United States
Department of
Agriculture

Forest Service

Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands

Payne Gulch Fuels Management Project

Environmental Assessment

March 2013

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1.0 Purpose and Need

This environmental assessment (EA) was prepared by the United States Department of Agriculture, Forest Service (USFS) Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands (PSICC) to address the potential environmental effects of the Payne Gulch Fuels Management Project. The information in this EA will be used to decide on a course of action for the proposed project. The analysis in this EA complies with provisions of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and the National Forest Management Act (NFMA).

1.1 Background

This section provides background information on several of the primary components of the purpose and need for this project.

1.1.1 Recreation Residences

The South Platte Ranger District administers a number of special use permits for recreation residences. These permits allow private citizens to occupy small parcels of National Forest System (NFS) lands as a 'lot' for privately owned cabins known as "recreation residences." The lots range in size from 100 feet by 200 feet to approximately one acre in size. The recreation residences can be occupied by the permittee or their guests at any time during the year, but not as primary residences. Commercial use of recreation residences is not allowed.

One of the largest concentrations of recreation residences is located south of Bailey, where the Happy Top, Payne Gulch, and Roark Gulch summer home groups contain 54 recreation residences. Happy Top is located in sections 29, 30, 31, 32, and 33, Township 7 South, Range 72 West. Twenty cabins are permitted in an area of 67 acres. Payne Gulch is located in sections 25, 26, 35, and 36, Township 7 South, Range 73 West and section 1, Township 8 South, Range 73 West. The Payne Gulch area has 27 permitted cabins. The Roark Gulch area is located in sections 30 and 31, Township 7 South, Range 72 West and sections 25 and 36, Township 7 South, Range 73 West, between the Happy Top and Payne Gulch areas. The Roark Gulch area contains seven permitted cabins.

Each recreation residence is authorized through a term special use permit. The special use permit does not authorize the cutting of timber or other vegetation. Trees, shrubs, grasses, and other plants may be removed or destroyed only after the authorized officer or the authorized officer's designated representative has approved in writing and marked or otherwise identified what may be removed or destroyed. One requirement of the special use permit is the preparation of an operating plan that governs that various activities authorized by the permit, including steps the permit holder will take to protect public health and safety and the environment.

The current management standards for recreation residences on the PSICC contain the following language:

> "A "hazard" tree is defined as one which poses a significant threat to the residence, associated structures, the parking area, or outdoor areas of frequent use. Hazard trees include dead, dying, or strongly leaning trees within striking distance of improvements or use areas. Trees causing structural damage to an improvement (such as root growth causing a foundation to crack) can be considered hazard trees as well. The permittee will work with the Forest Service to ensure that sufficient vegetation (trees, limbs, brush and grass) is removed to allow for an adequate "defensible space" (as defined by Forest Service fire standards) around the structure in the event of wildfire."

> "Administration of hazard trees and other vegetation on recreation residence tracts will be managed to meet fire and other safety needs while preserving the forest environment in as natural a state as possible. Permittees are responsible for the identification and removal of trees that are hazardous to their improvements (whether they are located on or adjacent to permitted lots), but must obtain Forest Service approval prior to removal of any tree. Under no circumstances will the Forest Service contract for any tree removal that is the responsibility of the permittee unless it is done through a cooperative agreement under which the permittee is responsible for all costs associated with this work. Permittees should contact the Forest Service if they are concerned about a particular tree. In addition the Forest Service may identify hazard trees during inspections and require permittees to remove them."

The current recreation residence operation and maintenance plan for the South Platte Ranger District contains the following requirement:

> "The permit holder shall maintain the structure and lot in a fire safe condition year-round. The Forest Service shall perform random fire prevention inspections annually to insure permit holder's compliance with local, state, and federal fire laws. Permit holder shall, by June 1 annually, do at least the minimum fire hazard reduction as follows":
>
> "Maintain a fuel break around and adjacent to the structures for a distance not less than 30 feet on each side. This does not apply to single trees, green shrubbery, or similar plants used as ground cover if they do not provide a means of rapidly transmitting fire from the native growth to any building or structure."

1.1.2 Forest Conditions

Forests in the western U.S. are currently much different from previous centuries. The density of trees is much greater than what existed historically (pre-European settlement of the 19th century). Because of past fire management practices, ground and ladder fuels have increased to the point that surface fires can easily move into the tree canopy, fueling destructive crown fires. The higher-density, continuous fuels present in many forests allow fires to spread quickly over large distances, making control difficult and dangerous.

Dense forest conditions also cause trees and other vegetation to compete for limited water and nutrients, particularly during drought periods. Competition for water and nutrients can reduce forest health, increasing the potential for outbreaks of insects and diseases, which can kill large areas of trees and increase fuel loads, increasing the potential for uncontrollable wildfires. Several disease and insect infestations, including dwarf mistletoe, mountain pine beetle, Ips beetle, Douglas-fir tussock moth, western gall rust, and spruce budworm have affected forests in or near the project area in the past. Reducing the potential for outbreaks of insects and disease by improving forest health is important to reducing the size, intensity, and hazards associated with future wildfires.

In 1996, a human caused wildfire burned approximately 12,000 acres in the Buffalo Creek and Spring Creek drainages in the South Platte Ranger District. This high-intensity, wind-driven fire burned the majority of the acres during a one day run in which fire suppression crews were unable to slow or stop the forward fire spread. In addition to killing most of the forest vegetation in its path, four buildings were destroyed. In the years after the Buffalo Creek Fire, the district was hit with a number of other high intensity fires, notably, the High Meadows Fire (in 2000) north of Buffalo Creek that burned 27 structures, the 2002 Snaking Fire, which caused the evacuation of 1,000 residences, and the Hayman Fire of 2002, which burned approximately 138,000 acres and 600 structures, including 132 residences. These

fires have demonstrated the potential for high-intensity wildfires that cause severe, long-term effects to many resources.

Because of these past fires, the district has conducted vegetation treatments at a landscape scale to return the forest to conditions that are more natural and reduce the potential for additional large-scale fires. In areas where prescribed fire or other hazardous fuel reduction activities have been completed, past wildfires have been reduced in intensity and suppression forces have been able to slow or stop spread of the fire. To complete an over-all risk reduction, all fire prone areas need to be examined and treated if a wildfire could cause severe resource damage. Following a review of the wildfire potential on the district, it was determined that the areas including and surrounding permitted recreation residences have a two-sided elevated fire risk. On one hand, unnatural forest conditions surrounding the recreation residences could support a high intensity wildfire, causing their destruction. On the other hand, the same forest conditions could carry fire from a structure onto NFS lands, leading to unacceptable resource damage.

1.1.3 Fire-related Initiatives and Guidance

The National Fire Plan (NFP) identifies the area around Bailey as an urban interface community at risk from catastrophic wildfire (USFS et al. 2001). The area occupied by the Happy Top, Payne Gulch, and Roark Gulch summer home groups is entirely within the wildland-urban interface (WUI) of the community of Bailey. In addition, the Upper South Platte River watershed, which includes the project area, provides a substantial portion of the water supply for the Denver metropolitan area. The NFP identifies two objectives that would be specifically addressed in the Payne Gulch project area:

- "Assign highest priority for hazardous fuels reduction to communities at risk and readily accessible municipal watersheds."
- "Restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically intense fires on a priority watershed basis. Methods will include removal of excessive vegetation and dead fuels through thinning, prescribed fire, and other treatment methods."

In 2004, the Platte Canyon Fire Protection District completed a WUI Wildfire Hazard Risk Assessment (Anchorpoint 2004). The area occupied by the Happy Top, Payne Gulch, and Roark Gulch summer home groups was included in the Bailey community, which was given a hazard rating of moderate. The assessment recommended thinning of vegetation on the edges of town, as well as a shaded fuel break on the south side of town adjacent to the National Forest.

1.2 Management Direction

The Land and Resource Management Plan for the PSICC (Forest Plan) (USFS 1984a), as amended, provides programmatic management direction. Through its goals, standards and guidelines, and management area (MA) direction, the Forest Plan provides the overall guidance for management of the land within the PSICC's borders. This EA is a project-level analysis, designed in conformance with the applicable Forest Plan management direction (goals and standards/guidelines). Where appropriate, this EA tiers to the Forest Plan.

The Forest-wide standards and guidelines in the Forest Plan that apply to this project are primarily those regarding diversity (pages III-12 to III-14), cultural resources (page III-17), visual resources (pages III-18 to III-19), recreation (pages III-19 to III-24), wilderness (pages III-24 to III-27), wildlife (pages III-28 to III-35), vegetation management (pages III-40 to III-50 and III-82), water resources (pages III-50 to III-52), special uses (pages III-68 to III-69), soil resources pages III-72 to III-74), transportation (pages III-74 to III-80), fire and fuels (pages III-81 to III-82), and air quality (page III-82) and are hereby incorporated

by reference. This project was also designed in conformance with Forest Plan direction that applies to specific MAs as described in Section 1.2.1.

1.2.1 Management Areas

The Forest Plan divides the PSICC into individual MAs and designates specific direction, goals, standards, and guidelines to be used in the management of each area to meet its emphasis more completely. These are referred to as MA prescriptions. The entire project area is in MA 2B, which emphasizes rural and roaded-natural recreation opportunities. Motorized and non-motorized recreational activities are possible. Motorized travel may be restricted to protect physical and biological resources. Visual resources are managed such that management activities maintain or improve the quality of recreation opportunities. Vegetation can be managed using commercial and non-commercial methods to enhance visual quality, diversity, and insect and disease control. Standards and guidelines for MA 2B are found in the Forest Plan on pages III-107 to III-115.

MA 9A (Riparian Area Management) is not specifically mapped in the Forest Plan, but applies to the aquatic ecosystem, the riparian ecosystem, and adjacent ecosystems within 100 feet of perennial streams, lakes, and other water bodies. The management of all component ecosystems of riparian areas is emphasized. Each of these components is managed together as an integrated riparian area. The goals of management are to provide healthy self-perpetuating plant communities, meet water quality standards, provide habitats for viable populations of wildlife and fish, and provide stable stream channels. Standards and guidelines for MA 9A are found in the Forest Plan on pages III-204 to III-215.

1.3 Purpose and Need

The purpose of the Payne Gulch Fuels Management Project is to create sustainable forest conditions that are resilient to fire, insects, and diseases, while providing for diverse wildlife habitats, recreational opportunities, and sustainable watershed conditions. This can be accomplished by reducing forest canopy density and ground and ladder fuels across the landscape. The risk of large-scale, high-intensity wildfire with uncontrollable fire behavior, such as active crown fire, would be reduced.

The need for the proposed project is driven by forest conditions. Historic fire suppression has created forests that are more susceptible to a large-scale, high-intensity wildfire. The proposed project is needed to reduce the risk, intensity, and hazards associated with a high-intensity wildfire near the Bailey community; improve forest health; and enhance ecological diversity.

1.4 Proposed Action

The South Platte Ranger District is proposing to reduce hazardous fuels adjacent to and surrounding the Happy Top, Payne Gulch, and Roark Gulch recreation residence groups through mechanical treatment and prescribed fire on up to 1,652 acres to modify potential fire behavior and reduce the risk of a large-scale, high intensity wildfire. Figure 1-1 shows the project area.

This project would be a cooperative effort between the Forest Service and the permittees. Recreation residence special use permits require permittees to manage the vegetation on or adjacent to the permitted lots to meet fire and other safety needs. Under no circumstances would the Forest Service contract for any vegetation treatment that is the responsibility of the permittee unless it is done through a cooperative agreement under which the permittee is responsible for all costs associated with the work.

