exposure to strong winds, spruce and fir are unable to establish, even under a mature stand of limber pine. On extreme sites, limber pine forms open woodlands of very old trees, some greater than 1,000 years old.

Bristlecone pine forests are often structurally similar to limber pine forests and fill an ecologically similar niche at higher elevations. The two species often occur together on ridges and south- and west-facing slopes in the subalpine zone, but bristlecone pine dominates at elevations above 9,500 feet. On rocky sites protected from wildfire, some bristlecone pine trees have been documented to be over 2,000 years old.

Understory vegetation in these communities is often sparse providing little fuel to carry surface fires. Stand replacement or crown fires are usually small in scale due to gaps in continuity between tree crowns. In the absence of strong winds, fires are typically limited in extent (two acres or less). However, studies of the regeneration dynamics of bristlecone and limber pine show that they can establish well after fire and are able to colonize the interior of large burned areas. Fire history data documents a decrease in fire occurrence during the 20th century in these communities, which can be attributed to a combination of fire suppression and the grazing of understory grasses by livestock.

Engelmann Spruce/Subalpine Fir Communities

Engelmann spruce/subalpine fir communities cover approximately 83,000 acres of the WFU analysis area. The spruce/fir forest type is widely distributed throughout the higher elevations of the area from about 9,000 to 11,500 feet.

These forests are dominated by Engelmann spruce and subalpine fir which have relatively low resistance to fire. At the highest elevations spruce usually dominates the overstory, while at slightly lower elevations spruce and fir codominate. Subalpine fir typically outnumbers the less shade-tolerant Engelmann spruce in the understory of these forests. Aspen and lodgepole pine are the major seral species of this forest type and often colonize large areas after major fires.

Fire intervals in spruce/fir forests are variable, ranging from decades to hundreds of years; the longer intervals are more typical. A majority of this forest community type is typified by primarily long interval (250–500 year) stand replacement fires; while a lesser amount of terrain is influenced by moderately long interval (50–100 year) mixed severity fires.

The naturally cool, moist environment associated with these forests makes them relatively fire resistant; so most fire ignitions quickly die out. However, under drought conditions, fire in the spruce/fir type can be of high intensity and severity. Large, severe fires in spruce/fir communities are highly dependent on extreme and infrequently occurring weather conditions. Large portions of the landscape can burn in a single event, and then long intervals (sometimes centuries) would pass before the next extensive fire at the same site.

Alpine Communities

Alpine tundra communities dominate approximately 15,000 acres on the WFU analysis area. Another 30,000 acres are dominated by barren rock where vegetation (mostly alpine tundra) covers less than 25% of the surface area. Above 11,500 feet the growing season becomes too short for trees, and the dominant vegetation is the complex mix of shrubs, sedges and forbs called alpine tundra. Treeline may be several hundred feet higher on north-facing slopes or several hundred feet lower on south facing slopes. At the low end of this elevational range, vegetation is more continuous, but the predominance of rock outcrops is greater above 13,000 feet.

The alpine tundra burns very infrequently, perhaps at intervals of 500 to 1000 years, or maybe never. Fire burns in the alpine only under the most extreme conditions and likely spreads from adjacent forests in dry autumns. Alpine plants are very slow growing and are not adapted to survive or propagate after fire. While lightning strikes are common above treeline, the vegetation is rarely dry enough, or the fuel continuous enough, for fire to spread. Most of the burns observed at timberline occurred during the Euro-American settlement period (c.1860-1910) and were human caused.

Montane and Subalpine Grassland Communities

Montane and subalpine grassland communities dominate approximately 32,000 acres of the WFU analysis area. The species composition of these grasslands varies based on elevation, geology, and soil moisture. Arizona fescue dominates many grassland communities across the WFU analysis area. Parry's oatgrass was previously the dominant or codominant species on many of these fescue sites. Many other grassland communities in the area are dominated by mountain muhly with varying amounts of June grass. Thurber's fescue or blue grama dominates still other grassland communities across the WFU analysis area.

Prior to the Euro-American settlement period (c.1860-1910), fire appears to have had a return interval varying from 5 to 30 years in most montane grasslands. Since fire suppression in the WFU analysis area became effective (c.1920), many of the landscapes covered by montane grasslands have not experienced any sizeable fire events. Absence of regular low-intensity fires has allowed trees and shrubs to invade many sites previously occupied by grasslands.

However, over the past 40 years two large and severe wildfires, the Maes Creek and Mason Gulch fires, have created long-term grasslands on previously timbered sites. By killing nearly all of the trees across broad landscapes, these large fires have eliminated the natural seed source that would have been available to restock these burned sites (over 95% of conifer seeds fall within a few hundred feet of the parent tree). The core areas of these large burns are often well over a mile from the nearest living tree. It will be decades, and in some places a century or more, before trees will naturally reestablish over much of these severely burned areas.

Riparian Communities

Taken together, riparian communities dominate approximately 13,000 acres of the WFU analysis area. These diverse riparian communities are grouped into three broad classifications: grass-dominated riparian areas (4,000 acres), shrub-dominated riparian areas (5,500 acres), and tree-dominated riparian areas (3,500 acres).

Riparian communities include; wetland meadows, fens, springs, seeps, lakes, ponds, and creek bottoms. Vegetation associated with riparian communities varies depending on elevation, soil, topography, water frequency and source. Riparian communities may include some or all of the following species: willow, shrubby cinquefoil, sedge, rush and wet grass species, as well as alder, cottonwood, American plum, chokecherry, Rocky Mountain maple and blue spruce in the overstory.

The live foliage and surface fuels in riparian areas typically have higher moisture content than similar vegetation and fuels on adjacent slopes. These mesic conditions reduce the flame intensity and subsequent burn severity compared to fires burning through adjacent non-riparian forests and grasslands. Lower severity burns in riparian communities frequently create a differing species composition and stand structure from what is observed in similar communities on upland sites. However, when fires occur during periods of drought, this contrast in burn severity and the resulting community structure can be nonexistent.

Desired Condition

The desired condition is to reintroduce fire, where desirable and feasible, to maintain the proper functioning and health of natural communities, and to reduce the long-term threat of catastrophic wildfires.

Historically, fire has played a significant role in the mountains of Southern Colorado. Individual plants and plant communities have evolved with fire and have adapted to it in various ways. Periodic fires are essential to sustaining proper functioning of the ecosystem and maintaining the health and diversity of vegetative communities. By allowing some lightning ignited fires to burn at low to moderate fire intensity levels, we hope to reduce the proportion of acres burned under high to extreme conditions.

Reducing the scale and severity of wildfires in lower montane forests (6,500'- 8,500' in elevation) centers on reintroducing relatively frequent low-intensity surfaces fires to broad areas, 40–60% of selected landscapes. Many of these forests have moved beyond their natural composition and structure and have the greatest need for treatment.

Large and severe fires are part of the natural pattern for subalpine forests, and to a lesser extent upper montane forests. Large and severe fires in these forests usually coincide with extended droughts. However, allowing some naturally occurring fires to play as large a role in these landscapes as is safely feasible, under low to moderate fire conditions, will create areas of reduced fuels and reduced fire severity during extreme fire events of the future. Accepting a larger role for fire in the upper montane and subalpine forests will be key to maintaining their natural function and condition through the 21st century.

Monitoring

This section identifies the activities that will occur before, during, and after a WFU fire that will help us monitor the environmental conditions before a fire starts, and determine the effects once the fire is out.

Prior to any natural ignition during the fire season, the environmental conditions that make up the ERC (for fuel model "G") will be measured daily. This will establish the local trend prior to any ignition. It will help the District Ranger determine if the ERC is in or out of range for allowing an ignition to continue under fire use.

Once an ignition has been reported, the ERC will be recalculated and documented as part of the evaluation for allowing the fire to continue. Once the exact location of each fire start is known, an evaluation of critical resources in the area that need protection will be conducted. The fire will be watched daily to observe its behavior, and how local conditions affect the direction and rate of spread, and fuel consumption.

Careful post fire monitoring to identify and record the establishment of noxious weeds will be critical. Burned areas should be monitored the following spring for emergence of noxious weed species. If this monitoring indicates that noxious weeds are present in the burned areas then an aggressive weed treatment program will need to be implemented as soon as possible.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished qualitatively among alternatives.

Table 2. Comparison of Alternatives.

Management objectives and concerns / issues	Alternative A	Alternative B	Alternative C
Reduce fuel loading in the National Forest	Best	Good	Marginal
Reintroduce fire into fire-dependent ecosystems	Best	Good	Counter productive
Threats to private property, public improvements and cultural resources	Best for the long term	Best for the mid term	Best for the short term
Threats to rare and sensitive species	Best for the long term	Best for the mid term	Good
Impacts to air quality	Best for the long term	Best for the mid term	Best for the short term

Short term – over the next 10 years
Mid term – roughly 10 - 25 years from present
Long term – more than 25 years from present

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Forest Vegetation

Effects of the "Action Alternatives" – "A" and "B"

<u>Alternative A – The Proposed Action</u> This alternative would allow <u>all</u> lightning fires occurring on National Forest lands to be evaluated for WFU. Lightning fires would be managed for WFU objectives subsequent to meeting the decision checklist contained in Stage I of the National Wildland Fire Use Guide and the additional restrictions listed on pages 7 thru 10 of this document. See attached Map #1 – Alternative A. Approximately 35% of all lightning fires each decade (2-3 fires per year on average) are likely to be managed for WFU objectives under Alternative A. From 4500 to 6000 acres are projected to burn under WFU management over the next decade. While 95% of fires managed for WFU objectives are expected to be smaller than 500 acres in size, approximately two fires per decade could grow to between 500 and 2000 acres in size.

<u>Alternative B – Modified Action</u> This alternative would allow lightning fires to be evaluated for WFU only when the ERC value (3-day average) on the date of ignition is less than 63 (for fuel model "G"). When the ERC value is less than 63, lightning fires would be managed for WFU objectives if they meet the decision checklist criteria contained in Stage I of the National Wildland Fire Use Guide and the additional restrictions listed on pages 7 thru 10 of this document. As a further constraint, lightning fires occurring on the east side of the Wet Mountains and most of the Spanish Peaks will be evaluated for WFU, only when the ERC value is less than 53. See attached Map #2 – Alternative B. Approximately 20% of all lightning fires each decade (1-2 fires per year on average) are likely to be managed for WFU objectives under Alternative B. From 3000 to 4500 acres are projected to burn under WFU management over the next decade. While 95% of fires managed for WFU objectives are expected to be smaller than 500 acres in size, approximately one or two fires per decade could grow to between 500 and 2000 acres in size.

Differences between Alternatives "A" and "B"

Sixty lightning-fires ignited on San Isabel National Forest lands in the Sangre de Cristo, Wet Mountains and Spanish Peaks from 2000 through 2004. These actual lightning-ignited fires were modeled for their potential to be managed for WFU based on the recorded location, weather, fuels, and fire fighting resources available on that date. Using the decision criteria contained in Stage I of the Nat'l Wildland Fire Use Guide for both Alternatives A and B, and the additional ERC constraints imposed by Alternative B, the modelers made a "go" or "no-go" decision on the potential for each lightning fire to be managed for WFU.

For example, the modelers selected zero fires for WFU management in 2002, due to the extreme fire danger, local fire closures and national shortage of resources. Also, having one active WFU fire of 100+ acres discouraged the modelers from managing any ensuing suitable fires for WFU due to a potential lack of resources, smoke concerns, and local political sensitivity to multiple concurrent fires.

The FARSITE model was used to project both the area burned by the fire, and the number of days the fire would burn before naturally extinguishing. The FARSITE model incorporates slope, aspect, fuel conditions, and weather data to predict the fire perimeter and rate of spread. The hourly weather data used in the modeling exercise was taken from archived data tied to field weather stations near the modeled fire site. Tables 4.1 and 4.2 summarize this modeling exercise.

The number of lightning fires that would have been managed for WFU during the years 2000 – 2004:

- **under alternative A = 22 fires**
- **under alternative B = 12 fires**

Table 3. Estimated acres that would have burned under WFU during the years 2000-2004 by Mountain Range

By Location	Estimated Acres that would have burned under WFU during the years 2000-2004	
Mountain Range	**Alternative A**	**Alternative B**
Wet Mountains	1430	80
Sangre de Cristo Range	2675	2375
Spanish Peaks	515	500
Totals	4620	2955

Table 4. Estimated acres that would have burned under WFU during the years 2000-2004 by Vegetation Type

By Vegetation Type	Estimated Acres that would have burned under WFU during the years 2000-2004	
Forest Community	**Alternative A**	**Alternative B**
Mixed Conifer	1840	1155
Spruce / Aspen	1765	1765
Ponderosa / Oak / Grass	1015	35
Totals	4620	2955

During the drought period 2000-2004, the ERC trigger points contained in Alternative B definitely reduced the number of acres managed for WFU in the Wet Mountains. During this period, 7 fires (consuming only 80 acres) would have been managed for WFU objectives in the Wet Mountains under Alternative B.

Alternative B also burned significantly fewer acres of the ponderosa pine and mixed conifer forest communities during this drought period. This disparity between Alternative A and Alternative B is most acute in the acres of ponderosa pine communities burned. Ponderosa pine communities have the greatest need for WFU to move their composition, structure, and function closer to natural conditions.

The number of lightning fires that would have been managed for WFU during the years 1994 – 1999:

- **under alternative A = 11 fires**
- **under alternative B = 8 fires**

A less intensive modeling exercise was conducted for lighting-ignited fires in the relatively wet years of 1994 through 1999. During these moist years, Alternatives A and B were more similar in both the total number of fires managed for WFU, and the number of fires managed for WFU in the Wet Mountains.

Eleven fires would have been managed for WFU under Alternative A from 1994 through 1999. Nine of these fires would have been managed for WFU in the Wet Mountains. Under Alternative B, eight fires overall would have been managed for WFU, seven of which would have been in the Wet Mountains.

Effects Common to both "Action Alternatives" – "A" and "B"

Under the Action Alternatives "A" and "B", the majority of the forested vegetation types will be influenced by an increasing amount of managed fire. This will be generally beneficial across all vegetative types, though there will be pockets that burn with a different intensity than desired, and some fires that may be larger, or smaller, than ideal. Overall, the effect of WFU on the majority of vegetation types within the analysis area will be beneficial. Forest Plan goals and objectives for biological diversity, forest composition and structure can begin to be achieved over the long term. For a more in depth analysis, by major vegetation type, of the ecological and long term effects to forested vegetation refer to the project the "Summary of Fire Effects, and Post-fire Vegetative Response for Forest Communities within the Wildland Fire Use Analysis Area" contained in the project planning record located at the San Carlos Ranger District Office in Canon City, Colorado.

Increasing the amount of influence that fire has on the vegetation types within the analysis area will also move those forest types that are largely in a Fire Regime Condition Class (FRCC) class of 2 or 3 towards a healthier, more diverse and more resilient species composition and stand structure.

From a fuels management perspective, the action alternatives have the potential to create a diversity of fuel types and fuel loadings across large parts of the analysis area. This diversity will help create a heterogeneous patchwork of fuels, reducing both loadings and continuity. This will subsequently help to modify future fire behavior as fires move across the landscape. This affords fire management personnel more and safer opportunities to manage future wildfires. It will also reduce the potential for fires to spread rapidly or with great intensity, possibly threatening resources, private property and improvements.

Cumulative Effects of Alternatives A and B

Sometimes the combined effects of several activities are more substantial and of a different nature, than the incremental impact of each activity viewed separately. Cumulative impacts can result from individually minor, but collectively significant actions taking place over time. Cumulative actions are those past, present and reasonably foreseeable activities in or near the WFU analysis area that may not individually, but may cumulatively result in the effects of concern. Sources of cumulative effects considered in this analysis include:

- Prescribed burning projects
- Wildfires from both natural and human caused ignitions
- Commercial timber harvesting
- Fuels reduction projects using mechanical means
- Natural events such as windstorms, and forest insect and disease epidemics

The cumulative effects of the Action Alternatives – “A” and “B”, when combined with the existing prescribed burning program, wildfires, timber harvesting, mechanical fuel treatment projects, as well as insect and windstorm events, will be to increase diversity and resilience in both species composition and stand structure in the affected forest communities. It will take several decades (30+ years) of implementing the WFU action alternatives alongside other fuels reducing activities before the desired vegetative and fuels mosaics begin to be achieved across large landscapes. Similarly, it will take several decades before saturation levels of fuels reducing activities would have the potential to create environmental concern across large landscapes.

Effects of Current Management – Alternative “C”

<u>Alternative C – Current Management</u> No lightning fires will be managed for WFU objectives. Generally all lightning fires will continue to be suppressed as soon as possible (7-10 fires per year on average). Current suppression policies allow for some fires to be managed using only monitoring and/or confinement tactics when firefighter safety is a concern, or to minimize suppression costs on large fires that have escaped initial attack. Since 1970, less than 15,000 acres have burned within the analysis area from both human and lightning caused fires. Nearly 14,000 of these acres burned during just two wildfire events, the Maes Creek fire of 1978 (2,600 acres) and the Mason Gulch fire of 2005 (11,300 acres).

Current fire suppression policies allow forest vegetation to continue accumulating to unnatural levels, setting the stage for future fires that are larger, more intense, more dangerous to fight and more harmful to the natural environment. This effect is most pronounced in the montane forests (Gambel oak, ponderosa pine, Douglas fir and white fir) where the natural fire return interval was 20 to 60 years, and where 85% of lightning-ignited fires within the WFU analysis area occur.

The Mason Gulch fire of 2005 is a classic example of long-term suppression of low intensity surface fires, producing forest conditions that favor a high intensity crown fire. Tree ring studies and fire scar analysis indicate that the 11,300-acre Mason Gulch fire was of larger scale and severity than any fire in the Wet Mountains in over a hundred years. Within the eventual perimeter of the Mason Gulch fire, lightning had ignited 12 previous fires between 1994 and 2004. Suppression actions contained all of these fires to 3 acres or less. If some of these fires in past decades had been allowed to burn under low to moderate fire conditions they would have created natural fuelbreaks and areas of reduced fuels. These naturally created fuelbreaks and areas of reduced fuel loading could have reduced the overall size and severity of the 2005 Mason Gulch fire.

The 2002 Hayman fire burned 138,000 acres in ponderosa pine and mixed conifer forests on the Pike National Forest. The Hayman fire is another example of a very efficient fire suppression program contributing to unnatural fuel conditions and the worst known fire in the Southern Rockies in over 700 years.

The effect of current fire suppression policies is less pronounced in subalpine forests (spruce, subalpine fir and lodgepole pine) and other forest communities where the average fire return interval is 80 plus years. Comparatively recent fire suppression policies have not significantly changed the composition, structure, and function of these forests. Fire control practices began to be effective at the landscape level in the 1920’s, and thus have only altered one fire cycle for forests with longer fire return intervals. Also, severe stand replacement fires are the natural pattern for long fire return interval spruce / fir, lodgepole pine and old growth pinyon / juniper forests. Additionally, these forests tend to burn only during drought and/or high wind conditions when fire suppression tactics are generally less effective.

Cumulative Effects of Alternative C

Roughly 35% of the plant communities on the Pike and San Isabel Forests fall into Condition Class 2 or 3, based on the national Fire Regime Condition Class (FRCC) rating system. Condition classes 2 and 3 represent plant communities that have been moderately to significantly altered from their historical range of variability, with regard to species composition and structural arrangement. This alteration was generally created by decreased fire frequency, arising from 80+ years of aggressive fire suppression. Continuing the current fire management strategy over the next 50 to 100 years, risks the loss of key ecosystem components from landscapes occupied by montane forests.

Fire Control

Effects common to Alternatives A and B

Under the Action Alternatives – A and B, any candidate ignition for WFU would be evaluated through the Wildland Fire Implementation Planning (WFIP) process. The WFIP process considers all aspects of the ignition (cause, location, time) along with weather conditions (current and forecasted), fuel condition (fuel type, loading, moisture content) and expected fire behavior (intensity, rate of spread, size) to determine if the candidate ignition will help achieve desired objectives, with minimal negative impacts. In addition, long-term fire spread predictions are calculated to determine the potential for a WFU fire to impact adjacent areas. The decision to manage a fire as a WFU event is revisited on a regular basis, typically daily. Each approved WFU fire is monitored in the field to determine if the fire is expected to continue meeting the specific objectives of the WFIP.

If a WFU fire is burning with more intensity, to a larger size, or moves outside of its Maximum Manageable Area (MMA), as previously identified in the WFIP, it can be declared a wildfire and suppression actions taken to contain or control it. The vast majority of WFU fires achieve their desired objectives and do not escape the MMA, or damage non-targeted resources, improvements, or private property. While statistics are not available separately for the ratio of WFU fires that escape, the ratio for all prescribed fires (of which WFU fires are included) is less than 1% nationally for prescribed fires managed by the U.S. Forest Service. Still, there is always some potential for a wildfire escape from a WFU event that cannot be completely mitigated.

An escape can result in damage to forest resources, public and private improvements and private property. The potential for a WFU escape must be considered relative to the long term risks of full suppression, which result in an ever increasing build-up of fuels and threats to adjacent resources and improvements. WFU allows fire managers an opportunity to manage fires under more controlled conditions, than a wildfire that has escaped initial attack efforts.

Studies (see project file) conducted on the Bitterroot and Payette National Forests show that the average management cost per fire event for WFU fires is much less than for fires where suppression action is taken. This is to be expected as fewer firefighting resources are used on WFU incidents. The average costs for WFU fire events was 50% less than the cost for suppression fire events during the 10 year study period.

Looking at individual fire events, there were higher costs associated with some WFU fires. Factors which account for these higher costs for individual WFU fires are; the proximity of the fire perimeter to the MMA boundary, the amount of infrastructure needing protection, and the extent of aircraft use for reconnaissance or logistical support.

Alternative C - Current Management

Under the No-Action Alternative – C, the option to select WFU as a fire management strategy would be precluded. Suppression actions would be taken on all wildfires, both human and lightning caused. Over the past 35 years, suppression efforts have held roughly 93% of lightning ignitions within the analysis area to small acreages (less than 10 acres). However, this percentage of successful containment is expected to decline as the fuel loading and continuity increases across the landscape, which increases fire intensity, rate of spread and resistance to control. To some extent this resistance to control has already been occurring. Looking at just the past decade, the percentage of lightning ignitions contained at less than 10 acres has dropped to 82%.

Cumulative Effects

The cumulative effects of the Action Alternatives – A and B, when combined with the existing prescribed burning program, wildfires, timber harvesting, mechanical fuel treatment projects, as well as insect and windstorm events, will be to increase diversity and resilience in both species composition and stand structure in the affected forest communities. This increased diversity leads to a more heterogeneous fuels complex across the landscape, consisting of older and denser vegetation / fuels broken up by younger and lighter vegetation / fuels. These spatially variable fuels should cause both future wildfires and WFU fires to drop in intensity as they move across the landscape, allowing fire management personnel more opportunities to safely suppress or manage these fires.

Maintaining current fire suppression policies (the No Action Alternative – C) allows forest vegetation to continue accumulating to unnatural levels, setting the stage for future fires that are larger, more intense, and more dangerous to fight. This effect is most pronounced in the montane forests (Gambel oak, ponderosa pine, Douglas fir and white fir) where the natural fire return interval was historically 20 to 60 years, and where 85% of lightning-ignited fires within the WFU analysis area occur.

Air Quality

The smoke from wildfires contains a number of pollutants, including tiny particles called **particulate matter.** Exposure to particulate matter can cause significant health problems, especially for people suffering from respiratory illnesses; including aggravated respiratory symptoms, poor lung function, and even premature death. Smoke also adversely affects the clarity of our air, or visibility. Smoke can impair our views and diminish the appreciation of scenic vistas in national parks, forests, and wilderness areas.

Alternative C - Current Management

The current management alternative in which all fire is suppressed and no fires are managed or prescribed is what has lead to the problems that the Proposed Action is trying to correct. This alternative will reduce emissions or at least not add new emissions to the airshed in the short term. However, because of the increased fuel loadings that would result with continued fire suppression; any new ignitions will have a steadily increasing potential to escape initial suppression efforts, with a greater risk of large fires producing more emissions in the long term. Recent fire seasons and several notable large fire years since 2000 have dramatically shown us how wildfire emissions can be high, long duration and detrimental to public health and welfare.

Direct and Indirect Effects

There would be no direct effects to the air quality or human health from the No Action Alternative. The indirect effects to the air quality would occur when a wildfire escapes initial attack efforts and starts to burn in unmanaged stands or in untreated fuels. The downed material associated with decadent stands, combined with ladder fuels from the developing shade tolerant understory, would act as a fuel source for a wildfire. Smoke from wildfires is unmanageable and would likely produce smoke in intensity and duration much greater than what would be produced by the planned ignitions of any of the action alternatives.

The severity of air quality degradation from wildfire is unpredictable. Air Quality impacts from wildfire would normally occur during the summer months when visitor use in affected airsheds is highest.

Short Term

Short-term impacts from smoke in the Current Management Alternative would continue at current levels. The impacts of wildland fires and suppression efforts to air quality, NAAs, and other sensitive areas (such as Class I areas) would likely be comparable to impacts from wildland fire and suppression efforts described in the Proposed Action. Due to the use of prescribed fire, and fuel treatments that would continue in the No Action Alternative, short-term impacts to air quality from these activities (such as smoke emissions and fugitive dust) are likely to be slightly higher than for the Proposed Action.