Colorado State Forest Service (CSFS) guidelines for defensible space (Appendix A) would be followed for hazardous fuels treatments surrounding the recreation residences. This defensible space would range

from approximately 30 feet from the structure to 120 or more feet from the structure depending on the vegetation, slope, and other factors. In some cases, the defensible space would be within the permitted lot. In other cases, the defensible space would cross the permitted lot boundary. Permittees would be financially responsible for cutting and removing the vegetation to create the defensible space on permitted lots. Neither Forest Service crews nor funds would be used to create, modify, or maintain defensible space on permitted lots.

Outside of this defensible space, vegetation would be modified to restore natural forest conditions, reduce hazardous fuels, modify potential fire behavior, and reduce the risk of unacceptable resource damage from high intensity wildfire. Modification of vegetation outside permitted lots would be accomplished by Forest Service crews or contractors and would be funded by the Forest Service. Future maintenance actions would also be the responsibility of the Forest Service.

1.5 Decisions To Be Made

The scope of actions to be addressed in this analysis is limited to mechanical and prescribed fire treatments in the Payne Gulch project area of the South Platte Ranger District on the PSICC. In addition, the scope of the proposed action includes temporary road construction and obliteration, temporary fire line construction, slash treatment, and mitigation measures deemed necessary to reduce the environmental effects of the project.

This EA documents the analysis of site-specific, on-the-ground activities. It is not a general management plan for the Payne Gulch area. The environmental analysis documented in this EA is tiered to the Forest Plan for the PSICC (USFS 1984a) as amended and the Final Environmental Impact Statement and Record of Decision for the Forest Plan (USFS 1984b). It does not reanalyze the MA allocations already specified in the Forest Plan, nor does it seek to re-examine federal regulations or USFS policy regarding fuels management on NFS lands.

This EA is not a decision document. It does not identify the alternative to be selected by the responsible official. This document discloses the environmental consequences of implementing the proposed action and alternatives to that action. The South Platte District Ranger is the responsible official who will decide which, if any, management actions will be implemented. The decision will include all mitigation measures and monitoring actions that will be required in association with the selected alternative. His decision will be stated in the Decision Notice. The District Ranger will make the following decisions:

1) Whether or not to conduct fuels treatment through mechanical thinning, prescribed burning, and other activities to meet the stated purpose and need, and;
2) If an action alternative were selected, under what conditions and by which methods mechanical thinning, prescribed burning, and other activities would be conducted. This decision will take into account the flexibility needed to successfully meet the purpose of and need for the project.

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Figure 1-1 Payne Gulch Fuels Management Project

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2.0 Alternatives

This chapter describes the alternatives considered to achieve the purpose and need discussed in Chapter 1. One action alternative and a "no-action" alternative are described in detail. Discussion is also provided on public involvement and issue identification, alternatives considered but not analyzed in detail, and a comparison of the two alternatives analyzed in detail.

2.1 Public Involvement and Issue Identification

The first step in environmental analysis is to determine what needs to be analyzed. Accordingly, scoping was conducted to determine the potential issues associated with a proposed action and further identify those issues that are substantial and relevant to the decision. Comments received during scoping were reviewed by the interdisciplinary team (IDT) to determine the substantial issues to be analyzed in detail and the issues that are not substantial or that have been covered by prior environmental review and should be eliminated from detailed analysis.

2.1.1 Scoping Process

Two public notices describing the proposed action and requesting public input were published in the Douglas County News Press. The first was published on February 17, 2005. One letter was received in response to the first public notice. The second notice was published on December 8, 2005. No comments were received in response to the second notice.

Letters were sent to all potentially affected recreation residence permit holders. Four letters and two emails were received in response to this mailing. Letters were prepared and returned to those that responded specifically addressing the concerns raised. In addition, employees of the USFS met with the director of the Payne Gulch summer home group in the South Platte District office to discuss the project proposal further. The director then visited many of the district's fuels management project areas and responded via letter with concerns and comments both to the project and permit compliance.

Employees of the USFS attended the annual meetings of the Payne Gulch and Happy Top homeowners associations during the summer of 2005. Their participation involved a presentation at each meeting on why the hazardous fuel treatments are necessary and how the work would be accomplished. No unique issues or concerns were raised at these meetings. Employees of the USFS attended the annual meeting of the Payne Gulch homeowners associations in August 2010 and 2011 to provide a project update.

2.1.2 Development of Issues

Public comments were reviewed and then used in the issue development process. Each issue identified during scoping was evaluated to determine its relevance to the decision and then placed in one of the following categories: 1) dismissed as not relevant to the decision or beyond the scope of the project; 2) eliminated from detailed study because of known minimal or no effects, or effective mitigation; 3) listed as a substantial issue to be analyzed in detail, but not a key issue for alternative development; or 4) listed as a substantial issue to be analyzed in detail, and a key issue for alternative development. In several cases, an issue was identified by the IDT based on the existence of the resource in the project area or the legal, regulatory, or policy requirement that the resource be addressed.

Nine preliminary issues were identified for consideration based on public comments received during scoping. Internal discussion during comment analysis led to the identification of seven additional issues, bringing the total number of identified issues to 16. Of these 16 issues, one was related to the recreation residence permitting process and one was related to the NEPA process. Both of these issues are not

discussed further in this EA because they were determined to be not relevant to the decision or beyond the scope of the project. One issue was based on a number of comments that provided general themes or specific items that were incorporated into the proposed action. This issue was considered a key issue for alternative development, but is not specifically analyzed in the EA because it was incorporated in the proposed action. Additional discussion on the remaining 13 issues is provided in the following sections.

2.1.3 Issues Eliminated from Detailed Study

The following four issues were eliminated from detailed study because of known minimal or no effects, or effective mitigation.

2.1.3.1 *Air Quality*

Air quality was identified as a potential topic of concern by the ID team. The primary concern was smoke produced by prescribed burning. The Colorado Smoke Management Memorandum of Understanding requires the Forest Service to conduct prescribed burns under conditions permitted by the Air Pollution Control Division of the Colorado Department of Public Health and Environment (CDPHE), which is the implementing agency for the federal Clean Air Act in the state of Colorado. Each prescribed burn must have a smoke permit that is reviewed by the CDPHE. Smoke permits are approved based on model outputs of particulate matter concentrations and visibility values at selected sensitive receptors. All prescribed burning would comply with applicable State of Colorado air quality guidelines, which would minimize any effects of the project on air quality.

2.1.3.2 *Recreation*

The potential for noise, dust, traffic delays, visual intrusions, and other adverse effects to recreation residence owners was identified as a topic of concern by the public. In addition, the IDT identified concerns with effects to the Payne Gulch trailhead and Brookside-McCurdy and Payne Gulch trails, which are well-used public recreation facilities. Several mitigation measures were added to the proposed action to minimize effects to recreation.

2.1.3.3 *Wilderness and Roadless*

Wilderness and roadless areas were identified as potential topics of concern by the IDT. Project activities would not be conducted in wilderness or roadless areas, eliminating the potential for effects to these special management areas.

2.1.3.4 *Public Health and Safety*

Public health and safety was identified as a potential topic of concern by the IDT, primarily related to the risk of various treatment operations to the public. Project design standards and mitigation measures would be used to minimize risks to public health and safety. All prescribed burning would be conducted under an approved burn plan, which would minimize risk. If necessary, the area would be closed to public entry by special forest order during treatment operations, which would minimize risk from equipment operations.

2.1.4 Issues Analyzed in Detail

The following nine issues will be analyzed in detail in the EA, but were not key issues for alternative development.

2.1.4.1 *Vegetation*

Forested stands in the project area tend to be dense and lack a diversity of age classes of trees. They are therefore more susceptible to crown fire, insects, and disease. One purpose of the proposed action is to create forest conditions that are resilient to fire, insects, and diseases. The proposed action may substantially alter the existing vegetation from its present condition in order to meet this purpose. Ground-disturbing activities may also increase the susceptibility of the project area to invasion and spread of noxious weeds.

2.1.4.2 *Fire and Fuels*

One of the primary purposes of the proposed action is to reduce fuel loads so that, in the event of a wildfire, suppression opportunities are improved, public and firefighter safety are improved, the risk to public and private property is reduced, and the extent of stands susceptible to crown fire is reduced. Proposed treatments may reduce fuel loads, alter potential fire behavior, and alter existing fire regime condition class.

2.1.4.3 *Watersheds*

Each of the activities associated with the proposed action may cause increased water production because of the decrease in trees, decreased surface water quality, contribute to soil erosion, and otherwise affect watersheds. There are small numbers of wetlands in the project area. Effects to or conversion of wetlands is a federally regulated activity under section 404 of the Clean Water Act (CWA).

2.1.4.4 *Wildlife*

NFMA establishes the use of Management Indicator Species (MIS) for planning and monitoring implementation of land and resource management plans. MIS include species whose response to management activities may help to predict the likely response of a wide range of species with similar habitat requirements to management activities. Forest Plan Amendment #30 (2005) identified four potential MIS for the PSICC. From this list, two species were selected for detailed evaluation because they are most likely to be affected by the proposed project.

2.1.4.5 *Special Status Species*

The Endangered Species Act (ESA) and USFS policy require the assessment of potential effects of proposed agency actions on species that are listed as threatened, endangered, or proposed under the ESA, or as sensitive by the Regional Forester (USFS 2011). Potential effects were evaluated in detail for two threatened species and 12 sensitive species that may occur in the project area. A Biological Assessment (BA) and Biological Evaluation (BE) have been prepared.

2.1.4.6 *Access*

A limited number of roads access the project area; however, these roads are generally sufficient to allow access for treatments. Traffic from logging trucks could affect local residents on county roads. No new system roads would be constructed. Reconstruction of existing roads may be necessary to access some areas. Temporary roads may be needed to access some areas. Existing non-system routes may be obliterated. Changes to the road system and vegetation may increase the risk of illegal OHV use.

2.1.4.7 *Visual Quality*

Part or all of some proposed treatment units could be viewed from recreation residences, trails, U.S. Highway 285, several Park County roads (PCRs), and several NFS Roads (NFSRs). The entire project area is in MA 2B, which requires that visual resources be managed to maintain or improve the quality of

recreational opportunities. The proposed action may affect the visual landscape by altering forest canopy structure and increasing contrast between treated and non-treated areas.

2.1.4.8 *Cultural Resources*

Cultural resources were identified as a potential topic of concern by the IDT. Several federal laws require consideration of potential effects to cultural resources. Cultural resource surveys have been completed and several potentially eligible properties have been identified. The proposed treatments have the potential to cause adverse effects to eligible properties. The proposed action has been modified and mitigation measures have been added to minimize the risk of adverse effects to cultural resources.

2.1.4.9 *Economics*

Implementing the proposed action may not produce a net benefit to the government in terms of cost/benefit ratio. However, intangible benefits to natural resources (for example, lowered risk of wildfire, increased resistance to insects and disease, and reduced costs for future firefighting) and public and private property may be more important than the direct monetary cost. The cost may also be justified because the wildfire hazard to private property would be reduced. Timber production would not be emphasized; however, commercial timber products may be sold to help offset costs. The proposed project may also benefit the local community by providing work in the form of service contracts and as a source of fuelwood.

2.2 Alternative Development

Following completion of scoping and issue analysis, the IDT met to discuss the array of substantial issues and to develop a range of alternatives. An alternative was considered reasonable if it was feasible and would achieve the purpose and need. Alternatives considered but eliminated from further analysis included those that were beyond the scope of the proposed action, failed to meet the purpose and need, were poorly defined, or were unlikely to be implemented. Five alternatives were developed and considered. Two of these (the proposed action and no action alternatives) were identified for detailed study based on the substantial issues. The other three alternatives were considered but eliminated from detailed study because they did not sufficiently address the relevant issues or meet the purpose and need for the proposed action.

2.2.1 Alternatives Considered but Eliminated from Detailed Study

This section describes the alternatives that were considered but eliminated from further analysis in the EA.

2.2.1.1 *Alternative A - No Use of Prescribed Fire*

This alternative would include all mechanical vegetation treatments and other activities that are part of the proposed action, but would not use prescribed fire. All natural and activity fuels would be treated using mechanical methods, such as mastication or lop and scatter. The use of prescribed fire is an important component of accomplishing the purpose and need of the project. Prescribed fire, when combined with mechanical treatments, removes ladder and ground fuels, prepares seedbeds, and promotes natural regeneration. Current scientific literature has shown that a combination of mechanical and prescribed fire treatments is more effective than mechanical or prescribed fire treatments alone (for example, Stephens et al. 2009). While mechanical treatments would accomplish similar objectives, prescribed fire can be the most efficient method of reducing fuels and modifying vegetation while minimizing effects to other resources. For example, mechanical means cannot remove accumulations of smaller slash and fine fuels without causing substantial soil disturbance. Removing slash using mechanical treatments without the use

of prescribed fire would also be prohibitively expensive. This alternative was eliminated from detailed study because it does not meet the purpose of and need for the project.

2.2.1.2 *Alternative B – No Use of Temporary Roads*

This alternative would include all mechanical and prescribed fire treatments and other activities that are part of the proposed action, except that activities would be limited to those that could be accomplished from the existing road system. Some areas of proposed treatment would not be accessible without temporary roads. Specifically, the area to be treated west of Payne Gulch extends approximately one mile south of existing roads. Treating this area is a high priority because prevailing winds from the west have the potential to push a fire towards Payne Gulch and the town of Bailey. Without temporary roads, treatment of this area would only be possible with substantially lower effectiveness or prohibitively higher cost. This alternative was eliminated from detailed study because it does not meet the purpose of and need for the project.

2.2.1.3 *Alternative C – Using Federal Funds to Accomplish Thinning on Recreational Residence Lots*

This alternative would include all mechanical and prescribed fire treatments and other activities that are part of the proposed action. In addition, federal funds would be used to accomplish thinning on recreational residence lots in the Happy Top, Payne Gulch, and Roark Gulch areas. Lot owners must remove hazard trees and create defensible space at their own cost, even when required to do so by the USFS, in accordance with the current PSICC Management Standards for Recreation Residences. Changing these standards would be outside the scope of this EA. This alternative was eliminated from detailed study because it would not be legally implementable.

2.2.2 Alternatives Considered in Detail

This section describes the features of the two alternatives that were considered in detail. First, Alternative 1, the No Action alternative, is described. Then, the various components of Alternative 2, the Proposed Action, are explained. Within the section on Alternative 2, the specific treatment types are described, followed by a description of the proposed transportation system and other aspects of the proposed action. The description of Alternative 2 concludes with lists of the project design standards, mitigation measures, and monitoring.

2.2.2.1 *Alternative 1 – No Action*

The no action alternative provides a baseline for comparison to aid in determining the relevance of issues and effects of the proposed action. Under Alternative 1, the proposed mechanical treatments, prescribed fire treatments, and associated activities would not occur. Current management activities, such as maintenance of recreation facilities and fire suppression, would continue, but no action would be taken to meet the purpose and need for the proposed project. Existing fuel accumulations and the risk of large-scale fire would not be reduced. Potential fire behavior would not be altered and the risk to firefighters, the public, and private property in the event of a wildfire would not be reduced.

Implementation of this alternative would cause no additional incremental effects relative to the issues previously described. For example, there would be no project-induced effects to water quality, special-status species, or visual resources. Ongoing ecological processes, such as insect and disease infestations, would continue unchecked. The potential for large-scale, difficult-to-control wildfires would remain at current levels in the short-term, but would likely increase in the long-term as stands age and fuels accumulate.

2.2.2.2 *Alternative 2 – Proposed Action*

This alternative is the proposed action described in Chapter 1. It is the initial proposal developed to meet the purpose of and need for the project. Treatments are expected to begin in 2013 and take three to five years to implement, depending on the availability of funding and other factors. Alternative 2 includes two primary components, mechanical treatments and prescribed fire treatments, each described below. Other components of this alternative are also discussed. Potential treatment units are shown in Figure 2-1 and summarized in Table 2-1. The exact amounts of each treatment discussed throughout this EA are the best available estimates; however, the final amounts implemented may vary based on any number of factors such as feasibility of each proposed treatment or the need to protect various resources.

Table 2-1 Summary of Treatments – Alternative 2

Mechanical Treatment	Prescribed Fire Treatment						Total	
	Pile Burn Only		Pile or Broadcast Burn		No Prescribed Fire			
	Acres	%*	Acres	%*	Acres	%*	Acres	%*
Light Thin/Prune	82	5%	394	24%	-	0%	476	29%
Restoration	166	10%	330	20%	-	0%	496	30%
Defensible Space	135	8%	-	0%	-	0%	135	8%
No Treatment	-	0%	-	0%	544	33%	544	33%
Total	383	23%	724	44%	544	33%	1,652	100%

* Percent of project area

Stand conditions created by these treatments may be maintained by the use of prescribed fire, thinning, or other mechanical treatments every 10 to 30 years, as needed. Prescribed burning for maintenance would be focused on created openings and ponderosa pine stands to replicate a more natural fire regime, but may also be used in other situations.

Mechanical Treatments

Several types of mechanical treatments would be implemented, depending on vegetation and topography. A combination of product removal, mastication, and hand treatments would be used to reduce canopy cover, basal area, and ladder fuels on approximately 1,107 acres (67 percent of the project area). The remaining 544 acres (33 percent) of the project area would not be treated.

Treatments would focus on reducing the canopy closure through targeting removal of small and intermediate Douglas-fir and less desirable ponderosa pine (for example, insect and disease infected trees, trees of low quality, or suppressed trees). Older and larger trees would generally be retained. Some co-dominant trees may be removed to reduce canopy density. Some smaller trees with good crowns would be retained to provide for a diversity of age and size class distributions in the remaining stands and to provide cover for lynx, snowshoe hare, and other lynx prey.

Figure 2-1 Alternative 2

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Commercial timber sales, stewardship contracts, service contracts, commercial or non-commercial fuelwood sales, or other means may be used to implement the mechanical treatments. In some areas, logs of commercial size would be produced, although production of commercial products is not the purpose of this project, nor would it be the focus of the treatment prescriptions. Commercial removal of material would only be done to reduce treatment costs where, or if, feasible. Tractor or other ground-based yarding systems would be used to move logs to landings. No helicopter or cable yarding is anticipated. Within the designated lots of recreation residences, permittees would be responsible for treatments. Activities on and immediately adjacent to recreation residence lots would be limited to hand thinning or other methods that do not cause ground disturbance. This limitation is designed to prevent adverse effects to potentially eligible cultural properties.

Slash from all treatment units would be treated by lopping and scattering, crushing, piling and burning, broadcast burning, chipping, or other methods. Piling may be done by tractors where feasible and by hand on steeper slopes and other areas that are not accessible to tractors. Slash may also be piled at landings for later disposal. Where slash is chipped, chips may be spread across the treatment unit or removed from the area. Slash treatment on and immediately adjacent to recreation residence lots would be limited to lopping and scattering or other methods that do not cause ground disturbance. This limitation is designed to prevent adverse effects to potentially eligible cultural properties.

Three basic mechanical treatments would be implemented, depending on conditions in the various stands to be treated. Each specific treatment would use a combination of methods as appropriate. Natural variation exists in each stand; therefore, the exact prescription for each stand would be developed during project implementation. All stand prescriptions would remain within the general project design standards listed later in this chapter. Specific treatments are described below.

Light Thin/Prune Treatment

This treatment would be used on up to 476 acres that are currently relatively open, when thinning across the entire stand is not needed to restore more natural forest conditions. The main purpose of this treatment would be to allow prescribed fire to be implemented while reducing the risk of higher intensity fire behavior. A combination of mechanized and hand thinning activities would be used to reduce basal area, canopy cover, and ladder fuels. Some trees and brush would be removed, while lower limbs on remaining trees would be pruned.

Restoration Treatment

This treatment would be used on up to 496 acres that are currently relatively dense to restore more natural forest conditions. The main purpose of this treatment would be to reduce the risk of crown fire and other high intensity fire behavior, while promoting healthy residual stands and allowing prescribed fire to be safely implemented. Thinning would primarily be accomplished using mechanized equipment to reduce basal area, canopy cover, and ladder fuels, though hand thinning may also be used. As trees and brush are removed, lower limbs on remaining trees would be pruned.

Defensible Space Treatment

This treatment would be used on up to 135 acres near recreation residences that are denser than natural conditions. The main purpose of this treatment would be to reduce the risk of crown fire and other high-intensity fire near recreation residences. Treatment would be accomplished by a combination of mechanized equipment and hand thinning, generally following CSFS guidelines for defensible space (Appendix A).

Prescribed Fire Treatments

Prescribed fire would be used on up to 1,107 acres (67 percent of the project area), including all areas that have been treated mechanically, to reduce litter and duff layers, slash produced by treatments, surface fuels, regeneration, and ladder fuels. It may also be used to create small openings. The remaining 544 acres (33 percent) of the project area would not be burned. Before any prescribed burning takes place, detailed burn plans that address site-specific details would be completed and approved.

Prescribed fire treatments would include hand piling and burning, mechanical piling and burning, and broadcast burning. Two basic prescribed fire treatments would be implemented, depending on conditions in the various stands to be treated. Prescribed burning on and immediately adjacent to recreation residence lots would not be allowed. This limitation is designed to prevent adverse effects to potentially eligible cultural properties. Natural variation exists in each stand; therefore, the exact prescription for each stand would be developed during preparation of the burn plan. All prescriptions would remain within the general project design standards listed later in this chapter. Specific treatments are described below.

Pile Burn Only

This treatment would be used on up to 383 acres of stands where the use of broadcast burning may not be appropriate, generally because of the unacceptable risk broadcast burning may pose to private property or recreation residences. Pile burning will be the primary prescribed fire treatment used along the north edge of the project area (closest to Bailey) and around the recreation residence groups in Payne Gulch, Roark, and Happy Top. Fuels would be piled by hand or using mechanized equipment. Piles would then be burned under controlled conditions as described in an approved burn plan and in accordance with applicable air quality regulations.

Pile or Broadcast Burn

This treatment would be used on up to 724 acres of stands where broadcast burning is considered appropriate. Pile burning may also be used in these areas depending on fuel loads and other site-specific factors. In some areas, both pile burning and broadcast burning may be used to reduce fuel loads and create openings. Fuels may be piled by hand or using mechanized equipment. Pile and broadcast burning would be conducted under carefully controlled conditions as described in an approved burn plan and in accordance with applicable air quality regulations. Broadcast burning may be used in areas that are not treated mechanically but where some fuel reduction is desired, such as along meadow edges to reduce conifer encroachment.

Transportation System

Existing NFSRs would provide the primary access for this project. No new NFSRs would be constructed, nor would any NFSRs be decommissioned. NFSRs used for the project would be maintained or reconstructed as needed to accommodate safety or environmental considerations.