Similar to the Proposed Action, the Current Management Alternative dictates the use of standard operating procedures including participation in the Colorado State Department of Health Smoke Management Program, and would minimize potential air quality impacts. Applicable federal, state and local air quality regulations would not be violated due to activities planned by the USFS.

Long Term

Under the Current Management Alternative, a trend toward more severe and uncontrollable wildland fires is anticipated. These fires have the potential to create more smoke emissions than smaller controlled fires and cannot be timed to minimize impacts to existing air quality conditions. Increased pollutant concentrations, and impacts to NAAs and other sensitive areas could increase as a result of these fires. Impacts to human health would also increase, particularly from exposure to particulate matter, with some events likely requiring special precautions be taken by the public to protect sensitive populations.

The Current Management Alternative would continue to allow non-fire fuels treatments and prescribed fires and would keep direct impacts from these actions at a minimum, but over the long-term, would set the stage for larger wildland fires, and accompanying unplanned smoke emissions, and trend away in the long-term from allowing natural fires to play out their role in the planning area.

Wildland fires are a source of air pollutant emissions during combustion of vegetation. The amount of emissions depends on the size and intensity of the fire, the fuel type and moisture content, and available fuel load. The level of resulting air quality impact depends on the amount and duration of emissions, atmospheric dispersion conditions, and terrain. The magnitude and extent of air quality effects resulting from the Proposed Action is complex to quantify due to the variability of potential fire management activities and the period of time each could occur.

Effects Common to Alternatives A and B

The Proposed Action alternatives include air quality Mitigation Measures to minimize air quality impacts. Potential impacts, both long- and short-term, would be minimized through action specific analysis and permitting and coordination efforts with the Colorado State Department of Health Smoke Management Program to ensure compliance with all local, state and federal regulations, as described in Chapter 3. With these laws and protection measures in place, fire management activities would not unlawfully exceed air quality standards or impact NAAs or other sensitive areas (including Class I areas and communities) in the planning area due to the Proposed Action. However, circumstances beyond the USFS' control (i.e., uncontrollable wildfires) may impact air quality, but these acts of nature are outside the scope of the Proposed Action. As with Alternative C (Current Management) several small communities within the project area could be affected by smoke during WFU implementation proposed in Alternatives A and B. Since a greater amount of smoke and emissions would be produced with Alternative A, these effects would be greater. Because more acres would be burned there would be an increased chance of smoke getting caught within an inversion layer and residing within the low lying areas over night.

Short Term

In contrast to the current widespread management direction of full suppression of all wildfires, the Proposed Action would potentially decrease the level of suppression being used on a wildfire through an Appropriate Management Response (AMR). The AMR would allow for wildland fire use in appropriate areas. Under the Proposed Action's wildland fire scenarios, slightly more acres may be burned and an increase in smoke and particulate emissions may result. For wildland fire use, emissions would be required to be within regulatory levels. Therefore, impacts on human health are not expected. Planned and unplanned ignitions can be managed effectively to reduce heavy fuels loads that could adversely impact air quality during a wildfire. When properly executed, managed fires would be much smaller and involve less combustion and would occur when the fuels characteristics, as well as weather conditions, are optimal to enhance efficient vegetation consumption and air pollutant dispersion (NWCGb 2001). The anticipated increase in wildland fire use would be coordinated with the Colorado State Smoke management program coordinator to prevent exceeding air quality standards and to minimize impacts to NAAs and other sensitive areas (Colorado State Department of Health Smoke Management 2004). Impacts due to Wildland Fire Use events are anticipated to increase slightly from current conditions, but each event would be assessed and undergo periodic review to minimize those impacts.

Long Term

The Proposed Action would decrease the potential for severe and uncontrollable types of wildfires and create a trend toward using fire to meet resource objectives on USFS managed lands, which would enable the agency to manage wildfire and associated emissions more effectively. These efforts would decrease the potential for negative impacts to human health.

Cumulative Effects

Air resources are somewhat unique in that the past impacts to air quality are not usually evident. The emissions produced through the Proposed Action would be cumulative only with the local emission sources described in the affected environment occurring at the time of burning. The cumulative area that may be burned in the analysis area over the next 10 years under Alternative A would be from 4500 to 6000 acres and from 3000 to 4500 acres in Alternative B. While Alternative C would have the least amount of direct adverse effects on air quality in the short term, this will likely change over the long term (20+ years).

Without the associated increase in acres burned with WFU implementation, any increase in new short-term emissions would generally come from increased use of prescribed fire. In the long-term, large quantities of emissions could be released if a large wildfire developed due to an abundance of fuels in the area. A large wildfire has the potential to emit large amounts of smoke that could remain in the local air sheds for a few days to several weeks depending on the size and intensity of the fire.

Alternatives A and B would both have direct short-term effects on air quality in the analysis area. Under these alternatives PM-10 would be released as a result of implementing the proposed action. Under these two alternatives 3000 to 6000 acres would be burned over a 10 year period. However, Alternative C would result in a greater short-term effect on air quality because a greater amount of fuel would be burned under this alternative and a greater amount of pollutants would be released.

Hydrology and Soils

In one way or another, fire affects nearly every component of the hydrologic cycle from altering vegetative cover, thus the interception of precipitation, to the amount of water that infiltrates into the soil, to the amount of water and sediment leaving the hillside as overland flow. Extensive research covering the effects of fire on soil and water exists. A recent, general technical report, Wildland Fire in Ecosystems, Effects of Fire on Soil and Water (September, 2005) prepared by the Rocky Mountain Research provides a state-of-knowledge review on this subject matter.

With or without WFU, large wildfires will occur throughout the project area over time. The effects of large, catastrophic wildfires are not addressed herein. Natural ignitions that qualify for WFU are expected to burn under conditions that will allow for a much greater percentage of the fire area to experience low to moderate burn severity. This is the underlying assumption for this project as it relates to the soil and water resources within the project area

Alternative C – Current Management

The effects of suppressing all natural ignitions (current management) in a general sense are: continual accumulation of fuels, elimination of fire's natural role in the environment, and assist in setting the stage for large wildfires. A good example of this is the Mason Fire that burned nearly the entire Red Creek watershed in July, 2005. This fire alone burned more area than all the fires combined in the project area since 1960. From a hydrology and soils standpoint, the large scale fires produce significant and far reaching effects compared to those effects associated with immediately suppressing all natural ignitions.

Effects Common to Alternatives A and B

Under either alternative, two to three WFU fires are predicted to burn each year. On average, it is estimated that between 200 and 600 acres will burn (based on fire modeling done for this project) per year above the levels experienced under the current fire management (suppression) policy. These fires will reduce fuel loading in those areas and will create additional, natural fire breaks, especially over several decades as more and more WFU fires are able to burn when conditions allow. Thus over a long period of time (say 30 to 40 years) where WFU fires have been effective in reducing fuel loading, the probability of a large wildfire can be somewhat reduced in that general area. Certainly, the natural barriers created by the WFU fires can be used to some degree in assisting with the control of larger wildfires. Any reduction in the occurrence and magnitude of large wildfires will benefit the soil and water resource across the project area. WFU fires can serve to speed nutrient cycling and can help to reduce the occurrence of hydrophobic soil conditions, accelerated rates of erosion and sedimentation, and potentially sterilization. Again though, it is important to realize that large wildfires will still occur even with the ability to use WFU as a tool!

In order to put the effects of WFU into perspective from a hydrological viewpoint, there is a need to relate the effects to the expected area to be burned. To accomplish this, the total acreages of the dominant vegetation-types expected to burn were compared against the likely acreage to burn under each alternative. As an example the total acreage of the dominant forested vegetation-types is 242,640 acres (see Table 11, Hydrology and Soils Report). The amount of acreage expected to burn above current management for Alternative A is 350 to 600 acres per year (see Table 8, Hydrology and Soils Report). In this example, between 0.14% and 0.25% of the dominant vegetation-types would be expected to burn each year, see Table 16. Where each vegetation-type is identified separately, it is assumed that all acres burned were confined to this vegetation-type. For example, the total burned acreage of the mixed-conifer is 11, 500 acres. Using the same acreages expected to burn under Alternative A, the percent of the mixed-conifer vegetation-type that would burn on a yearly basis would range between 0.31% and 0.54%. As seen in the Table 16, the expected amounts to be treated on a yearly basis are less than 1.5% in all cases. It is important to remember that in some years, there is a good chance that no natural ignitions will be considered for WFU.

Table 5. Percent of Vegetation-type to be treated with WFU by Alternative

Vegetation-types	% Range of Total Acres Burned per Year; Alternative A	% Range of Total Acres Burned per Year; Alternative B
Mixed-conifer, Ponderosa Pine and Spruce-fir	0.14% to 0.25%	0.08% to 0.14%
Mixed-conifer	0.31% to 0.54%	0.18% to 0.31%
Ponderosa Pine	0.87% to 1.5%	0.5% to 0.87%
Spruce-fir	.39% to 0.66%	0.22% to 0.39%

Essentially, WFU gives the USDA Forest Service another tool to manage the public lands. In order to treat 25% of the dominant vegetation-types (60,660 acres) with WFU, it would take between 100 and 173 years under Alternative A and between 173 to 303 years under Alternative B. Thus from a soils and hydrology perspective, it is not meaningful to attempt to quantify the effects in any measurable terms**.** With that said, it is important to monitor the effects of every natural ignition that will be allowed to treat the public lands under WFU. Each fire qualifying for wildland fire use will be mapped and evaluated for effects and recovery for up to 5 years.

For the expected two fires (per decade) that could grow to between 500 and 2000 acres in size, again the assumption is that this would occur under low to moderate-fire severity conditions. However, careful field inspection of these fires will occur to identify pockets/areas that burned at a high severity. Based on the extent of those areas and their relation to watercourses and riparian areas, some localized, rehabilitation treatments could be required. In addition, should any associated hand lines or access roads be constructed during a WFU fire, these will be rehabilitated according to USDA Forest Service guidelines.

Rangeland Management

Effects common to Alternatives A and B

Direct Effects

Since fire effects are highly variable, fire effects on rangeland vegetation would also be highly variable. In this discussion the short term time period is defined as the period of time that is less than one year after the fire. The long term time period is defined as the period of time that is more than one year after the fire.

Under both alternatives several substantial long term positive effects would occur. These effects include an increase in forage health, production, and availability as a result of the removal of encroaching conifers in parks and meadows. In the mountain shrub areas forage health, production, and availability would also be increased by fire in the long term providing positive substantial effects. Other positive substantial effects in the long term would be fire enhanced improvement in seed production, germination, and establishment in grass and shrubland vegetation types and the improved quality, nutrient value, and palatability of forage. In the aspen type even though encroaching conifers would be removed, forage production would still be reduced after fire because of the presence of dense regenerating aspen stands. This would provide for substantial negative effects in the short term. In the long term positive substantial effects would occur as forage production in aspen stands would be gradually restored and improved as the aspen canopy eventually opens up.

According to the Wildland Fire Use Analysis map which shows recorded lightning fires from 1994 through 2004, Alternative A would have the potential to have more rangeland acres enhanced by fire in the long term than Alternative B but the risk of hotter fires occurring which could have substantial negative effects on vegetation in the short term is greater in this alternative. Under Alternatives A and B according to the Wildland Fire Use Analysis Map the possibility of enhancement by fires on rangelands would occur the majority of the time in the northern portion of the Wet Mountains. Under both alternatives there would be the risk of the loss of structural range improvements from fire which would provide for short term minor negative effects.

Indirect Effects

Under Alternatives A and B the following long term, positive, indirect, substantial, effects would occur. There would be more flexibility in management of livestock due to improved distribution of grazing use because natural barriers could be removed and forage availability would be improved. Because of overall improvement in the management of grazing use, wildlife species would also benefit because habitat would also be improved. There would be less use of riparian areas by livestock because of improved distribution which would benefit wildlife species. Improvement in forage quality and availability could reduce competition between livestock and elk. Another long term substantial positive indirect effect would be in areas with soil and water concerns due to past concentrated grazing use. These areas would be improved as a result of better grazing distribution and more flexibility in management of grazing use occurring.

An indirect, short–term, negative, substantial, effect would be a shorter season on the livestock grazing allotment for the permittee after a fire. This would result in the permittee needing to find alternative feed for their livestock in order to allow sufficient time for vegetation to recover.

Cumulative Effects Alternatives A and B

In the past timber sales, mechanical treatments, and prescribed burns have provided many positive benefits by opening up the canopy resulting in an increase in forage production and availability. Over the years recreational use has increased resulting in greater negative impacts on vegetation. Increased recreational use has negatively impacted management of livestock on grazing allotments. Gates between pastures are being left open resulting in problems with properly implementing grazing rotations. Increasing elk numbers has also affected forage health and production in the project area. Suppression of natural fire and timber sale practices over the past fifty years has affected forage production and availability.