Up to four miles of new temporary roads would be needed to access treatment units. Temporary roads would be constructed to the minimum standard needed for safe and efficient use by project equipment, which may include vegetation clearing and minor earth movement. Temporary roads would be constructed immediately before access is needed for a particular treatment area and then closed and obliterated as soon as possible after treatment is complete. Public use of these roads would be prohibited. Temporary road construction and obliteration would be phased throughout the life of the project to minimize the extent of open temporary roads. Closed temporary roads would be thoroughly obliterated using physical barriers to prevent future use by motorized vehicles and would be monitored to ensure such use does not occur. Temporary roads would not be allowed on and immediately adjacent to

recreation residence lots. This limitation is designed to prevent adverse effects to potentially eligible cultural properties.

Project Design Standards

This section describes project design features and activities, mitigation measures, and monitoring activities that would be used under the proposed action.

Cultural Resources

- One "officially eligible" cultural site (5PA4243) shall have its values at risk protected from project treatments. Protection shall be accomplished by avoidance during project layout and implementation, as well as through project implementation monitoring in coordination with the Pike National Forest Zone Archaeologist.
- For activities involving hazardous tree removal, grapple piling, mechanical treatment, skid trails, and landing areas, eligible cultural resource sites and a 50 foot buffer around their site boundary may be hand treated for hazard trees and accumulated fuel build up (PA Stipulation B6 2011, page 12). Hazard trees shall be directionally felled away from cultural features.

Riparian Areas, Wetlands, and Floodplains

- All treatments near riparian areas would follow Forest Service Handbook (FSH) 2509.25, Watershed Conservation Practices Handbook – R2 Amendment 2509.25-2006-2 (WCPH) (USFS 2006) to minimize effects to riparian habitats.
- Project design and implementation would follow Forest Plan standards that relate to riparian area management (prescriptions for MA 9A, page III-203), specifically 0658 and 0750 (page III-206), 0088 (page III-207), 0670 (page III-208), 0007 (page III-210), 0091 and 0003 (page III-212), 0694 (page III-213), 0718 and 0720 (page III-214), and 0724 (page III-215).

Small Mammals

- Project design and implementation would follow Forest Plan standard 6022 (page III-13), which relates to retention of coarse woody debris.

Snag Dependent Species

- Project design and implementation would follow Forest Plan standards that relate to snag dependent species, specifically 0405 (page III-12), 6010PI (page III-12), and 6011PI (page III-13).

Treatment Operations

- Treatments would retain larger trees to the extent possible. Specifically, stands that are predominantly old growth will not be treated. In younger stands, trees with old growth characteristics as defined by Huckaby and others (2003) would be protected during burning and thinning operations except when severely infected with insects or diseases, or when retention would compromise the effectiveness of the proposed treatments.
- Blue spruce, bristlecone pine, and limber pine would not be cut, except where their removal would be needed to meet the objectives of a particular treatment. Aspen and ponderosa pine would be favored for retention. Douglas-fir, Engelmann spruce, lodgepole pine, and subalpine fir would be favored for removal.
- Treatments would only remove hazard trees that actually pose a safety hazard, such as on roads and trails that would be open to the public.

- South and west slopes would be favored for openings to increase the amount of shrublands. Openings would also be created near private lands and other fire strategic locations to increase areas of aspen or to remove pockets of disease- or insect-infected trees. Typically, openings would not exceed one acre, and no new openings greater than 10 acres would be created. Existing openings, such as meadows, may be expanded where fire suppression has allowed encroachment of young trees or dense brush. Existing openings may exceed 10 acres in size, but would not be expanded beyond their pre-fire suppression era size.
- Roads constructed for temporary access into a treatment unit would be guided by the principles of temporary road construction. In general, these roads are short and used where the topography and drainage requirements are minimal and the potential for adverse effects to other resources is low. Temporary roads would not be constructed in the Water Influence Zone (WIZ).
- Public use of temporary roads would be prohibited.
- Temporary roads serve no long-term need; therefore, they would be closed and obliterated by the purchaser, contractor, or Forest Service after use.
- Temporary roads would be closed and obliterated as soon as possible once treatments are complete.
- Mechanical treatments would be prohibited from the Thursday before Memorial Day weekend until the Tuesday after Labor Day weekend.
- Prescribed fire and other activities would be restricted during the summer months. If prescribed fire and other activities were planned between the Thursday before Memorial Day weekend to the Tuesday after Labor Day weekend, they would not take place within ½ mile of any recreation residence, the Payne Gulch trailhead, or the Brookside-McCurdy and Payne Gulch trails.
- The Fuels Management Specialist would coordinate with the Recreation Specialist and the owners of the recreation residences as to the timing of activities adjacent to recreation residences, trails, and trailheads.

Wildlife

- Project design and implementation would follow Forest Plan standards and guidelines that relate to wildlife, specifically 6003PI (page III-29), 6004PI (page III-29); and 6186 (page III-119).
- Some (up to two per acre) hand piles would be left unburned to serve as wildlife shelter in areas not adjacent to roads, private property, or recreation residences.

Mitigation Measures

The following mitigation measures are integral to the proposed action and have been identified as necessary to ensure that it complies with the Forest Plan and to reduce environmental effects. These measures would be incorporated into the project design, service contracts, burn plans, and project plans.

Air Quality

- All prescribed burning would be conducted in a manner that complies with State of Colorado's regulations and permit process for burns.

Cultural Resources

- If any previously unknown cultural resource sites are found during implementation, project activities would stop and the Zone Archeologist would be contacted immediately. The Zone Archeologist would evaluate the site and determine future actions.

Noxious Weeds

- The contractor/purchaser would be required to clean all equipment that operates off road before the first entry into the project area.
- All equipment would be inspected by the USFS before it is allowed to enter the project area.
- Any infestations of weeds would be treated by the USFS following project completion. Chemical, biological, cultural, or mechanical techniques would be used as appropriate to control populations of noxious weeds as described in the PSICC Noxious Weed Management Plan Programmatic EA and Decision Notice. All treatments of noxious weeds would follow state and federal regulations.
- Disturbed areas, such as roads, landings, and skid trails, would be revegetated using a seed mix prepared specifically for the project area. Commercially available native species would be used in all seed mixes.

Public Safety

- Travel routes open to public use would be signed to warn of project traffic or other potential hazards (such as prescribed fire). Where public safety cannot be reasonably ensured, portions of the project area, including public roads, may be temporarily closed to public use.
- The public would be notified in accordance with state air quality regulations before prescribed burning activities.

Sensitive Species

- Sensitive species located in or near treatment areas before or during project implementation should be managed through active coordination among contractor or purchaser, USFS line officer, project administrator, and District Wildlife Biologist or Forest Botanist, as appropriate. Project implementation would be modified as necessary to minimize or avoid effects to sensitive species discovered in the project area.

Watersheds

- Management measures in the WCPH would be used to minimize erosion.
- All crossings of the WIZ would take place at designated locations. The number of designated crossings and the extent of disturbance in the WIZ from these crossings would be minimized.
- Ash piles at landings where large slash piles are burned would be ripped or otherwise scarified and seeded.

Wildlife

- In aspen clones or aspen stands that contain conifers in the understory and that are mapped as lynx habitat, do not remove conifers from within the aspen to preserve suitable lynx and snowshoe hare habitat.
- In units with suitable lynx habitat adjacent to recreation residences, treat defensible space only.
- Where suitable lynx habitat is present on steeper slopes, exclude those areas during layout of treatment boundaries.
- A goshawk survey would be conducted in potential goshawk habitats before ground-disturbing activities are conducted.
- A 30-acre buffer surrounding known active and historic nest sites would be created for all northern goshawk nests.
- From March 1 to September 30, additional human-caused noise and disruption beyond that occurring at the time of nest initiation (for example, road traffic, timber harvests, and construction activities) would be minimized in an approximate 420-acre area around any known active northern goshawk nest in order to reduce potential effects on nesting and fledgling success.

- Management at northern goshawk nest sites would be designed to conserve or enhance nest stand conditions (for example, defer treatment or thin regeneration).
- Silvicultural prescriptions and management activities would be designed to enhance prey species habitat by maintaining vegetative diversity and striving for a balance of structural stages, from stand initiation to late successional, in northern goshawk post-fledging habitat.
- Buffers and timing restrictions would be applied as necessary to minimize disturbance of any known raptors nesting in or near treatment areas.
- Wetlands that may provide potential habitat for northern leopard frogs would be avoided by all mechanical treatments and prescribed burning. No roads or other designated crossings of the WIZ would be located in these wetlands.

Monitoring

Monitoring occurs at the programmatic or Forest Plan level and the project-specific level. Following are several monitoring activities that apply specifically to this project.

Noxious Weeds

- Treated areas and access roads would be monitored for noxious weeds for at least two years after project completion.

Roads

- Treatment units, and especially closed temporary toads in treatment units, would be monitored for unauthorized off-highway vehicle (OHV) use. Additional measures would be developed or used to restrict OHV use and prevent resource damage if high OHV use or resource damage caused by OHVs is observed.

Vegetation/Fuels

- Post-treatment stand characteristics, such as overstory density, regeneration density, crown base height, and fuel loads, would be monitored to ensure that the stand prescriptions and the purpose and need for the project have been met.

Watersheds

- All roads used for project activities, including existing system roads and temporary roads, would be monitored to ensure that no adverse soil erosion or other watershed effects are occurring.

Wildlife

- Any northern goshawk nests found in the survey area would be monitored for occupancy for two seasons following treatment.

2.3 Comparison of Alternatives

Table 2-2 briefly compares the two alternatives studied in detail as they relate to the project components, objectives (purpose and need), and issues. Chapter 3 discusses the environmental consequences of each alternative in more depth.

Table 2-2 Comparison of Effects to Substantial Issues

Issue and Indicator		Alternative 1	Alternative 2
Vegetation			
Mechanical thinning and prescribed fire (acres)		0	1,107
Total area not treated (acres)		1,652	544
Post-project distribution of cover types (acres)	Aspen	176	176
	Douglas-fir	49	49
	Grassland	144	144
	Lodgepole Pine	155	155
	Mountain Shrub	48	48
	Ponderosa Pine	1,045	1,045
	Spruce/Fir	24	24
	Wetland/Willow	10	10
Post-project distribution of habitat structural stages[1] (HSS) (acres)	HSS 1M	168	168
	HSS 2S	35	35
	HSS 3A	79	150
	HSS 3B	305	239
	HSS 3C	81	76
	HSS 4A	275	559
	HSS 4B	708	424
	HSS 4C	1	1
	HSS 5	0	0
Vegetation patterns		Dense, homogenous forests, which are substantially different from pre-settlement forest conditions, would be maintained.	The proposed treatments would promote an open mosaic of trees and fuel types similar to pre-settlement conditions.
Insect and disease risk		Same as current condition in the short term, likely to increase in the long term.	Reduced compared to the current condition for the short and long term.
Fire and Fuels			
Fire regimes		Ponderosa pine stands would remain outside the historic range of variability. Many stands would remain in condition classes 2 and 3.	Treatments would move stands back towards pre-settlement fire regimes. Treated stands would move back towards condition class 1 and would be less susceptible to severe, stand-replacing fires.
Predicted wildfire burn area between the years 2013 and 2033 (acres)		132	66
Fuel models		The extent of fuel models would not change in the short term, but areas represented by timber litter models may increase in the long term.	The extent of most timber litter and timber understory fuel models would decrease, while the extent of grass fuel models would increase.