Mitigation Measures for Alternatives A and B

Short and long term monitoring of forage species will be needed in order to implement appropriate post fire management. This monitoring will determine range productivity and suitability of rangelands. In areas where hotter fires have left bare ground, seeding of native vegetation may be needed in order to help re-establish vegetation.

Close communication with the grazing permittee during the pre and post fire planning process will be essential. Effects on use of grazing allotments by the permittee after a fire could be mitigated by allowing more flexible rotations during vegetation recovery periods, and allowing impacted permittees to use vacant allotments or allotments in a nonuse status until forage on the allotment is available.

Identifying range improvements in the planning process and protection of valuable structural range improvements could mitigate loss of range structural improvements.

Alternative C Current Management

Direct and Indirect Effects – In the long term this alternative would provide the least substantial positive effects of all the alternatives to rangelands in terms of forage health, production, and availability. The loss of vegetative cover and bare ground in the short term would be greatly reduced since fires would be suppressed as soon as possible. Under this alternative typically the amount of acres burned annually would be small, resulting in long term substantial negative effects to rangelands. As a result of the suppression of wildfires, canopy cover in forested areas, open parks, and meadows would continue to increase. In the mountain shrub types, dense thick stands of brush would continue to expand. Because forage availability and production has been reduced, movement of grazing herbivores through the dense conifer and shrub stands would gradually become more difficult and affect distribution. With the loss of forage production and availability, rangelands in the project area would continue to become unusable.

Cumulative Effects Alternative C

Cumulative effects would be essentially the same as listed in Alternatives A and B, due the comparatively small amount of rangeland acres projected to burn in the next decade under all alternatives.

Mitigation Measures Alternative C

Mitigation measures would be the same as listed in Alternatives A and B.

Recreation

Common to all alternatives, recreational opportunities for the public may be temporarily adversely impacted due to ongoing fire operations or lands being closed to the public. Even considering two fires per decade between 500 and 2,000 acres, the public would have a variety of alternative areas to pursue most recreational activities. The cluster of potential wildland fire use fires in the northern Wet Mountains would only temporarily displace the public. Recreational activities provided in this area (hiking, rock climbing, motorcycle/ATV riding, horseback riding, picnicking, dispersed camping, four-wheel driving, photography, and viewing wildlife) are easily pursued elsewhere on the San Isabel National Forest or adjacent public lands.

Special Uses

Special Use Permit Holders (i.e. outfitter guide operations, electronic sites, private access roads, ditches, etc.) assume all risk to the authorized improvements as stated as a condition of the permit. The permit holder also agrees to hold the United States harmless for any violations incurred under any such laws and regulations or for judgments, claims, or demands assessed against the United States in connection with the holder's use or occupancy of the property.

Heritage Resources

Management Measures

There are a number of actions that heritage resource specialists can take or promote to help preserve cultural resources from the effects of wildfire, including fire suppression activities:

- Serve as a technical specialist during fire events; the best protection for cultural resources during a wildfire is to have knowledgeable cultural resource professionals ready and able to participate in the suppression effort.
- Prepare plans for protecting high value cultural resources before a fire occurs, and make sure that appropriate authorities know about and have access to these plans. Define ahead of time those high value cultural resources that are really worth saving. "Fire proof" vulnerable sites ahead of time when possible.
- Ensure that cultural resource concerns are included in fire management plans, especially with regard to appropriate management responses to fire whenever it might occur in specific areas. For example, where there are areas of high value cultural resources and these are also areas where fires will be suppressed, ensure that plans include the necessity for "ordering up" a cultural resource specialist when a fire occurs.
- Track fire effects on cultural materials in local contexts, and share that information regionally. When possible, do "before/after" experiments of prescribed burns, to assess the effects of fire in specific, local contexts on those archaeological materials which are typical in your area.

Protection measures

There are many actions that will help protect cultural resources from the effects of fire. Cultural resource specialists should work with fire specialists to implement these measures.

In some cases there may be adverse effects associated with implementing the protection measures, such as using retardant on historic structures during a fire, or clearing vegetation which screens sites from vandals. In these cases, of course, the effects of the protection measures must be weighed against the potential for loss of the resource due to fire. In all cases, prescribed fire and Wildland Fire Use offer the chance of greater control over fire effects than does wildfire.

The following heritage protection measures are pertinent to Wildland Fire Use. This list is not exhaustive.

- Identify and avoid vulnerable cultural resources. Note that avoidance may contribute to greater likelihood of wildfire in the future when sites have high fuel loads, or that avoidance may create “vegetation islands” that identify sites to vandals. If necessary, work with fire planners to minimize these effects.
- Record and collect information that would be lost during a fire. For important rock art, thorough recordation and collection of samples of the surface varnish for dating may be the best protection possible.
- Manually reduce fuels on and/or around vulnerable sites; pile debris offsite.
- Create fire breaks near/ around sites. This may be an effective way to protect rock art panels, for example.
- Use retardant or foam to protect structures.
- Wrap structures in fire proof materials to protect from fire.
- Flush cut and cover stumps with dirt, foam, or retardant, where fire could affect subsurface cultural resources.
- Identify and reduce hazard trees next to structures.
- Limit fire intensity and duration over vulnerable sites.
- Wrap carved trees, dengroglyphs, and other such features in fire retardant fabric.
- Limb carved trees to reduce ladder fuels, if possible to do so.
- Cover rock art in fire retardant fabric.
- Minimize fuels and smoke near rock art.
- Cover fuels near rock art with foam, water, or retardant, avoiding the rock art.

Fire effects are context-dependent. The effects of fire on cultural resources depend upon factors which vary from place to place, including physical factors such as fuels, terrain, site type, and cultural materials present. Managing for fire effects also depends upon the value of the cultural materials at risk. In areas where surface materials have little integrity, for example, due to collecting, erosion, past fires, or other factors, surface effects from fire may be of minimal consideration.

There are also a number of potential fire effects to heritage resources that do not depend upon fire effects to specific materials, including:

- Increased visibility from vegetation burn-off and consequently greater vulnerability to vandalism
- Physical damage to sites from snags/ trees falling
- Soil erosion and loss of archaeological data
- Increased damage from rain, new drainage patterns, flood
- Increased rodent and insect activity within site soil matrix

Wildlife

Effects to Threatened or Endangered Species

Mexican Spotted Owl

Alternative B

The MSO occupies fire adapted mixed-pine forests of the Southwest including the action area. Therefore, fire is a natural part of the ecological processes that historically created and maintained this ecosystem with somewhat frequent, low intensity underburns and relatively smaller stand replacement fires that typically occurred throughout the low- and mid-elevation forests of the region and probably some larger high severity burns (Smucker et al. 2005). Because of these relatively short recurrence fire intervals, stand replacement fires were limited throughout much of the range of the MSO. Pre-settlement characteristics of the region was a complex mosaic of vegetation conditions, ranging from open park-like stands, to patches of younger age classes associated with dense multi-layered canopies on canyon slopes and cooler, moister northern aspects. Because of past land use and fire exclusion policies (primarily over the past 80+ years), vast areas of the region are now overstocked with dense stands of small diameter trees, abundant ladder fuels, and considerably increased fuel loading are common. When combined with periodic drought conditions, these abnormal conditions greatly increase the likelihood of large, high-intensity crown fires. In the long-term, fires burning at high intensities represent major departure from the natural range of variability of most southwestern forests, and represent a substantial threat to the continued viability of the MSO (Jenness 2000). Increased human-caused threats discussed in the baseline section above add to the potential of ignition sources that can start fires under these conditions. The occurrence of large-scale “unnatural” (outside of normal fire burn intensity/severity) fires has increased in some of these forested areas, causing uncharacteristic widespread stand replacement fires (e.g., Hayman, Mason Gulch, and others fires in Colorado, Arizona, and elsewhere throughout the Southwest within the range of MSO). However, there is some evidence of “catastrophic” fires in ponderosa pine dominated forests (Smucker et al. 2005). These severe fires can adversely affect structural diversity and destroy roosting, nesting, and other habitats for the MSO. Fuel reduction management strategies, such as those specified in this Plan, would likely reduce fuel loading and spatial arrangement of fuels by allowing naturally ignited fires to return to the ecosystem resulting in the following effects to MSO.

MSOs evolved with a variety of fire intensities in the ecosystem, and as a result, fires typically burned in a mosaic of mixed severities. Lower intensity fires may actually improve overall habitat conditions for the MSO in the short and long-term bringing the habitat back closer to within its HRV in relationship to stand structure and density. The improvement in habitat conditions from these lower intensity fires comes from the increased vegetative diversity and initial herbaceous growth, if precipitation allows, which in turn can result in increased prey densities, thereby providing short-term benefit to MSO (Bond et al. 2002). As previously stated, there is approximately 25,000 ac of vegetation in the Wet Mountains that meet MSO roosting/nesting habitat criteria and 14,000 ac of the mid- or late-seral closed-canopy forest needs to be moved to mid- or late-seral open-canopy forest to be within HRV levels in the next 30-40 years. Fires allowed to burn under the Plan should help to move the habitat in this direction, and consequently, better mimic the HRV habitat conditions.

In general, fires can alter habitat in several ways such as loss of trees, snags, and CWD, reduction in lower branches of trees used for perching and prey hunting by MSOs; and short-term loss of shrubs, grasses, and forbs, which are essential for prey base food, etc. A low to moderate severity fire such as proposed under this Plan would have some potential adverse effects (short-term displacement from smoke and possible reduction in prey foraging habitat and availability for one breeding season or less) and multiple beneficial short to long-term effects such as: increased prey availability (rebounding post-fire) and hunting opportunities, new forage base for prey (new revitalized grasses, forbs, and shrub growth) due to a more open understory and nutrient recycling, and reduction in the likelihood of large catastrophic wildfires in the future.

Although not specifically designed to occur, there is a potential that an unintended high-intensity fire might occur within a PAC, Restricted Area, or suitable owl habitat. In the event that they were to occur in these areas, adverse effects to MSO habitat could be long-term (30-150 years). High severity fires can destroy the forest canopy cover necessary for nesting, roosting, and hiding and remove most or all understory trees and shrubs as well as grasses and forbs, which to some extent are all used by prey animals for food, cover, and shelter. This may result in alterations to such a degree that it is no longer suitable for MSOs in the long-term. In addition, snags and CWD can also be substantially reduced to the point that habitat conditions are degraded for MSO prey species in the mid-term (4-30 years). However, even under this unlikely worst-case scenario where MSO habitat was destroyed by a large catastrophic fire, there is the potential that surviving MSOs in a particular PAC could relocate to an adjacent or nearby drainage with suitable habitat, which does not appear to be limiting in the Plan Area at this time. If a high severity wildfire (not part of the Plans objective for either of the action alternatives) burned in a PAC, and to a lesser degree in a Restricted Area, there is the potential for loss of the PAC or other MSO habitat for 50-150 years. High severity fires can render habitat no longer suitable for MSO until habitat components redevelop. They become more susceptible to predators due to lack of cover, and are less likely to reproduce successfully if nesting and prey habitat have been degraded (James 2005).

Jenness (2000) found that the presence of a fire in MSO territory did not appear to play a significant role in whether they would be present or reproduce within four years in Arizona and New Mexico. Lastly, spotted owls exhibit high site fidelity, and individuals may remain in their historically used core home range even as the habitat in it becomes less suitable. These finding would suggest that fires do not appear to have long-term adverse effects on MSOs although it is quite possible there could be short-term adverse effects such as reduction in prey availability and hiding cover, thermal cover, etc. The magnitude any adverse effects to MSOs from fires would probably not be significant to the owl's productivity and long-term survival, judging by Jenness' findings.

The Action Alternatives and specifically the design criteria have been developed to minimize the risk of large-scale high intensity fires from occurring within MSO suitable habitat to the degree that substantial adverse effects would be minimized, yet still possible. This alternative would limit the amount of suitable MSO habitat in the Wet Mountains area that could be burned from any source in any 10-year period to no more than 3,500 ac (25,000 ac currently available). Therefore, enough suitable MSO habitat would be present at any given time in order to provide MSOs displaced by fire translocation area. The Plan is designed to provide for a reduction in fuel loading of MSO habitat as well as other forest types, and the scale, timing, and duration of impacts are not likely to encompass the whole PAC (or substantial amounts of more than one PAC at any given time) since fires would not be considered in a PAC that had previously burned within a decade. The design criteria would most likely minimize short-term adverse effects by suppressing fires that are likely to turn into the high severity type. Ultimately, reducing the likelihood of catastrophic wildfires and restoring the natural fire regime would have long-term benefits to the owl and is necessary for the conservation of this species, and is as recommended in the Recovery Plan (see above discussion). Given the long-term benefits to the species from reducing the likelihood of large stand replacement fires under these circumstances, the short-term (0-3 years) adverse affects should be reasonably minimized or offset, while there could be long-term (30-150 years) adverse effects to MSO habitat if unplanned catastrophic wildfire events outside of the desired Plan objectives occur. It is unlikely that there would be long-term adverse effects to MSOs in any event since there would be nearby alternate sites with suitable MSO habitat available at any given time even if one PAC or occupied area did receive a large high severity fire.