Table 2-2 Comparison of Effects to Substantial Issues

Issue and Indicator	Alternative 1	Alternative 2
Fuel loads	Fuel loads would increase on 100 percent of the project area in the long-term.	Treatments would decrease fuel loads on 67 percent of the project area. Fuel loads would increase in the long term on the 33 percent that is not treated.
Potential fire behavior	Flame length and resistance to control would increase. Stands would be increasingly susceptible to torching and crown fire over time. Firefighter and public safety and the efficiency of firefighting efforts would decrease in the long-term.	The potential for torching and crown fire would be reduced. Treated areas would serve as fuel breaks to slow or stop large-scale wildfire. Firefighting efforts would be safer, more efficient, and more effective.
Change in predicted wildfire burn area from current condition (percent)	0	-50
Predicted extent of moderate- and high-intensity wildfires between the years 2013 and 2033 (acres)	79	26
Change in predicted extent of moderate- and high-intensity wildfires from current condition (percent)	0	-67
Watersheds		
Water quality	Current water quality would be maintained in the short-term, but would increase in the long-term as risk of high-intensity fire increases.	Minimal changes to water quality are predicted.
Water yield	No changes to water yield are predicted.	No changes to water yield are predicted.
Riparian areas, wetlands, and floodplains	Current conditions in riparian areas, wetlands, and floodplains would be maintained.	Minimal effects to riparian areas, wetlands, and floodplains are predicted.
Soils	There would be no changes to current levels of soil disturbance and compaction. The risk of adverse soil effects from wildfire would increase in the long-term.	Soil disturbance and compaction would be limited to less than 15 percent of each treatment unit. Bare soil would not increase. The potential for increased soil erosion is minimal.
Watershed conditions	Current watershed conditions would be maintained. The predicted extent of areas burned by wildfire or the potential for adverse watershed effects (primarily increased erosion and sediment yield) would not be reduced.	Minimal effects to watershed conditions from treatment activities, including temporary roads, are predicted. The predicted extent of areas burned by wildfires would be reduced by 50 percent and the potential for adverse watershed effects (primarily increased erosion and sediment yield) would be reduced by 67 percent.

Table 2-2 Comparison of Effects to Substantial Issues

Issue and Indicator		Alternative 1	Alternative 2
Management Indicator Species			
Habitat trend	Elk	Stable	Stable
	Abert's Squirrel	Stable	Slight decrease
Population trend	Elk	Stable	Stable
	Abert's Squirrel	Stable	Slight decrease
Post-treatment HABCAP score	Elk Summer	0.66	0.67
	Elk Winter	0.93	0.92
	Abert's Squirrel Summer	2.22	1.73
	Abert's Squirrel Winter	2.22	1.73
Special-status Species			
Threatened and endangered species determinations		"No effect" for Mexican spotted owl and Canada lynx.	"Not likely to adversely affect" for Mexican spotted owl and Canada lynx.
Change in lynx habitats (acres)	Denning	0	-1
	Winter Foraging	0	-20
	Other	0	+21
	Total Suitable	0	0
	Unsuitable	0	0
	Total Habitat	0	0
	Non-Habitat	0	0
	Lynx Analysis Unit Total	0	0
Sensitive species determinations		"No impact" for North American wolverine, Townsend's big-eared bat, northern leopard frog, bald eagle, flammulated owl, Lewis' woodpecker, loggerhead shrike, northern goshawk, olive-sided flycatcher, American marten, fringed myotis, and hoary bat.	"No impact" for North American wolverine and Townsend's big-eared bat. "May adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend toward federal listing" for northern leopard frog, bald eagle, flammulated owl, Lewis' woodpecker, loggerhead shrike, northern goshawk, olive-sided flycatcher, American marten, fringed myotis, and hoary bat.
Access			
Road system length (miles)	Current	3.5 (0.25 open to public use)	3.5 (0.25 open to public use)
	Proposed temporary	0.0	4.0 (max., not open to public use)
	Total during project life	3.5 (0.25 open to public use)	7.5 (0.25 open to public use)
	Obliterated at end of project	0.0	4.0 (max.)
	Total at project completion	3.5 (0.25 open to public use)	3.5 (0.25 open to public use)
Road density	Current	2.5	2.5

Table 2-2 Comparison of Effects to Substantial Issues

Issue and Indicator		Alternative 1	Alternative 2
(miles per square mile)	Proposed temporary	0.0	1.6 (max.)
	Total during project life	2.5	4.1 (max.)
	Obliterated at end of project	0.0	1.6 (max.)
	Total at project completion	2.5	2.5
Visual Quality			
Visual quality		Existing condition unchanged, but higher potential for negative effects from large, high-intensity wildfires.	Short-term degradation of foreground views adjacent to treatment units. Forest Plan Visual Quality Objectives (VQOs) would be met.
Cultural Resources			
National Register of Historic Places (NRHP) eligible cultural properties		Current fuel loads would increase over time in and around cultural sites and pose a substantial threat of high severity wildfire. A wildfire could damage or destroy fire-susceptible NRHP eligible cultural resources. Fire suppression activities could damage or destroy known or undiscovered resources.	Decreased potential for site-damaging high severity wildfire, loss of fire-susceptible cultural values, or fire suppression damage to cultural properties. Potential adverse effects to NRHP eligible properties would be minimized through use of mitigation measures.
Economics			
Present net value	USFS	-$277,958	-$1,343,435
	All partners	-$14,236,947	-$5,935,219
Net cost/savings	USFS	n/a	-$1,065,477
	All partners	n/a	$8,301,728
Non-price values	Sustainable and resilient forest conditions	Tree stands would remain unnaturally dense and vulnerable to large-scale losses from fire, insects, or disease.	Forest conditions would be improved on 1,107 acres, creating a more heterogeneous natural landscape with diverse habitats.
	Habitats for MIS, special-status species, and other wildlife.	Habitats would be maintained in the short term. Habitat conditions for some species would be degraded as the forest grows less open and large fires threaten to cause habitat loss. Species that depend on snags and open habitats may benefit from poor forest health or large-scale wildfire.	Open forest conditions would improve habitat for some species, but cause small-scale habitat loss for others. The hazard of large-scale habitat loss to fire, insects, or disease would be reduced.
	Recreational experiences	The current risk of large-scale fire may worsen over time. Such an event could dramatically reduce recreational use.	The risk of large-scale events would be reduced. Treatments would not reduce recreational use.

[1] Habitat structural stages are defined in the glossary (section 4.2).

3.0 Affected Environment and Environmental Consequences

This chapter starts by describing past, present, and reasonably foreseeable future activities to set the stage for the discussion of cumulative effects later in the chapter. Each of the resource topics to be analyzed in detail is then discussed. For each resource topic, existing conditions are described followed by a discussion of the potential direct, indirect, and cumulative effects of each alternative on that resource. At the conclusion of each resource section, compliance of the alternatives with Forest Plan direction and other laws, regulations, and direction is discussed. The chapter concludes with a discussion of unavoidable adverse effects, irreversible and irretrievable commitments of resources, the tradeoff between short-term use and long-term productivity, and other required disclosures.

3.1 Past, Present and Reasonably Foreseeable Future Activities

There are several activities that have already occurred, are occurring, or that are likely to occur in the future in or near the project area. Past activities have contributed to the current condition of resources as described in this section. The structure, composition, and pattern of vegetation and surrounding landscape have been altered from pre-European conditions by the cumulative effects of various human activities. These activities include livestock grazing, human use of fire, extensive logging between 1870 and 1900, fire suppression since the early 1900s, and the introduction of exotic plant species (Foster Wheeler 1999). Cumulatively, these activities have altered the disturbance processes that shaped the landscape before European settlement.

Ongoing and future activities could affect resources that may also be affected by the proposed project. The need to include these activities in the cumulative effects section of each individual resource analysis depends on the extent of the cumulative effects analysis area and the duration of effects on each resource. Future activities on NFS lands described in this section are not part of the decision to be made for this EA. Ongoing activities are similar to past activities, with the exception of increased focus on mechanical and prescribed fire fuel treatments as well as increased recreational activity on federal lands and an increase in the number of primary residences on private lands. Future activities are also likely to be similar, again with an increased emphasis on fuel treatment and recreational activities on federal lands and increased residential use on private lands. The extent of each type of activity is detailed below.

3.1.1 Fuel Treatments

Relatively little fuel treatment has been conducted in the past. Most fuel treatment activities in the past were completed in conjunction with timber harvest. In 2009, 211 acres were treated to reduce fuels on the AG Ranch (managed by the USFS), three miles west of the project area. The primary current and future fuel treatment project near Payne Gulch is the Harris Park Fuels Management Project, which will treat up to 9,531 acres of NFS lands with a combination of mechanical and prescribed fire treatments, similar to Alternative 2. About 1,722 acres have been treated adjacent to the Harris Park community and another 1,303 acres of treatment are in the planning stages in the Deer Creek, North Fork North Elk Creek, and Slaughterhouse areas. Additional acres may be treated in the future, including potentially several thousand acres across the South Platte River and upstream of Payne Gulch. A small area of fuel treatment, about 71 acres, may be conducted on the AG Ranch in the next few years. No other large-scale fuel treatments are planned nearby, although private landowners are likely to conduct small-scale fuel reductions on their private parcels.

3.1.2 Livestock Grazing

There is no livestock grazing on federal lands in the project area. Livestock grazing was much more extensive in the past. In general, livestock numbers have declined in recent years, as the area has been

extensively subdivided and traditional land uses, such as livestock grazing and timber harvest, have been replaced with residential development. Larger parcels of private land are grazed, as are some smaller ranchettes and horse properties. Levels of livestock grazing may stay similar into the future or may decrease gradually as larger parcels are divided for residential use.

3.1.3 Mining

There has been no mining in the project area, nor is any expected in the future. Scattered, small mining areas are located on nearby lands, especially along Highway 285 between Bailey and Grant. There are also several small gravel pits on private lands. No new mining activity is expected, other than occasional operation of some small gravel pits.

3.1.4 Noxious Weeds

Herbicides have been applied to existing noxious weed infestations throughout the PSICC. Treatment of known infestations and continued survey for new infestations of noxious weeds will continue. Noxious weeds are not a widespread problem like in other areas of the PSICC.

3.1.5 Recreation

The project area is primarily used for recreation by the owners of the recreation residences and by hikers on the Brookside-McCurdy (#607) and Payne Creek (#635) trails. The trailhead for these trails is in the project area. Other uses include camping, horseback riding, hunting, and sightseeing. Future recreational uses are expected to be similar to current uses, with increasing numbers of people participating in these activities. No specific plans exist for changes to current recreation developments.

3.1.6 Residential Use

Residential use of private lands began more than 100 years ago and has slowly increased ever since. Over the last 10 to 20 years, this use has increased substantially as more people who commute to the Denver metropolitan area began to live here. Continued development of primary residences on nearby private lands at an accelerated pace is expected in the future.

3.1.7 Roads

The main access routes in and around the project area are quite old. In the recent past, there has been little change to the road system, except on private lands in areas of residential development, where local roads have been built to access individual homes. Improvements to Highway 285 between Shaffer's Crossing and Bailey are currently in the conceptual phase, with no known date for a decision or construction. Some future expansion of residential roads on private lands is also expected, but specific plans are not available.

3.1.8 Timber Harvest

Timber harvest probably occurred between 1870 and 1900 (Foster Wheeler 1999), as the surrounding area was developed and wood products were needed in Denver and other developing communities. There are no specific records, but many of the existing timber stands are likely composed of trees that regenerated after these harvests. Evidence of more recent (mid-20th century) timber harvest, in the form of stumps and skid trails, can be observed, though no specific records of these harvests are known to exist. No future timber harvests are planned on NFS lands or known on private lands. Any future removal of commercial timber would likely be secondary to fuel treatments projects, as is the case with the proposed project.

3.1.9 Wildfire

Several large wildfires have burned near the project area in recent years, including the Snaking Fire. Other smaller wildfires have also occurred in the past. The Snaking Fire in April 2002 was human-caused and burned 2,312 acres immediately across the South Platte River and Highway 285 to the north. The Snaking Fire burned primarily ponderosa pine stands, with smaller amounts of Douglas-fir, lodgepole pine, and spruce/fir. Burn intensity was variable, with low-intensity surface fire on 34 percent of the burned area, a mosaic of moderate-intensity surface and crown fire on 46 percent, and high-intensity crown fire on 18 percent. Crown fire mostly occurred on slopes greater than 30 percent, in areas exposed to high winds, and in dense, closed-canopy ponderosa pine stands. Numerous structures were threatened, and more than 1,000 residences were evacuated. Aggressive suppression efforts were successful and only two outbuildings and no residences were burned. Subsequent to the fire, rain events caused substantial sediment transport from the burned area on to private lands and U.S. Highway 285 for several years. Similar fire behavior patterns and watershed effects would be expected from future wildfires in similar fuel types.

3.2 Vegetation

This section discusses current vegetation conditions in terms of cover type, habitat structural stage, and insects and diseases as well as potential changes to those conditions from the proposed alternatives.

3.2.1 Cover Type

Cover types are shown in Figure 3-1. Ponderosa pine is dominant, covering 63 percent of the project area (Table 3-1). Other common cover types include aspen (11 percent), lodgepole pine (9 percent), and grasslands (9 percent). Less common cover types are also listed in Table 3-1.

Ponderosa pine is dominant on most slopes and aspects. Ponderosa pine stands range from relatively open forested areas with a substantial grass or brush component, to denser stands with a sparse understory. Ponderosa pine is also a common component of stands dominated by other species and with few exceptions is found throughout the project area. Even areas where grasses or shrubs are dominant contain a scattered overstory of ponderosa pine.

Aspen is a minor component in many stands but becomes dominant along the drainages where soils are deeper and more moisture is available. Decline in aspen vigor is common, as shade-tolerant conifers have regenerated, out-competing the aspen.

Lodgepole pine is found primarily at higher elevations, often in nearly pure stands or mixed with ponderosa pine and other conifers. Many of the lodgepole pine stands are continuous with very large stands to the south in the Lost Creek Wilderness.

Mixed grasslands and shrublands are found across the project area. Mountain mahogany (*Cercocarpus montanus*) is the most common shrub in these areas, which often have scattered older ponderosa pines and in some cases more recent pine regeneration making up less than 10 percent canopy cover.

Several other cover types occupy small portions of the project area. Stands of large spruce are found along Payne Gulch and several tributaries, sometimes mixed with aspen or other conifers. Several stands are dominated by Douglas-fir, which is also a component of many of the ponderosa pine stands. A few wet meadows, some with mixed cover of willows and aspen, occur along drainages or in meadows.

3.2.2 Habitat Structural Stages

HSSs describe the current successional status of the vegetation, corresponding primarily to stand age and tree size, and form the basis for wildlife habitats. HSSs are defined in the glossary (section 4.2). The distribution of cover types and HSSs is shown in Table 3-1. Of particular note are the number of ponderosa pine and Douglas-fir stands in HSSs 3B, 3C, 4B, and 4C, which collectively cover 47 percent of the project area. These are the main areas where current conditions differ substantially from historic conditions. Historically, many of these stands would have been in HSSs 3A and 4A (Foster Wheeler 1999).

Table 3-1 Current HSS Distribution

	HSS (acres)									
Cover Type	**1M**	**2S**	**3A**	**3B**	**3C**	**4A**	**4B**	**4C**	**5***	**Total**
Aspen	0	0	16	72	11	19	57	1	0	176
Douglas-fir	0	0	0	15	0	0	34	0	0	49
Grassland	144	0	0	0	0	0	0	0	0	144
Lodgepole Pine	0	0	0	71	42	0	43	0	0	155
Mountain Shrub	19	29	0	0	0	0	0	0	0	48
Ponderosa Pine	0	0	63	134	29	256	563	0	0	1,045
Spruce/Fir	0	0	0	14	0	0	10	0	0	24
Wetland/Willow	4	6	0	0	0	0	0	0	0	10
Total	168	35	79	305	81	275	708	1	0	1,652

* HSS 5 (old growth) is determined by field observation, and is not designated by data used for this analysis

3.2.3 Insects and Disease

Several insects endemic to Colorado forests are present in the project area. High populations of defoliating insects and bark beetles can cause substantial tree mortality; however, endemic populations rarely cause noticeable large-scale damage. Insects and disease most likely to occur are described below.

Defoliators are insects that feed on tree foliage. Damage caused by endemic populations is usually minor; however, under epidemic populations, heavy defoliation causes tree mortality. Outbreaks of defoliators are characteristically sporadic. Spruce budworm and Douglas-fir tussock moth have historically caused areas of mortality on portions of the South Platte Ranger District. Other defoliators include the western spruce budworm and the Pandora moth. Currently, defoliation by these insects above endemic levels is not evident.

Bark beetles can be major disturbance agents in western coniferous forests. Outbreaks of these insects have historically killed thousands of acres of forest. Several species of bark beetles have caused the greatest amount of mortality. These include the western pine beetle, mountain pine beetle (MPB), Douglas-fir beetle, and spruce beetle. Ongoing outbreaks of MPB are killing large areas of lodgepole pine and ponderosa pine in other parts of Colorado and threaten un-infested areas. In addition, several species of beetle in the *Ips* genus have the potential to cause extensive damage. All of these bark beetles are endemic to the project area. Epidemic-level outbreaks of MPB are occurring elsewhere on the PSICC, but have not yet developed in the project area, despite the presence of typical risk factors including long-term drought and high stand density.

Figure 3-1 Vegetation

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Dwarf mistletoe is a parasitic flowering plant that reduces growth rates, kills trees directly, or predisposes them to attack by insects, accelerating the death of the tree. Suppression of wildfire has led to increased distribution of mistletoe. Past practices, such as the incomplete removal of infested trees in timber harvest areas and the perpetuation of uneven-aged stand conditions, have promoted its spread. Heavy infections of mistletoe are common in pine stands on the PSICC (Foster Wheeler 1999). There are areas of mistletoe-infected trees in the project area. In a few cases, entire stands are infected with dwarf mistletoe.

3.2.4 Analysis of Effects

This section describes the anticipated direct, indirect, and cumulative effects of implementing each of the alternatives on cover type, HSSs, and insects and disease, and compares and contrasts these effects between alternatives.

3.2.4.1 *Alternative 1 – No Action*

Cover Type

Alternative 1 would not alter the distribution of cover types in the short term. Natural processes such as succession, insect and disease outbreak, or other disturbances would continue. In the absence of these disturbances, trees would continue to grow and spread in grassland and shrub dominated areas, so that these areas would shrink. Regeneration of aspen would continue to decrease and conifer density would increase in aspen stands. In the long-term, cover types would shift towards dense, continuous stands of conifers.

Habitat Structural Stages

Alternative 1 would not immediately alter the current HSS distribution. Natural growth and mortality would continue and stands would graduate to higher HSSs over time. In the absence of disturbance events, such as fire or insect or disease outbreaks, encroachment of trees into grass and shrublands would move some areas into higher HSSs over time. The long-term effect of this alternative would be an increase in dense, even-aged, mature forested stands and a reduction in the diversity of HSSs available to support different wildlife species.

Insects and Disease

Alternative 1 would not reduce the current risk of MPB, tussock moth, mistletoe, or other insects and disease outbreaks. Affected trees would continue to decline in health. Trees killed by pests or pathogens would add to fuel loads as both fallen branches and standing dead wood. As stands mature, resources such as water would become less available for trees to resist attack. Areas where mistletoe is present would likely expand in the absence of control measures.

Cumulative Effects

Alternative 1 would not add to the cumulative effects of past and ongoing projects in the area, except for the continuing effects of fire suppression. As described in section 3.1, there have been no major forest management activities in recent history. Therefore, the majority of the project area would remain in its current, unmanaged condition. Over time, the risk of wholesale changes in cover type and HSS, whether from wildfire, insect or disease outbreak, or other disturbance, would increase. Treatments designed and analyzed for Alternative 2 may not be effective, or even possible, in the future. To accomplish the same objectives, future treatments would likely take longer to implement, cost more, and present a higher risk to the public and personnel implementing prescribed fire treatments.

3.2.4.2 *Alternative 2 – Proposed Action*

Cover Type

Alternative 2 would not alter the distribution of cover types. Within stands, the proportion of some species would change, but the currently dominant species are expected to remain dominant after treatment. For example, lodgepole pine and Douglas-fir would be removed from ponderosa pine stands, while aspen would be favored for retention. In the long-term, the proportion of aspen would increase, though the stands would remain dominated by ponderosa pine. Similarly, some ponderosa pine and other trees would be removed from grassland and shrub areas, preventing conifer encroachment and maintaining the grass and shrub cover types.

General treatment guidelines would follow the hazardous fuel reduction specifications that have been used across the South Platte Ranger District in the past. Many of the forested stands proposed for treatment contain a component of ponderosa pine (Table 3-2). In these areas, stands would be treated to reduce the basal area to between 40 and 60 square feet per acre, which more closely matches the level that research has indicated existed before European influences and aggressive fire suppression activities over the last hundred or more years (Kaufmann et al. 2001). A few forested stands do not have a ponderosa pine component. These are located in drainages (especially along Payne Gulch) adjacent to recreation residences and generally are a mix of aspen and spruce. In these stands, treatments would focus on reducing fuel accumulations and risk of high-intensity fire behavior. In addition to forested stands, several non-forested stands with a minor tree component (less than 10 percent canopy cover) are proposed for treatment. The light thin/prune treatment, followed by prescribed fire would be used to reduce grass and shrub fuel loads.

Table 3-2 Proportion of Treated Stands with a Ponderosa Pine Component

Treatment Type	Ponderosa Pine	No Ponderosa Pine	Not Forested	Total
Light thin/prune, pile burn only	5%	0%	2%	7%
Light thin/prune, pile or broadcast burn	23%	0%	12%	36%
Restoration, pile burn only	15%	0%	0%	15%
Restoration, pile or broadcast burn	29%	1%	0%	30%
Defensible space, pile burn only	7%	5%	0%	12%
Total	79%	6%	15%	100%

Habitat Structural Stages

Alternative 2 would alter the distribution of HSSs through the thinning of conifer stands. The treatments are designed to thin from below to reduce stocking and promote the health and future establishment of ponderosa pine, aspen, and other desired species. Treated areas would be returned to conditions more closely resembling the historic range of variability. Restored stands would exhibit age and size diversity more characteristic of pre-settlement conditions. A complete conversion of a stand from one HSS to another would not occur and is not the objective of the project. However, portions of some HSSs would be converted to other HSSs. To enhance habitat and forest structure diversity, portions of stands would remain well stocked while others would be opened to a relatively low tree density. No seeding or planting is planned, although natural regeneration would occur.

The overall effect would be an increase of 71 acres of HSS 3A and 284 acres of HSS 4A. Because substantial removal of the overstory is not an objective of this project, no forested stands would be

converted to a lower HSS, for example, HSS 4C to HSS 3B. Openings that are created within stands would be small enough that no conversion of forested HSSs (3 and 4) to open HSSs (1 and 2) is expected. The HSS distribution following the implementation of Alternative 1 is shown in Table 3-3, and the net change to HSS distribution is shown in Table 3-4.