Lastly, as specified in the Plan, daily assessments would be made by the resource team (including a wildlife biologist) to determine if the risk of a fire moving outside of the desired parameters, and the effects it might have on MSOs and other TEPS species, is acceptable. FWS would also be kept abreast and consulted with for issues relating to any federally listed species that are in the fire area or have suitable and/or critical habitat present. If the risk increases to the level that it may result in undesirable effects to owls or their habitat (e.g., high intensity, stand replacement, within an occupied PAC, above the acreage limitations set forth in the Plan, etc.) measures would be taken to minimize or avoid additional adverse effects (e.g., fire suppression, backfire, use of retardant, constructing firelines, etc.) to protect habitat. Any proposed post-fire salvage activity would need separate NEPA analysis and consultation with the USFWS prior to any salvage action being taken. The effects of timber salvage activities in some cases exceed that of the fire itself (Baker et al 2004). The quantity of acres that would be allowed to burn per decade (3,500 ac) with this alternative are only a small percent (14%) of MSO habitat in the Plan Area; however, there is a potential of adverse effects to this species due to potential loss of habitat.

As a consequence of allowing some of the naturally ignited fires to burn, there would be a reduction in the amount of fire suppression related activities within the Plan Area, (i.e., less of: retardant and water drops, hand line and dozer line development, brushing/swamping of hand lines, fire suppression-related vehicular traffic, hand crew activities, etc.). The reduction in the amount of fire suppression-related activities would generally be beneficial to MSOs if they would have occurred in occupied habitat, in that there would be less disturbance and potential adverse effects from retardant on MSOs.

Alternative A
The effects of this alternative would be very similar to Alternative B (see above) except the effects would occur on a slightly larger scale since more acres (estimates are 4,500 to 6,000 ac per decade vs. 3,000 to 4,500 ac per decade for Alternative B) are likely to burn per decade. The estimated number of acres that may burn is still a very small percent of the total Plan Area (up to 1.6%; only 3,500 ac would be allowed to burn in the Wet Mountains MSO suitable habitat per decade).

Alternative C
This alternative would have no additional effects on MSOs. However, ecological processes would continue at current rates. As a consequence, the long-term indirect effects of continuing the current management direction (suppression of all wildfires) is that fuels would continue to build up and understory brush, shrubs, and trees would continue to increase in density, which would increase the likelihood of large catastrophic wildfires in PACs and other MSO habitat. The forest and shrublands would continue to mature and fuel loads would continue to increase as more trees and shrubs die. The vegetation type and structure would continue to move farther away from HRV. Natural succession of the vegetation communities would increase the habitat suitability for MSOs in part of the Restricted Areas or PACs (where the forested structure is not currently meeting their habitat requirements) while also raising the risk of a catastrophic wildfire in their other habitat areas. Without changes in the forest strategies for fuels management, such as specified under this Plan, there would be an increase in fuel loading from continued suppression of fires and the likelihood of a catastrophic wildfire within one or more of the PACs or Restricted Areas would increase in both the short- and long-term. The PACs, Restricted Areas, and the general vicinities around them have accumulated CWD and vegetation densities have increased due to the exclusion of fires. Existing ladder-type fuels (limbs and branches within six to eight feet of the ground) have the potential to enable ground fires to get into the crowns of the larger and mature trees increasing the likelihood of a large catastrophic wildfire entering the PACs and suitable habitat elsewhere. Continual suppression of all fires will eventually cause disturbance and fire retardant related impacts on MSOs when a fire occurs in occupied habitat as well as potentially impacting additional amounts of vegetation (loss of prey foraging habitat

and possibly MSO roosting habitat if larger trees and snags are removed during fireline construction) due to fireline construction in their habitat. Consequently, this alternative would have the most substantial long-term adverse effects on MSOs and their habitat in comparison to the action alternatives.

Canada Lynx

Alternative B

In addition to the effects common to all species there could be other specific impacts to lynx from fires, but most likely, anything other than large stand replacement fires would have discountable effects (i.e., short-term disturbance or displacement from smoke and fire related impacts plus potential loss of habitat until regrowth of vegetation returns to suitable habitat of one form or another) on lynx due to the unlikelihood of a large portion of any LAU being affected by a fire and the small percent of the LAU that would likely be affected. Even large, stand replacing fires, which may have some short-term negative impacts, would most likely have mid- to long-term beneficial impacts since lynx have evolved with the infrequent (every 300-500 years) stand replacement type of fires that tend to occur in primary lynx habitat such as spruce-fir forested areas.

Fires act as a mechanism to set vegetation structure and succession back to early seral stages, provide for a diversity of vegetation types in a mosaic pattern, and is an important component to provide early successional habitat (disturbance mechanism) for lynx prey such as snowshoe hare. Having a diversity of structural stages and vegetation on a landscape scale is beneficial to wide-ranging predators such as lynx. A fire could cause the temporary loss (1-100 years or more, depending on the habitat type burned and the fire intensity) of any type of lynx habitat (denning, winter, or other) that may have any combination of effects listed above under the effects common to all species section. However, when viewed from a landscape scale the beneficial effects (increased habitat diversity and new foraging habitat for prey species) of having fires occur in the ecosystem far out weigh these potential negative effects. For example, fires considered under this action could cause a shift in the habitat utilization patterns such as: changing the use patterns of an area from denning or winter foraging to summer foraging habitat in stand replacement type of fires, or changing denning habitat to winter habitat, if the large wood component is lost from an underburn type of fire while the tree structure remains the same for given areas in a LAU due to habitat changes created. Judging from the quantities of different lynx habitat types within the Plan Area LAUs (in relation to lynx home range sizes), no one type of lynx habitat appears to be limiting at this time. Most likely, all lynx habitat types within any given LAU would remain in sufficient quantities even with the fires that are proposed with this action due to the limited size and scope of areas burned over time. The effects would be insignificant and discountable to lynx for the above-mentioned reasons. In addition, the higher elevation areas are currently still within their HRV for stand structure, age, and species composition, so allowing these fires to burn under the design criteria as stated above would not have any effects on lynx that are outside the normal range and magnitude of effects that lynx have adapted to and evolved with.

Fires could alter lynx travel corridors between the Sangres and Wet Mountain LAUs (see Map 4) and cause a reduction in the hiding cover available throughout the corridor possibly causing lynx to alter their travel routes. However, design criteria would limit the area that could burn in any given year and the intensity level that would minimize their size and scale to ensure their effectiveness as travel corridors for lynx. In addition, if deemed necessary to protect essential lynx (or other species) habitat features, any fire can be put into the fire suppression mode in an effort to abate unacceptable consequences or effects on wildlife or any other resources. A resource team that includes a biologist would evaluate any fire and its potential effects on lynx on a case by case basis in addition to the disclosure of effect described in this document and prescribe appropriate measures as needed in order to meet the LCAS guidelines, standards, and objectives that are applicable to wildland fire management.

No known denning sites have been documented for lynx in the Plan Area, but there is individual lynx location data from radio-collared lynx showing that they have been documented there between February 1999 and February 2005 (CDOW 2005). Fires could cause some disturbance or displacement of lynx that could cause avoidance, displacement, or disruption to any lynx utilizing the area during the burning period and beyond. There is also the potential for loss of lynx denning and winter foraging habitat for 50-100+ and 7-20 years, respectively, depending upon the fire intensity and the residual stand that remains post-fire. But once again, it is very unlikely that there would be enough of any lynx habitat type destroyed by a fire to adversely affect lynx, since lynx are wide ranging and anything other than a landscape scale fire that burns most of an LAU at a high severity level would not prevent lynx from being able to survive in the LAU post fire.

As a consequence of allowing some of the naturally ignited fires to burn, there would be a reduction in the amount of fire suppression related activities within the Plan Area, (i.e., less of: retardant and water drops, hand line and dozer line development, brushing/swamping of hand lines, fire suppression-related vehicular traffic, hand crew activities, etc.). The reduction in the amount of fire suppression-related activities would generally be beneficial to lynx if the fire occurred in habitat that had lynx present, in that there would be less noise disturbance and potential adverse effects from retardant on lynx.

Alternative A

This alternative would have very similar effects on lynx as Alternative B above except that the scale would be slightly larger due to more acres/decade that would be likely to burn. The overall impacts to lynx would still be insignificant and discountable due to the small percentage of a LAU likely to burn.

This alternative would have very similar effects to lynx like Alternative B except the amount of reduction of those activities would be at a slightly greater scale due to more acres per decade projected to burn which would require less of a need to conduct fire suppression in areas allowed to burn naturally and move habitat structure and function towards HRV.

Alternative C

This alternative would have no additional effects on Canada lynx above the baseline condition. Current anthropogenic and natural ecological processes would continue along with the changes in habitat associated with succession described above for Alternative C direct/indirect effects on MSOs. Most of the lynx habitat is in forests that typically incurred low-frequency high-severity fires (spruce-fir that is probably within HRV currently) so continuing with fire suppression and ultimately causing an increased potential for high severity fires in lynx habitat is not as likely to be out of the HRV for fires in those habitat types. The lower elevation mixed-conifer forests would over time incur a greater deviation from HRV than those in lynx habitat since they tended to burn more frequently and at lower intensities most of the time. Long-term effects from continuing the current fire management strategy would likely have some minor negative effects on lynx due to the increased likelihood of large catastrophic fires (disturbance and displacement during fires and loss of prey habitat in short-term in high-severity burned areas) in the future from the continual accumulation of fuels in forested areas that are currently still within HRV for spruce-fir forests.

Fire suppression activities could cause disturbances to lynx from fire line construction, retardant usage, crew deployment, vehicle traffic and some modification to lynx habitat such as tree removal, dozer line, etc.

EFFECTS DETERMINATION

Alternatives A and B

Based on the effects analysis and rationale discussed above, both of the Action Alternatives - A and B would have insignificant and discountable effects on lynx, and lynx habitat. Therefore, it is our determination that this action **MAY AFFECT, but is NOT LIKELY TO ADVERSELY AFFECT** the Canada lynx.

Mexican Spotted Owl Designated Critical Habitat

Based on the effects analysis, both of the Action Alternatives A and B may adversely affect the MSO and its critical habitat. These alternatives have been designed specifically to avoid or minimize adverse effects on MSO and its designated critical habitat, but there is the possibility that both of the Action Alternatives could result in adverse effects (i.e., a large high severity fire) which could destroy one or more MSOs, their PAC(s), Restricted Areas, suitable habitat, and/or their critical habitat. Therefore, it is our determination that both of these alternatives are **LIKELY TO ADVERSELY AFFECT** the Mexican spotted owl and its critical habitat.

Alternative C

Canada lynx

Based on the effects analysis and rationale discussed above, this alternative would not create additional impacts or effects on the bald eagle, Canada lynx or their habitat above those already present in the environmental baseline condition. However, current ecological processes as described above in the effects section and the effects on bald eagle and lynx associated with them would continue. Therefore, it is our determination this alternative **MAY AFFECT, but is NOT LIKELY TO ADVERSELY AFFECT** bald eagle and Canada lynx.

Mexican Spotted Owl and its Critical Habitat

Based on the effects analysis and rationale discussed above, this alternative would have no additional effects to MSO or their critical habitat above the environmental baseline condition. However, current ecological processes as described above in the effects section and the effects on MSO associated with them would continue. Therefore, it is our determination this alternative is **LIKELY TO ADVERSELY AFFECT** Mexican spotted owl and its critical habitat.

Effects to Sensitive Species

Rocky Mountain Capshell Snail, Boreal Toad, Plains Leopard Frog, and Northern Leopard Frog

Alternative B

Potential habitat for each of the above sensitive species exists in the project area and there is potential that they may be present, although there are not documented occurrences of these species. Hammerson (1999) identifies that the Plan Area is within or immediately adjacent to the known distribution of plains and northern leopard frogs. There is only a very small likelihood of Rocky Mountain capshell snails or boreal toads existing in the Plan Area since there is no known documentation of their presence in the area (surveys have been conducted in numerous places over the years for boreal toads). Since there is a potential of these species to occur and habitat is present, potential impacts may occur as discussed below.