Table 3-3 Future HSS Distribution

Cover Type	HSS (acres)									
	1M	2S	3A	3B	3C	4A	4B	4C	5*	Total
Aspen	0	0	37	50	11	19	57	1	0	176
Douglas-fir	0	0	0	14	0	7	27	0	0	49
Grassland	144	0	0	0	0	0	0	0	0	144
Lodgepole Pine	0	0	1	73	39	0	43	0	0	155
Mountain Shrub	19	29	0	0	0	0	0	0	0	48
Ponderosa Pine	0	0	112	87	27	533	286	0	0	1,045
Spruce/Fir	0	0	0	14	0	0	10	0	0	24
Wetland/Willow	4	6	0	0	0	0	0	0	0	10
Total	168	35	150	239	76	559	424	1	0	1,652

* HSS 5 (old growth) is determined by field observation, and is not designated by data used for this analysis

Table 3-4 Changes in HSS Distribution

Cover Type	HSS (acres)									
	1M	2S	3A	3B	3C	4A	4B	4C	5*	Total
Aspen	0	0	+22	-22	0	0	0	0	0	0
Douglas-fir	0	0	0	0	0	+7	-7	0	0	0
Grassland	0	0	0	0	0	0	0	0	0	0
Lodgepole Pine	0	0	+1	+2	-3	0	0	0	0	0
Mountain Shrub	0	0	0	0	0	0	0	0	0	0
Ponderosa Pine	0	0	+49	-46	-2	+277	-277	0	0	0
Spruce/Fir	0	0	0	0	0	0	0	0	0	0
Wetland/Willow	0	0	0	0	0	0	0	0	0	0
Total	0	0	+71	-66	-5	+284	-284	0	0	0

* HSS 5 (old growth) is determined by field observation, and is not designated by data used for this analysis

Insects and Disease

Alternative 2 would reduce the occurrence of dwarf mistletoe and MPB in affected areas and create a forest structure more resistant to outbreaks by reducing competition for resources such as light, water, and nutrients among remaining trees. Thinning treatments would target diseased and weakened host trees, inhibiting the spread of current infestations. Endemic populations of forest pests would be kept in check by more open forest structure, reducing the potential for an outbreak of epidemic level.

Cumulative Effects

Alternative 2 would reduce some of the cumulative effects of the past century (particularly fire suppression and timber harvest) by moving characteristics of treated stands back towards the historic range of variability. The risk of wholesale changes in cover type and HSS, whether from wildfire, insect or disease outbreak, or other disturbance, would decrease. Future management options for maintenance of the historic range of variability would increase. For example, prescribed fire could be used in the future without preceding mechanical treatment because stands would be less dense, posing a lower risk of adverse fire behavior or escape.

3.2.5 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, the proposed treatments would retain sufficient snags and down logs to meet Forest Plan standards 6010, 6011, and 6022.

3.3 Fire and Fuels

This section discusses current conditions for fuels and fire behavior as well as potential changes to those conditions from the proposed alternatives.

3.3.1 Values at Risk

The numerous values at risk on both NFS lands and adjacent private lands were deciding factors in the selection of the project area for treatment. These values include:

- The presence of numerous residences in and adjacent to the project area. Substantial areas of wildland-urban interface exist. Wildfires originating in or moving through the project area would put homes and communities at risk.
- The South Platte River watershed, which is a municipal watershed for the city of Denver, is managed to protect wild and scenic river values and provide recreational opportunities. Soils in 23 percent of the project area have moderate to high erosion ratings. Past wildfires in this watershed have caused greatly increased soil erosion, sedimentation of stream channels, and damage to facilities of water providers.
- A large wildfire would have substantial negative effects to air quality, not just in surrounding communities, but also potentially in Denver and other Front Range cities with existing air quality concerns.
- The local economy is based in part on tourism, which is supported by scenic landscapes and the presence of numerous, heavily used recreational opportunities. Past large fires, particularly the Hayman Fire, have had substantial negative effects on tourism and related businesses.
- The project area supports important fish and wildlife habitats and has the potential to provide forest products. Use of these resources is an important part of the economy of surrounding communities.

3.3.2 Fire Regimes

The relatively dense forested stands that characterize the current condition favor fires that consume all of the trees over large areas, as demonstrated by the Snaking, Buffalo Creek, Hi Meadow, Schoonover, and Hayman fires over the past several decades. The density of forested stands is generally high enough to sustain a large-scale crown fire under severe weather conditions. As the observed fire behavior of recent large-scale fires on the Front Range indicates, forested stands no longer have the same characteristics that they developed under historical fire regimes (Romme et al 2003).

Pre-settlement fires in ponderosa pine communities were mostly low- to moderate-severity surface fires that are estimated to have recurred every 5 to 50 years (Howard 2003, Kaufmann et al. 2000). This fire behavior thinned small trees and maintained open, park-like stands. However, the combined effects of fire exclusion, logging that removed many overstory trees, livestock grazing, and climate change have created closed-canopy stands with dense understories and ladder fuels (Brown et al. 1999, Howard 2003). When wildfires burn these stands under dry conditions, the abundant fuel allows the development of high-intensity fire behavior, including active crown fire. Severe, stand-replacing fires were infrequent in ponderosa pine forests in the past, but are now common and indicate a shift to a fire regime characterized by extensive crown fires (Howard 2003). Ponderosa pine stands are clearly outside the historic range of variability and are in condition class 3 (Hann et al. 2003).

Fire exclusion allows conifers to encroach on natural grass and shrub openings, which fill in over time, transitioning to conifer stands. Historically, relatively frequent, low intensity fires would have maintained these openings mostly free of conifers. Without fire, fine fuels accumulate and shrubs become decadent. When fire does occur, it is more intense and harder to control, promoting spread between adjacent forested areas. Grass and shrub openings are outside the historic range of variability and are in condition class 2 or 3 (Hann et al. 2003).

Aspen-dominated stands do not readily burn, especially when they are young and healthy. Slow burning, low-severity surface fires are typical. Decadent aspen stands contain more fuel and are more likely to burn than younger stands. An understory of conifer species increases the flammability of aspen stands. Healthy, aspen-dominated stands generally do not support severe fires. Crown fires are generally slowed into surface fires when they enter aspen stands (Howard 1996). Aspen stands may be outside the historic range of variability and on average are in condition class 2 (Hann et al. 2003).

Lodgepole pine thrives under the influence of infrequent, high-severity (stand-replacing) fire. Although most lodgepole pines are killed by fire, they provide an abundant seed supply for rapid regeneration. The natural fire frequency in lodgepole pine stands ranges from 25 to 300 years. Many of the lodgepole pine stands date from the post-settlement logging era (roughly 100 years ago), are probably within the historic range of variability, and are in condition class 1 (Hann et al. 2003).

3.3.3 Fire Frequency and Risk Analysis

The area of this proposed project is too small to conduct a meaningful fire frequency and risk analysis. However, the Harris Park EA (USFS 2005) described such an analysis for a larger area adjacent to the Payne Gulch area. This analysis found that about eight percent of the analysis area was expected to burn over a 20-year period. This translates to 132 acres over 20 years at the scale of the Payne Gulch project. It is important to note that these results contain averages from the last 30 years. Within this period, most years had precipitation higher than the long-term average. If the current trend of warmer temperatures and cyclical drought continues, these results may underestimate the extent of future fires.

3.3.4 Fuel Models, Fuel Loads, and Potential Fire Behavior

Specific fuels data have not been collected; however, eight fuel models (Scott and Burgan 2005) can be used to describe general fuel conditions (Table 3-5).

Table 3-5 Fuel Models

Fuel Model	Acres		
	Current and Alternative 1	Post-Treatment – Alternative 2	Change From Current – Alternative 2
GR1 – Short, sparse dry climate grass	0	261	+261
GR2 – Low load, dry climate grass	437	616	+179
GS1 – Low load, dry climate grass-shrub	142	142	0
TU1 – Low load, dry climate timber-grass-shrub	413	146	-267
TL2 – Low load, broadleaf litter	24	24	0
TL3 – Moderate load conifer litter	250	268	+18
TL4 – Small downed logs	273	146	-127
TL8 – Long needle litter	113	49	-64
Total	1,652	1,652	0

Fuel model GR1 covers open grassy areas that have been recently grazed or burned and that have a limited amount of litter in addition to recent growth. Spread rate is moderate and flame length is low. Direct attack is generally possible in this fuel model and resistance to control is low.

Fuel model GR2 characterizes open grassy areas that have not been recently burned or grazed, as well as forested areas with a sparse, predominantly ponderosa pine overstory where grasses are the primary carriers of fire. Spread rate is high and flame length is moderate. Despite increased fire behavior relative to fuel model GR1, fuel loads are low; therefore, direct attack is generally possible and resistance to control remains low except under adverse fire weather conditions.

Fuel model GS1 covers areas where a mix of grasses and shrubs are the primary carriers of fire. Spread rate is moderate and flame length is low. Similar to fuel model GR2, fuel loads are low; therefore, direct attack is generally possible and resistance to control remains low except under adverse fire weather conditions.

Fuel model TU1 characterizes areas with a timber overstory and an understory of mixed grasses, shrubs, and litter, which are the primary carriers of fire. Spread rate is low and flame length is low. Under most conditions, direct attack is possible and resistance to control is low. However, under adverse fire weather conditions or where ladder fuels are present, torching or crowning is possible and resistance to control will increase.

Fuel model TL2 was assigned to forested stands composed primarily of aspen, where broadleaf litter is the main carrier of fire. Spread rate is very low and flame length is very low. Direct attack is usually possible and resistance to control is low.

Fuel model TL3 was used to characterize conifer stands where conifer litter is the primary carrier of fire, with few grasses, shrubs, or coarse fuels. Spread rate is very low and flame length is low. Direct attack is usually possible and resistance to control is low, except where ladder fuels increase the risk of torching or crowning.

Fuel model TL4 covers conifer stands where a combination of conifer litter and coarse fuels (down logs) is the primary carrier of fire. Spread rate is low and flame length is low. Under average fire weather conditions, direct attack is possible and resistance to control is low. However, the increased fuel load, as well in longer burn times in heavier fuels, increases the risk of torching or crowning. Under adverse weather conditions, direct attack may not be possible and resistance to control may be high.

Fuel model TL8 was used to represent some ponderosa pine stands where needle litter is the primary carrier of fire. Spread rate is moderate and flame length is low. Under average fire weather conditions, direct attack is possible and resistance to control is low. However, under adverse weather conditions, the high fine fuel load may cause increased rate of spread and flame length, precluding direct attack and increasing resistance to control. The presence of ladder fuels, with associated torching or crowning, can also complicate fire suppression in this fuel model.

Fuel load is an important factor for predicting whether a fire will ignite and how it will behave (Anderson 1982). Stand data are not available for the project area; therefore, fuel loads are discussed in general terms related to their fuel model (Scott and Burgan 2005), as shown in Table 3-6.

Table 3-6 Fuel Loads

	Fuel Load (tons per acre)				
Fuel Model	1-hour	10-hour	100-hour	Live herbaceous	Live woody
GR1	0.10	0.00	0.00	0.30	0.00
GR2	0.10	0.00	0.00	1.00	0.00
GS1	0.20	0.00	0.00	0.50	0.65
TU1	0.20	0.90	1.50	0.20	0.90
TL2	1.40	2.30	2.20	0.00	0.00
TL3	0.50	2.20	2.80	0.00	0.00
TL4	0.50	1.50	4.20	0.00	0.00
TL8	5.80	1.40	1.10	0.00	0.00

3.3.5 Fire Intensity

Fire intensity was estimated to provide information on potential fire effects to watersheds and other resources. These estimates were based on current and post-treatment vegetation type and canopy cover; published information on fire regimes, fire ecology, and fire effects for dominant species; standard fuel models; and field observations of stand and fuel conditions. The analysis assumed 90th percentile (severe) fire weather conditions. Areas of moderate- and high-intensity burns have the potential to cause negative effects to soils, watersheds, and other resources because of the erosive nature of many soil types. It was assumed that all prescribed burning conducted under the proposed treatments would be of low intensity and would not affect these same resources.