A fire (especially a high intensity/severity) could cause direct or indirect mortality or reduced natality and recruitment to any of the above species if it destroyed or adversely affected suitable habitat (lakes for capshell snail; ponds, streams, and riparian areas for the toad and frogs). Fire can destroy habitat by any of the following mechanisms or the impacts from it: direct fire, flames and heat, destruction of riparian area, elevated water temperatures, reduced dissolved oxygen content, smothered larvae/eggs/snails by sedimentation resulting from slope erosion, etc. Low to moderate severity fires in suitable habitat would probably have little or no impacts to any of these aquatic/riparian dependent species. Fire suppression activities will occur on any fires that do not meet the Plan Area objectives for fire use. The effects of fire suppression related activities on the above species’ productivity and/or survival would likely be insignificant and discountable since the vast majority of fires are contained at 1 ac or less. It is unlikely that any of the above effects would destroy or alter the habitat adversely enough to cause any substantial effects to individuals or populations. Low severity fires have very little potential to impact the littoral areas of a lake where the capshell snail inhabits. Most of the lakeshore areas have low fuel densities in the immediate area and fires would likely be of a low severity if they did occur along the lake shore. Therefore, it is unlikely that a fire would cause any adverse impacts on them due to low risk of sedimentation, elevated lake temperatures, or decreased dissolved oxygen content of the lake water.

Potential for short- and long-term impacts (as previously mentioned above) exists in the immediate area of a high severity fire to the above species. Overall, it is quite unlikely that allowing natural fires to burn in the ecosystem would have any long-term adverse impacts to the above species' viability. The frequency, distribution, and intensity of wildfires are very unlikely to affect the overall populations of these species at the landscape scale and these species have adapted to an ecosystem that experienced fires in the past.

Alternative A

This alternative would have very similar effects as Alternative B except at a slightly larger scale since there would likely be more acres burning.

Alternative C

This alternative would have no additional impacts above the environmental baseline on the above species. Fire suppression of all fires would continue and there is the possibility that suppression-related activities such as dozer and hand line construction, retardant usage, and ground disturbances could affect some of the riparian or wetland habitat that these species inhabit and thereby cause disturbance, mortality, or loss habitat and fragmentation of habitat.

Northern Goshawk, Boreal Owl, Olive-sided Flycatcher, Lewis' Woodpecker, Flammulated Owl, American Three-toed Woodpecker, Wolverine, and American Marten

Alternative B

The above species tend to occupy deciduous and/or coniferous-forested habitats (plus alpine habitat for wolverine). Species' response to fire depends on the number of years since fire, severity, and a variety of other factors and thus, evaluation of the effects is complex (Smucker et al. 2005). Fires would vary in intensity across the landscape and can have immediate and long-term impacts on snags and snag dynamics (decay and fall rate) (Chambers and Mast 2005). Low intensity fires may have little effect on live trees, but may scorch and in some cases, incinerate snags (Harrington 1996). Fires can dramatically increase snag density across a landscape, creating a pulse of new snags and altering vegetation class from mature forest to open grasslands with snags that will affect various species differently (Chamber and Mast 2005). Fire suppression activities will occur on any fires that do not meet the Plan Area objectives for fire use. The effects of fire suppression related activities on the above species' productivity and/or survival would likely be insignificant and discountable since the vast majority of fires are contained at 1 ac or less.

Generally, returning fire to the ecosystem in a way that mimics the natural fire regimes for the different habitats would have long-term beneficial effects to each of these species by reducing the risk of large high severity wildfires in the future and creating habitat that has a mosaic of vegetation patterns and diversity of forest structures, ages, and species compositions for all of the above species at a landscape level. All of these species have evolved and adapted to fires to some degree. The area projected to burn per decade in the Plan Area (~3,000-4,500 ac) is substantially less than what burned historically under the natural fire regimes (LANDFIRE 2005).

Alternative A
This alternative would have very similar effects as Alternative B except at a slightly larger scale since there would likely be more acres burning (~4,500-6,000 ac).

Alternative C
This alternative would have no additional impacts on the above species beyond the environmental baseline conditions. Natural ecological processes and fire suppression would continue in the current trend. Continued fire suppression would increase the likelihood of large high severity wildfires in the Plan Area causing the vegetation to further depart from HRV, ultimately having greater effects on species' long-term viability. Fire suppression-related activities such as dozer and hand line construction, retardant usage, vehicle and personnel traffic and ground disturbances could affect some of the habitat that the above species inhabit or utilize and thereby cause disturbance or loss habitat and fragmentation of habitat. The long-term effects of this alternative would allow the vegetation communities and stand structure to continue moving away from HRV while the Action Alternatives would move it toward HRV, and consequently, provide more long-term benefits for those species utilizing the habitat provided.

Black Swift and Peregrine Falcon

Alternative B
The above species tend to occupy rocky cliffs/ledges with forested surroundings. It is very unlikely that a fire (especially a low-moderate intensity/severity one) would cause direct mortality or reduced natality and recruitment to either of these species since their nesting habitat is generally located on rocky cliffs and ledges with very light fuels (if any) in the vicinity. Fire suppression activities will occur on any fires that do not meet the Plan Area objectives for fire use. The effects of fire suppression related activities on the above species' productivity and/or survival would likely be insignificant and discountable since the vast majority of fires are contained at 1 ac or less. Most likely, any effects of fire would be of an indirect nature in that they could cause a disturbance to the nesting area with young due to the smoke from a fire in the area. Mortality to young could occur if the smoke levels at the nest sight are concentrated enough and remain long

enough to asphyxiate the nestlings or fledglings. Adult falcons and swifts are very mobile and most likely could avoid direct mortality by flying or moving out of the fire's direct path. However, there is the potential for temporary disturbance from smoke and fire and there could be nest abandonment if fire and smoke effects were substantial enough.

Neither species tends to forage in the immediate vicinity of their nests, but there is potential that foraging opportunities would be affected by a fire in their foraging areas. Low to moderate severity fires could improve foraging opportunities for black swift (insectivores) in both short and mid-term by stirring up insects to forage on and creating more insect habitat by killing trees and shrubs, etc. A high severity fire could reduce available insects for the short-term due to fill kill, while probably improving foraging opportunities in the mid-term as insects colonize and breed in dead trees and downed wood in the fire area. Insect populations would likely stabilize over the long-term. Low-moderate fires would likely cause very little change in foraging behavior for falcons (primarily feed on birds) due to minimal impacts to their prey species, but large high severity fires could reduce foraging opportunities for peregrines in the short- to mid-term due to loss of habitat for many of the peregrine's prey species. However, the scales of the proposed fires are unlikely to have substantial effects on either species' feeding opportunities since the acres burned per decade are well below the HRV.

Alternative A

This alternative would have very similar effects as Alternative B except at a slightly larger scale since there would likely be more acres burning.

Alternative C

This alternative would have very similar effects as those listed above under Alternative C for the Northern Goshawk, Boreal Owl, etc.

Common Hog-nosed Skunk, Fringed Myotis, and Townsend's Big-eared Bat

Alternative B

These species typically inhabit the more open rocky lower- to mid-elevation forests and shrublands that frequently are found in open to canyon-type country with crevices, caves, and rocky outcroppings. A fire (especially a high intensity/severity fire) could remotely cause direct mortality or reduced natality and recruitment to any of the above species if it destroyed or adversely affected habitat being utilized by them at the time of the fire. Most likely, this would occur if there was destruction of roosting areas in snags for the fringed myotis, and remotely, the big-eared bat since they typically use features other than trees for roosting (i.e., bridges, culverts, caves, abandoned mines and buildings, rocky ledges and overhangs). Most fires would have few direct adverse impacts to hog-nosed skunks since they can avoid most direct contact with fire and flames by moving away. Fire suppression activities will occur on any fires that do not meet the Plan Area objectives for fire use. The effects of fire suppression related activities on the above species' productivity and/or survival would likely be insignificant and discountable since the vast majority of fires are contained at 1 ac or less.

While there may be some short-term negative impacts to the above species, there would likely be beneficial impacts to them in the short- to long term. Fires may improve natality and recruitment rates for the above species due to the post-fire beneficial effects that fire could have on insect and small vertebrate species' populations as a result of improved habitat (improved forage availability and nutrition), and therefore, the prey species' recruitment and reproductivity. Fires that burn in a mosaic pattern at low- to moderate severity would likely improve vegetative diversity, plants species composition, stand structure, create snags, and promote the new growth of grasses and forbs that provide a food base for insects and other animals that are prey to bats and skunks.

Alternative A
This alternative would have very similar effects as Alternative B except at a slightly larger scale since there would likely be more acres burning.

Alternative C
This alternative would have very similar effects as those listed above under Alternative C for the Northern Goshawk, Boreal Owl, etc.

Northern Harrier, White-tailed Ptarmigan, Loggerhead Shrike, Brewer's Sparrow, Gunnison's Prairie Dog, and Black-tailed Prairie Dog

Alternative B
These species are found in open habitats that have smaller and lower quantities of fuels. Habitat for all of these species is very limited and their occurrence is at best rare in the analysis area. Fires would have less noticeable impacts to their habitat versus the forest dwelling species; lasting for a shorter time (lower intensity and severity) since the vegetation types where these species are found would burn quickly and also tend to re-vegetate or recover quickly (i.e., grasslands [prairie dogs, shrike], wetlands [harriers], rock, tundra, and willow [ptarmigan], and shrublands [sparrow, shrike]). Most all individuals (except for young and infants) could avoid direct contact with fires coming through their habitat by flying away, moving underground or to another location away from the fire. Fire suppression activities will occur on any fires that do not meet the Plan Area objectives for fire use. The effects of fire suppression related activities on the above species' productivity and/or survival would likely be insignificant and discountable since the vast majority of fires are contained at 1 ac or less.

The greatest potential for direct mortality would probably be to nesting Brewer's sparrows and shrikes since they utilize shrublands that have the potential to sustain the hottest fire of any vegetation type utilized by the above species. Most any other habitat type that might burn would have a low intensity fire and be unlikely to cause direct mortality to the less mobile individuals in the area, such as young of the year. Large and high severity fires are unlikely to occur in ptarmigan and shrike habitat due to the discontinuous fuels, therefore the potential effects on ptarmigan and shrikes from fires are probably minimal to none. Prairie dog and harrier habitat could sustain larger fires due to the more continuous fuels but they are finer fuels that would burn quickly and with a low severity and would not likely have much for direct effects on them since they could escape into burrows or simply fly away until the fire had burned through the area.

A fire could cause short-term adverse effects such as temporary displacement from their habitat during a fire due to the flames, heat, and smoke to any of the above species, but the likelihood of long-term adverse effects are minimal for any of the species. Fire would most likely benefit all of above species to some degree since they have adapted and evolved with it in their respective habitats to one degree or another and it provide a means of disturbance that can stimulate re-growth of and improve stagnating vegetation.

Alternative A
This alternative would have very similar effects as Alternative B except at a larger scale since there would likely be more acres burning.

Alternative C
This alternative would have very similar effects as those listed above under Alternative C for the Northern Goshawk, Boreal Owl, etc.

Migratory Birds

Alternative A
This alternative of the WFU Plan would help to restore the natural variability of vegetative species composition, forest and grassland structure, and successional seral stage diversity by allowing fire to act as a natural disturbance in the ecosystem, and therefore, promote conservation of migratory birds by providing for habitat diversity that is utilized by the many different species of land birds. Another benefit of this alternative would be the reduction in the likelihood of large catastrophic wildfires that could severely alter many thousands of acres with one or multiple fires (i.e., Mason Gulch, Haymen, and Schoonover fires) in areas that did not normally receive fires of those sizes or intensities (primarily low- to mid elevation areas that had mostly low- to moderate-severity fires historically).

There is the potential for some short-term adverse impacts to land birds if a fire destroys nests, nestlings, and less likely, adult migratory birds in a given area should the fire occur during the nesting/breeding season. If the fire occurred outside of the breeding season there is still the potential for short- to mid-term negative impacts to those individual birds that had utilized the previously unburned area due to habitat conversion and displacement to less suitable habitat, which could cause loss of recruitment for one or a few years, and possibly even death, due to starvation in severe cases.

Alternative B

This alternative would be very similar to Alternative A except at a somewhat smaller scale taking longer to reach the HRV conditions since fewer acres are expected to burn in any given decade.

Alternative C

This alternative would continue the current management strategy of suppressing all wildfires in the WFU area and potentially lead to more high severity catastrophic fires that could have more significant adverse effects on migratory bird habitat.

Cumulative Effects (Sensitive Wildlife Species)

Cumulative effects are analyzed at the home range or diversity unit level for each sensitive species.

In addition to the environmental baseline condition described above (Section 6.0), reasonably foreseeable future actions that would likely occur are similar to the past and present activities affecting the specific FS sensitive species. Continuation of road building, residential development, and associated activities, grazing, recreational use (motorized and non-motorized), prescribed burning/thinning, all have potential to negatively affect the productivity and survival rates of the sensitive species addressed above. The above activities can cause displacement, disturbance, habitat fragmentation, destruction of breeding, nesting, resting, roosting, and feeding habitat that can adversely effect the productivity and survival of all of the above species if habitat modification occurs in areas that are currently inhabited by any of the FS sensitive species listed above.

Re-introducing fire into these fire-adapted habitats would have long-term beneficial impacts for all of the sensitive species to the degree that they were dependent upon fire for habitat modification and disturbance. Fires would act as a catalyst to promote the development of different essential elements such as food, cover, and shelter in meeting their life history needs and therefore enhance the habitat promoting increased productivity and survival at the landscape scale.

EFFECTS DETERMINATION (Sensitive Wildlife Species)

Fire is a natural process that the above sensitive species have adapted to and it is very unlikely that re-introducing it to fire-dependent ecosystems would have any long-term negative impacts since it would move the ecosystem towards HRV and the scale of area likely to burn per decade from implementing the Plan is smaller than what occurred under the natural fire regime for the Plan Area. It is highly likely that it would benefit the populations of the above sensitive species in the long-term as stated above in the cumulative effects section. Some short-term negative impacts, as mentioned in the cumulative effects section above, may occur to individual animals but none of the species' populations are likely to be reduced to the point they would be considered threatened, endangered, or exterminated due to this alternative.

Based on the above stated rational, it is our determination that all the alternatives **MAY ADVERSELY IMPACT INDIVIDUALS, BUT NOT LIKELY TO RESULT IN A LOSS OF VIABILITY ON THE PLANNING AREA, NOR CAUSE A TREND TO FEDERAL LISTING OR A LOSS OF SPECIES VIABILITY RANGEWIDE** for the following FS sensitive species: northern goshawk, boreal owl, northern harrier, olive-sided flycatcher, black swift, peregrine falcon, white-tailed ptarmigan, loggerhead shrike, Lewis' woodpecker, flammulated owl, American three-toed woodpecker, Brewer's sparrow, common hog-nosed skunk, Gunnison's prairie dog, black-tailed prairie dog, wolverine, American marten, fringed myotis, and Townsend's big-eared bat.

Fisheries

Alternative A

Fire along stream corridors can result in immediate mortalities to fishes due to elevated water temperatures, but studies documenting direct mortality following wildfire are few. High severity fire and heavy fuel loads in riparian zones are predisposing factors for direct fish mortality. Propst et al. (1992) observed no mortalities of endangered Gila trout immediately following the Divide Fire in New Mexico. Large areas of high severity fire were documented, but riparian areas only suffered low severity fire or did not burn at all. Reiman et al. (1997) observed dead fish and reaches of stream with no live fish after high severity fire moved through two riparian corridors in Idaho.

Size of the riparian area, riparian fuel loads, fire severity and stream size are key factors in immediate postfire fish mortality. Most susceptible to direct mortality of fishes are small streams with heavy fuel loads and high severity fire. In some cases, local extinctions have been observed in response to fire, particularly in areas where populations of fishes have been isolated in small headwater streams (Dunham et al. 2003). Headwater catchments tend to burn more intensely and completely than do those of larger size streams.

Fire suppression activities involving application of fire retardants can negatively impact fish assemblages. Fire retardants can cause direct mortality of fishes if retardants find their way into streams. Dead fish have been documented following application of fire retardant; however, documentation is poor (Norris and Webb 1989). The key factors determining fish mortality appear to be the number of retardant drops, the volume of retardant used and orientation to the stream.

The indirect effects of wildfires on fishes are much better understood and can be significant (Reiman and Clayton 1997). Fires can effect large changes in water chemistry (Spencer et al. 2003), water quantity (Dunham et al. 2003), and channel stream structure (Benda et al. 2003). Most often these changes occur through changes in transpiration, infiltration, ground water recharge, erosion and mass wasting (Meyer and Pierce 2003), riparian shading and the recruitment and delivery of coarse debris (Wondzell and King 2003). The largest problems arise from the longer term impact on habitat that changes in stream temperature due to plant understory and overstory removal, ash-laden slurry flows, increases in flood peakflows, and sedimentation due to increased landscape erosion. For example, only a single Gila trout was collected from a stream in New Mexico two weeks after the Divide Fire. Three months later, follow up sampling suggested that Gila trout had been extirpated from this headwater stream (Rinne 2004). Moreover, Rinne (1996) documented dead fish on exposed stream banks two weeks postfire and observed only a single brook trout three months after the Dude Fire. In both cases, it appeared that "slurry ash flows" during summer monsoons may have been responsible for fish mortality and local extirpation after several months of sustained flooding of stream corridors. The removal of vegetation during the fire likely contributed to the flooding. Flooding and debris flows have the greatest impact on fishes following wildfire.

The most deleterious impact to aquatic resources from wildfire is elevated rates of sedimentation. Watersheds denuded by wildfire are vulnerable to accelerated rates of soil erosion and can yield large amounts of postfire sediment (USDA 2005). Wildfire has the potential to remove most if not all vegetative and/or litter cover, exposing bare ground. High intensity rain events following loss of these protective layers increase the rate of erosion from adjacent slopes and hillsides (Satterlund and Adams 1992), increasing sedimentation into streams and negatively impacting water quality for fishes. Large inputs of sediment into a stream following a wildfire can tax the transport capacity of the stream and lead to channel aggredation (USDA 2005). In the Rocky Mountain and Intermountain areas, these events (flooding and mass movement) are usually associated with snowmelt runoff or intense mid-summer rainstorms following the July-early September fire season (Minshall 2003).

Riparian (streamside) areas are an integral and important component of watersheds. Riparian vegetation next to water bodies plays a major role in sustaining the long-term integrity of aquatic systems by providing shade, bank stability, fish cover, woody debris input, storage and release of sediment, flood attenuation, surface-ground water interactions, and plant-and-animal habitats. Intact, properly functioning riparian areas can greatly mitigate the effects on streams from large disturbances, including wildfire. Riparian areas act as large sponges filtering sediment and/or other organic matter from overland flow into streams and protecting fish habitat.

Stream flow responses to prescribed fire are generally much smaller in magnitude in contrast to the responses to wildfire. Moreover, prescribed burning doesn't completely consume extensive areas of litter and other organic matter on the soil surface and, therefore, the drastic alterations in peakflow discharges that are common after severe wildfires do not normally occur following prescribed fire (USDA 2005). Prescribed fires with low to moderate burn severity rarely produce hydrologic effects that land managers need to be concerned about. Post wildfire floods are the main concern, particularly the timing of storm flows (response time) and magnitudes of flood peaks. Low severity fire has little effect on peak flow because it does not generally alter watershed condition.

Under Alternative A, deleterious impacts to greenback cutthroat trout individuals or populations are not expected from the Plan because specific streams and/or tributary drainages containing greenback populations would not be considered for beneficial fire use. Natural ignitions in the South Prong Hayden, North Taylor, Newlin, Graneros and South Apache Creeks would be actively suppressed as directed in the National Fire Plan. Fire suppression activities would begin immediately if ignitions occur in a greenback stream or tributary drainage, or if fire is moving from adjacent areas into a greenback drainage. Fire exclusion boundaries encircling greenback cutthroat trout drainages have been established to prevent fire and fire effects from impacting these populations. The boundaries typically follow ridge tops, open meadows, roads and other natural features of terrain, improving the success of fire suppression activities. Therefore, there should be no direct or indirect mortality and no cumulative impacts to greenbacks within the scope of the Plan.

With the exception of Newlin and Graneros Creeks, greenback watersheds would move toward the desired future condition because fire will only be restricted from the specific stream or tributary drainage of the watershed where greenbacks occur. Greenbacks occur in the main stem of the Newlin and Graneros Creek watersheds. Therefore, to protect against possible negative impacts from wildland fire, all natural ignitions in the main stem and tributary drainages of the watersheds will be suppressed.

Alternative B

Under alternative B, and within the scope of the Plan, direct, indirect and cumulative effects to greenback cutthroat trout would likely be similar to those of Alternative A. However, because of the use of ERC values as trigger points in the decision making process, our expectation is that fewer fires will be managed for beneficial use under this Alternative. Because fewer fires may be managed for beneficial use, we would expect a lower potential for a managed fire to intensify to a level outside of Plan goals and objectives. Also, fewer acres may be treated under Alternative B and, therefore, fuel loads across the Plan Area will not decrease as rapidly as they may under Alternative A. Moreover, the potential for a catastrophic wildfire, outside of Plan goals and objectives, would be somewhat higher under Alternative B because it will take longer to reach the desired future condition.

Alternative C

Under this alternative, the Plan would not be implemented, fire suppression activities would remain consistent with the National Fire Plan (i.e., suppress all fires). Fuel loading above the historic range of variability would continue to increase and the potential for catastrophic, stand-replacement wildfires would also increase. If fires of this nature were to occur in a greenback cutthroat trout drainage, the likelihood of extirpation of the population would increase substantially. The Plan Area would not move towards the desired future condition.

Cumulative Effects

Cumulative effects include direct and indirect effects of the proposed action in addition to the effects of past, present and reasonably foreseeable future actions, both federal and non-federal.

Under Alternative A and B, cumulative effects occur in the form of probabilities rather than quantifiable impacts to greenbacks. First, there is potential for cumulative impacts to greenback cutthroat trout even though beneficial fire would be restricted from greenback drainages. This potential would be realized if a fire being managed for beneficial use in an adjacent or nearby watershed was to escape suppression activities into a greenback drainage (outside of Plan goals and objectives) resulting in negative impacts. This scenario, however, could only occur if several actions were to happen sequentially. First, a natural ignition in close proximity to a greenback drainage would have to occur. Secondly, the ignition would have to occur under a specific set of circumstances such as meeting ERC criteria, favorable weather conditions and etc. Thirdly, the fire would have to exceed the expected fire behavior patterns for beneficial use, resulting in suppression activities. Lastly, the fire would have to escape suppression activities into a greenback drainage and result in direct mortality, increased erosion and stream sediment loading and/or loss of riparian vegetation and buffering. The potential for this set of circumstances to occur in sequence and negatively impact greenback cutthroat trout is small and likely discountable for a discussion of cumulative effects.

The cumulative effects under Alternative B may be slightly less than the cumulative effects under Alternative A. Because we would expect fewer fires to be managed for beneficial use under Alternative B, the likelihood of one of those fires escaping suppression activities and burning into a greenback drainage would also be less than the likelihood or potential under Alternative A. Under Alternative B, only natural ignitions occurring when ERC values are below 63 would be considered for beneficial use, and this would result in fewer opportunities to manage fire, relative to Alternative A with no ERC criteria. As a further constraint, natural ignitions occurring in a large portion of the Wet Mountains and Spanish Peaks will be evaluated for WFU only when the ERC value is less than 53. This criterion will further reduce the number of fires managed for beneficial use. However, the potential for a catastrophic, stand-replacement type fire may be increased under Alternative B over the potential observed under Alternative A. Because more fires would be managed for beneficial use under Alternative A, greater fuel loads may be reduced overtime, decreasing the potential for a high severity wildfire.

Under Alternative C, the likelihood for a catastrophic, stand-replacement wildfire will increase over time due to continued fuel loading in greenback drainages. Wildfires of this nature in greenback drainages would very likely result in negative impacts to greenback populations. The cumulative effects could range from none to extirpation of greenback populations. Increased fuel loading is also a testament to the Forest Service's ability to control wildfires. However, at some point, fuel loading will reach levels that exceed the Forest Service's abilities to actively suppress wildfire. As previously mentioned, the cumulative effect of an increased probability of severe wildfire due to continued fire suppression activities in greenback drainages is not quantifiable, but certainly increases as fuel loads increase over time.

Long-term Effects

It's important to note that while we propose to restrict the use of wildland fire in greenback cutthroat trout drainages, the long-term effect of doing so will negatively impact greenback populations. Fuel loads will continue to increase until they exceed our ability to suppress fire once ignited. This will lead to an increasing probability that a catastrophic wildfire will occur, negatively impacting greenbacks and their habitats.

Recent genetic testing on existing, pure-strain greenback populations has cast doubt on their genetic purity, including populations within the Analysis Area. Metcalf et al. 2007 determined that most greenback populations within their native range, and previously thought to be genetically pure, were in fact introgressed with various other forms of cutthroat trout and rainbow trout. Moreover, it was further determined that the Graneros Creek and South Apache Creek populations are actually pure-strain Colorado River cutthroat trout, not greenbacks as previously thought (Metcalf et al. 2007). Based on the work of Metcalf et al. 2007 and others, it appears that the only genetically pure greenback population in the Analysis Area is the population in the South Prong Hayden Creek. At this time, however, the U.S. Fish and Wildlife Service has not made a final determination or ruling on the current protections afforded those populations (i.e., the current protections are still afforded to those populations or not). Therefore, the FS will continue to recognize the populations of Graneros, South Apache, Newlin and North Taylor Creeks, as well as South Prong Hayden Creek, as protected greenback populations until a future determination is made by the U.S. Fish and Wildlife Service. Alternatively, should the U.S. Fish and Wildlife Service determine or designate that some or all greenback populations within the Analysis Area, and currently afforded protection under ESA, are introgressed and no longer afforded those protections, those watersheds would then become eligible for beneficial fire use.

Therefore, we propose that the Plan, especially the criteria for excluding fire in greenback drainages, be reevaluated in 5-8 years. Our reasoning for the reevaluation is that we expect to have more information available at that time to make future determinations on the use of wildland fire in greenback drainages. For example, in the Forest's Five-Year Fisheries Action Plan, we have proposed three to four greenback reintroduction projects, all occurring in the Plan Area. With the establishment of more populations, we may be more comfortable with allowing wildland fire in a greenback drainage. Also, perhaps in the next 5-8 years some greenback populations become *stable* based on Recovery Plan criteria. Also in that time period, we will gain valuable experience in managing wildland fire for beneficial use. The experience gained will help us to more fully understand what we can expect from the use of wildland fire. Also, using wildland fire over time will hopefully create a more mosaic habitat type and reduced fuel loading adjacent to greenback drainages, providing for better fire management.

During the 5-8 year reevaluation period, we strongly suggest that other forms of fuel reduction (mechanical thinning and/or prescribed fire) be used in greenback drainages, in effect, "pre-treating" the area before the use of wildland fire. This alone may lead us to become more comfortable with allowing wildland fire in greenback drainages. To pre-treat the area using mechanical thinning or prescribed fire will likely achieve the same results as wildland fire with a lower level of risk associated with it. We feel the level of risk associated with prescribed fire is lower, perhaps considerably lower, than with wildland fire. A prescribed fire would only occur where you want, when you want, under the specific conditions you specify and with fire fighting/management staff on location. By reducing the fuel load prior to a wildland fire in a greenback drainage, our ability to manage a wildland fire to low or moderate severity levels would be much greater.

In summary, the long-term effect of excluding wildland fire in greenback drainages will negatively impact greenback populations. We propose a 5-8 year period of not allowing wildland fire in greenback drainages. After the 5-8 year period, the exclusion of wildland fire in greenback drainages should be strongly reconsidered. Also during the evaluation period, we suggest that other fuel reduction techniques be applied to reduce fuel loads in greenback drainages.

EFFECTS DETERMINATION

Alternatives A and B

Because naturally ignited fires in greenback watersheds would be suppressed as directed in the National Fire Plan, no direct, indirect or cumulative effects would be expected under Alternative A or B. However, there is potential for negative effects if a naturally ignited fire in an adjacent watershed was managed for beneficial use under the Plan, and escaped suppression/control tactics and burned into a greenback drainage. The probability of this event occurring is not quantifiable, but likely small, if not discountable. Therefore, our determination is that Alternative A and B **MAY AFFECT, BUT ARE NOT LIKELY TO ADVERSLEY AFFECT** greenback cutthroat trout.

Alternative C

Under this alternative, the Plan would not be implemented, fire suppression activities would remain consistent with the National Fire Plan (i.e., suppress all fires). Fuel loading above the historic range of variability would continue to increase and the potential for catastrophic, stand-replacement wildfires would also increase. If fires of this nature were to occur in a greenback cutthroat trout drainage, the likelihood of extirpation of the population would increase substantially. Therefore, it is our determination that Alternative C **MAY AFFECT, LIKELY TO ADVERSELY AFFECT** greenback cutthroat trout.

Botany

Threatened, Endangered and Sensitive Plant Species

Alternative B

The direct effect of fire is the potential scorching or mortality of individuals or populations from fire or heat. The timing of burns is critical to annual species that may not be as seriously impacted by fall burns that take place after they have set seed and completed their lifecycle. However, annual species may be greatly affected by spring fires that take place while they are growing and flowering. Fire intensity is also a factor; high-intensity fires may cause greater impacts to TES plant species since these fires may kill the seedbank and sterilize the soil.

Fire can indirectly impact TES plant species by causing changes in vegetation composition and successional pathways of that vegetation, changing local hydrologic patterns in sensitive plant habitat, changing the fire regime or by changing the soil characteristics of the habitat. Some of these changes may result from shifts in the hydrologic, solar, and soil characteristics of TES plant habitat. Fire can also lead to changes in forage condition, and this can lead to changes in the foraging behavior of livestock and wildlife within the area. New use patterns can result in different potential impacts to sensitive species. Indirect effects can also occur from noxious weed invasion or from impacts to pollinators or mycorrhizae associated with sensitive plant species. Fire also affects the nutrient cycles of the affected habitat, making nutrients available for use by plants. Indirect impacts can have positive or negative effects.

Some indirect effects, such as noxious weed invasion, potentially pose a highly negative impact to all plant habitats, although different habitats may be invaded by different species of noxious weeds. These potential effects result from removal of vegetation and opening up the area to additional light. In riparian areas or wet meadows, Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*) may invade with potentially catastrophic results. Upland areas may be invaded by a host of noxious weeds such as leafy spurge (*Euphorbia esula*) or knapweeds (*Centaurea* spp.). These noxious weeds can lead to habitat changes that are detrimental to TEPS plant species. Noxious weeds, once established, could indirectly impact sensitive plant species through allelopathy (the production and release of plant compounds that inhibit the growth of other plants), changing the fire regime, or direct competition for nutrients, light, or water. Subsequent weed control efforts such as hand-pulling, hoeing, mowing, or herbicide application could also negatively impact sensitive plants.

The level of indirect effects from fire may vary depending on the seasonal timing of the fire, the intensity of the fire, and the sensitivity of the individual species to fire. While fire is detrimental to some species (particularly those which inhabit interior forest habitats with a closed canopy), fire suppression is detrimental to plants which inhabit forest openings. No single fire regime will be advantageous to all species. Thus, response to fire will be highly species-dependent with changes being beneficial to some sensitive plant species and detrimental to others. Species-specific responses to fire are discussed below.

Cumulative Effects

Past and current activities have altered TES plant occurrences and their habitats. These activities have the potential to cumulatively affect TES plant species and include: historic grazing, timber harvest and thinning, fire suppression, prescribed fire, mining, motorized and non-motorized recreational use, road and trail construction, urban development (sub-dividing and development of private land), and noxious weed infestation.

Some of the effects of these types of activities on TES plants are as follows:

- Grazing leads to biomass removal and trampling. It has led to changes in species composition, compaction of soils, changes in fuel loading and the fire regime, downcutting of riparian areas with subsequent drying of adjacent meadows, and noxious weed invasion. Within riparian areas and wet meadows livestock grazing has led to churning of the soil and hummocking.
- Timber harvest and thinning has led to a more open canopy with additional light reaching the forest floor (which may be beneficial or detrimental depending on the species), soil disturbance and compaction, development of skid roads, and noxious weed invasion. Changes in forest composition, structure and fire frequency have also taken place.
- Fire suppression has led to increased fuel loading and canopy closure.
- Prescribed fire ideally mimics natural fire processes, but may burn too hot and kill the native vegetation and lead to invasion by non-native plant species. Prescribed fire usually takes place during the spring or fall, which is outside of the normal fire season and may lead to additional mortality of perennial plant species.
- Mining has caused destruction of habitat, leaching of heavy metals in to streams, changes in stream pH. Activities associated with mining that affect TES plants include road and railroad development, timber harvest, weed invasion and revegetation efforts.
- Motorized and non-motorized recreational use (including OHV use, camping, horseback riding, mountain biking, hiking, hunting, and fishing) has led to the development of non-system roads and trails, development of dispersed campsites, erosion, and the vectoring of noxious weeds in previously pristine areas.
- Road construction causes soil disturbance and erosion, destruction of habitat, and noxious weed invasion. It also increases the impacts from recreational activities by allowing improved access for those activities.
- Urban development destroys TES plant habitat, fragments populations, and increases the risk of weed invasion and fire.
- Noxious weed infestation is often the result of the ground disturbing activates listed above. Noxious weeds displace native plants, mostly through direct completion.

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

MacDonald (2000) reports that a critical step in cumulative effects analysis is to compare the current condition of the resource (in this case TES plants) and the projected changes due to management activities (in this case fuels management, mechanical or hand treatment) with the natural variability over time in the resources and processes of concern. This approach is difficult for TES plants since long-term data are usually lacking, and many TES plant habitats have a long history of disturbance (i.e., an undisturbed reference is often lacking). For some species, particularly those which do not tolerate disturbance or are found under dense canopy conditions, minimizing on-site changes to TES plants is an effective way of reducing cumulative impacts. MacDonald (2000) states, "If the largest effect of a given action is local and immediate, then these are the spatial and temporal scales at which the effect would be easiest to detect. If one can minimize the adverse effects at this local scale, it follows that there would be a greatly reduced potential for larger-scale effects". Even though the cumulative effects analysis for TES plants is hampered by the absence of historic data and the lack of an undisturbed reference, we can minimize the potential cumulative effects by minimizing the local (direct and indirect) effects. For other species, particularly those that are disturbance tolerators or fire-followers, minimizing on-site changes can be detrimental. These species tolerate or benefit from on-site changes, which result in opening the stand, reducing the potential for catastrophic fire, and increasing light reception in the understory. Thus, the response of TES plant species to the management activities is species-dependent.

If adverse effects are not minimized at the local level, cumulative effects may occur. Past and present forest management activities have caused changes in plant community structure and composition across the forests. These management activities have altered the present landscape to various degrees and have had direct, indirect, and possibly cumulative effects on TES plant species. These effects can be minimized by following Forest Service standards and guidelines and by implementing integrated design features or mitigation measures to monitor or offset impacts to TES plant species. With these protective measures in place, cumulative effects are less likely to be adverse.

For many of the TES plant species analyzed in this document historical population data is unavailable. It is unknown whether these species have always been rare or if management activities have made them less common across the landscape due to cumulative effects. The goal of the adaptive management plan developed for this project is to reduce the direct and indirect effects to TES plant species. By reducing those effects, cumulative effects can also be minimized.

Alternative A

The effects of implementing Alternative A would be similar to those of Alternative B. The difference is a matter of scale; under Alternative A more acres are predicted to burn than under Alternative B. More populations may be subjected to impacts from fire than under Alternative B. However, the negative effects of fire suppression would be minimized should additional acres burn due to the implementation of Alternative A.

Alternative C
Under Alternative C, no acres would be burned under the Plan and no TES plant populations would be subjected to impacts from WFU fires. However, the negative effects of fire suppression, including canopy closure, fuel accumulation, and the risk of higher-intensity fires in the future would increase.

EFFECTS DETERMINATION

- The effect of implementing Alternative A, B, or C on sensitive plant species Aquilegia chrysantha var. rydbergii, Asclepias uncialis, Astragalus leptaleus, Botrychium lineare, Carex livida, Cypripedium parviflorum, Draba smithii, Drosera rotundifolia, Epipactis gigantea, Eriogonum brandegeei, Festuca campestris, Festuca hallii, Machaeranthera coloradoensis, Malaxis brachypoda, Mimulus gemmiparus, Neoparrya lithophila, Oenothera harringtonii, Penstemon degeneri, Potentilla rupincola, Primula egaliksensis, Ptilagrostis porteri, Rubus arcticus ssp. acaulis, Salix arizonica, Salix myrtillifolia, Salix serissima, Selaginella selaginoides, Utricularia minor, and Viola selkirkii is **MAY ADVERSELY IMPACT INDIVIDUALS, BUT NOT LIKELY TO RESULT IN A LOSS OF VIABILITY ON THE PLANNING AREA, NOR CAUSE A TREND TO FEDERAL LISTING OR A LOSS OF SPECIES VIABILITY RANGEWIDE.**

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies during the development of this environmental assessment:

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Federal, State or Local Agencies

U.S. Fish and Wildlife Service

U.S. Bureau of Land Management

Colorado Division of Wildlife

MAP #1 – ALTERNATIVE "A"

MAP #2 – ALTERNATIVE "B"

MAP #3 – SENSITIVE FISHERIES, HERITAGE AND WILDLIFE RESOURCES

MAP #4 - CAUTION LEVELS FOR SOIL & WATER RESOURCES – SANGRE DE CRISTO RANGE

MAP #5 - CAUTION LEVELS FOR SOIL & WATER RESOURCES – WET MOUNTAINS

MAP #6 - CAUTION LEVELS FOR SOIL & WATER RESOURCES – SPANISH PEAKS