Under current stand and fuel conditions, 40 percent of the project area would support low-intensity fire, while 48 percent would support moderate-intensity fire and 13 percent would support high-intensity fire. Wildfires in 60 percent of the project area could cause adverse effects to watersheds and other resources.

3.3.6 Analysis of Effects

This section describes the anticipated direct, indirect, and cumulative effects of implementing the proposed alternatives on fire regimes, fire frequency and risk, fuel models, fuel loads, potential fire behavior, and fire intensity and contrasts these effects between alternatives.

3.3.6.1 *Alternative 1 – No Action*

Fire Regimes

Fire regimes under Alternative 1 would not change from the current condition. Ponderosa pine stands as well as grassy and shrubby areas would remain outside of the historic range of variability. Aspen and lodgepole pine stands would continue to age and move farther from the historic range of variability. Many stands would remain in condition classes 2 and 3.

Fire Frequency and Risk Analysis

For Alternative 1, it is assumed that the number of fire occurrences would not change. Based on the Harris Park risk analysis (USFS 2005), the total acreage that would be burned by wildfires during the next 20 years would be 132 acres.

Fuel Models, Fuel Loads, and Potential Fire Behavior

Fuel models under Alternative 1 would remain the same as current conditions in the short term. Over time, conifer stands would become denser and more conifers would encroach on openings. As stands age, more trees would die, increasing fuel loads. Insect or disease outbreaks, which would become more likely (see section 3.2.4.1) could dramatically increase tree mortality and fuels loads. Aspen stands would become more decadent and may be invaded by conifers. Timber litter and down logs would increasingly become the primary carriers of fire. The extent of stands represented by timber litter fuel models such as TL3 and TL4 would increase. Additional fuel models, such as TL5 (high load conifer litter) and TL7 (large downed logs) would be needed to describe the increased fuel loads. Fire behavior parameters such as flame length, as well as resistance to control, would increase. The overall effect of these changes would be increased susceptibility of stands to torching and crown fires. Firefighter and public safety, along with the efficiency of firefighting resources, would decrease in the long term because of more intense fire behavior and the potential for large-scale crown fire.

Fire Intensity

For Alternative 1, it is assumed that the intensity of fires over the next 20 years would not change from the current condition. Fires across 60 percent of the project area would contribute to adverse effects to watersheds and other resources.

Cumulative Effects

Past timber harvest and fire suppression were the primary forces that created the current landscape. Implementation of this alternative would maintain the current landscape conditions. Alternative 1 would not add to the cumulative effects of past and ongoing projects, except for the continuing effects of fire suppression. Fuels in the majority of the project area would remain in their current, unmanaged condition. Adjacent fuel treatments, along with past wildfires, have begun to reverse the cumulative effects of past activities and create a more natural pattern of vegetation, fire regime, fuel loads, and potential fire behavior across the landscape. These treatments would be less effective because treatments in the project area would not contribute to this pattern on a landscape scale. Instead, fuel loads and potential fire behavior, such as flame length, rate of spread, and crown fire activity, are likely to increase over time,

causing decreased firefighter and public safety, decreased effectiveness of suppression efforts, and increased suppression costs.

3.3.6.2 *Alternative 2 – Proposed Action*

Fire Regimes

Alternative 2 treatments have been designed to contribute to a shift towards vegetation patterns that are more typical of pre-settlement fire regimes. These treatments would create a more complex and heterogeneous mosaic of trees than currently exists. Treatments would move ponderosa pine stands and existing openings towards the pre-settlement condition and create new openings, reduce canopy continuity, and increase size and age diversity in aspen and other conifer stands. These stands would be moved back towards condition class 1. All of these changes would shift the treatment areas towards conditions that are less susceptible to severe, stand-replacing wildfires (Kaufmann et al. 2000, Kaufmann et al. 2001).

Fire Frequency and Risk Analysis

For Alternative 2, it is assumed that the number of fire occurrences would not change from the current condition. The USFS (2002) estimated that similar treatments would reduce the fire risk on any given acre to two percent. Applying this risk rate to all treated acres, the overall fire risk across the project area (treated and untreated) would be reduced from eight percent to four percent. The predicted area burned in the next 20 years would be reduced from 132 acres to 66 acres, which represents a 50 percent reduction from the current condition.

Fuel Models, Fuel Loads, and Potential Fire Behavior

Treatments in Alternative 2 would change the distribution of fuel models (Table 3-5). Areas of fuel model GR1, which is not currently present, would be created in areas that are broadcast burned. Areas of fuel model GR2 would increase, especially in areas where ponderosa pine stands are restored to conditions similar to the historic range of variability. Areas that are currently in fuel model TU1, TL3, TL4, and TL8 would in some cases transition to fuel model GR2 or TU1 where the overstory cover or ground fuels are reduced by the proposed treatments. Other areas in fuel model TL4 would transition to fuel model TL3 where treatments reduce the amount of down logs and other woody debris.

Treatment activities would reduce stem density, basal area, canopy cover, crown bulk density, and ladder fuels, while raising crown base height in treated stands. Each of these changes would alter potential fire behavior. By opening up stands and removing dense fuel accumulations, fires would be more likely to remain as surface fires and less likely to cause torching or crown fire. In addition, fire behavior in untreated areas would be reduced once it ran into treated stands. For example, a crown fire running through an untreated stand may drop down and become a surface fire when it hits a treated area because the crown density would be too low to support crown fire. This type of change in fire behavior was observed in the Hayman Fire (Martinson et al. 2003).

These changes to fuel model and expected fire behavior would improve the effectiveness of fire suppression forces, increase firefighter and public safety, and reduce firefighting costs. Safety concerns often limit firefighting efforts to the most costly methods (such as aircraft) in areas of active and passive crown fire. In addition, these efforts are less likely to be successful because of high flame lengths, high rates of spread, extensive spotting, and other extreme fire behavior. On the other hand, surface fires do not raise as many safety concerns and can often be attacked more effectively with less expensive, ground-based resources. These resources are also more likely to be successful because of shorter flame lengths, lower rates of spread, less spotting, and generally more moderate fire behavior.

Fire Intensity

The proposed treatments under Alternative 2 would reduce predicted fire intensity. Sixty percent of predicted fires over the next 20 years would be low-intensity burns, 28 percent would be moderate-intensity burns, and 12 percent would be high-intensity burns. Fires across 40 percent of the project area would contribute to adverse effects to watersheds and other resources. This represents a 67 percent decrease in the extent of adverse watershed effects from the current condition.

Cumulative Effects

Past timber harvest and fire suppression were the primary forces that created the current landscape. Alternative 2, when combined with fuels treatments on other federal, state, and private lands, would begin to reverse the cumulative effects of past activities and create a more natural pattern of vegetation across the landscape. The cumulative changes to vegetation patterns and fuel loads would work together to create a landscape where potential fire behavior is changed from the current undesirable condition. The potential for crown fires and the size of many fires would be reduced. The overall effect would be increased firefighter and public safety, increased suppression ability, and decreased suppression costs.

3.3.7 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, fuels loads in treated areas would meet Forest Plan standard 6056.

3.4 Watersheds

This section discusses current watershed conditions and potential changes to those conditions from the proposed alternatives.

3.4.1 Water Resources

Watershed boundaries were developed from the PSICC's watershed Geographical Information Systems (GIS) layer based on Hydrologic Unit Code (HUC) 6th-level watersheds. The project area is contained within one 6th-level watershed: Bailey Creek (HUC 101900020303), which covers 46,463 acres. For the cumulative effects analysis, the entire 6th-level watershed was considered. Streams in the project area such as Payne Gulch, Roark Creek, Corbin Gulch, and Rock Creek, drain directly into the North Fork of the South Platte River.

3.4.2 Water Quality

Water quality is a high priority for the Upper South Platte watershed. It is a major source of water for municipalities along the Colorado Front Range and agriculture throughout northeastern Colorado. The South Platte drainage is a major recreational area in Colorado and is highly regarded for its "Gold-Medal" trout fisheries. Portions of the South Platte River have been recognized by the PSICC as being eligible for inclusion into the Wild and Scenic River system (USFS 2004).

The CDPHE (2012) has designated the beneficial uses for the North Fork of the South Platte River as Agriculture, Aquatic Life Cold Water Class 1, Domestic Water Source, and Recreation Primary Contact. The CWA requires states to compile a list of water bodies, known as the 303(d) list, that do not fully support their beneficial uses. The North Fork of the South Platte River is not on the current 303(d) list; however, two upstream tributaries are. The upstream segments are Hall Valley Area to Geneva Creek, which is listed for copper and pH, and Geneva Creek to the North Fork of the South Platte River, which is

listed for cadmium, copper, and zinc (CDPHE 2012). Streams in the project area are too small to be assessed for beneficial uses or impairment independent of the North Fork of the South Platte River.

The greatest threats to water quality are total suspended sediment (TSS) and metals, which are the focus of most regulatory efforts. TSS is the concentration of solids in the water column and can affect water quality both physically and chemically (MacDonald and Stednick 2004). The high surface area of fine particles has the potential to absorb phosphorus and other chemicals, leading to further water quality degradation. An unnatural sediment load can also remove a stream from its state of equilibrium and cause it to become unstable. Roads are most likely the current sources of erosion and sediment deposition. The metals that have been a problem in the larger watershed include cadmium, lead, copper, zinc, and iron. Metal-laden discharge from historic upstream mining and mineral-rich geology are likely the source of these contaminants. Such issues are not known to affect streams in the project area.

3.4.3 Water Yield

Extensive studies of flow regime in the Upper South Platte watershed show that peak flows are dominated by snowmelt above an elevation of 7,500 feet. Water flows higher than bankfull discharge are uncommon (MacDonald and Stednick 2004). Channel formation above this elevation is primarily determined by long-term snowmelt patterns. This elevational effect is important because peak flows from rainfall events have a greater potential to transport sediment into stream channels by overland flow and sheet wash processes than do peak flows that are snowmelt dominated. In Colorado, most summer rainstorms have little effect on summer stream flows, as the amount of rain is small relative to the available soil moisture storage capacity. Watershed studies indicate that only one to three percent of summer precipitation is converted into runoff (MacDonald and Stednick 2004). However, it should be noted that, the largest peak flows include some rainfall events (Foster Wheeler 1999).

Stream flow data are not available for any streams in the project area. Limited flow data, compiled by the U. S. Geological Survey (USGS) are available for the North Fork of the South Platte River. Peak flows typically occur in June or July in response to peak snowmelt, with mean monthly discharge in June of 477 cubic feet per second (cfs) recorded at Pine (the closest station to the project area) between 2000 and 2008 (USGS 2012). It is important to note that stream flows in the North Fork of the South Platte River are altered by input from the Roberts Tunnel, which imports water from Dillon Reservoir on the West Slope to the Upper South Platte Basin.

3.4.4 Riparian Areas, Wetlands, and Floodplains

Riparian areas exist along Corbin Gulch, Payne Gulch, Roark Gulch, and to a lesser extent along other unnamed streams. Collectively, riparian areas occupy less than one percent of the project area. Riparian areas are defined as a form of wetland that is transitional between permanently saturated wetlands and upland terrestrial areas. They are characterized by visible vegetation or physical features reflective of permanent surface or subsurface water influence. Riparian areas are the green zones adjacent to permanently or seasonally flowing rivers and streams. They are among the most productive ecosystems in the watershed. Properly managed riparian areas offer wildlife habitat, bank stability, dissipated flood energy, and improved water quality through the filtering and trapping of sediment. Water flow volume, longevity, and timing are all closely tied to riparian condition.

For regulatory purposes under section 404 of the CWA, the term wetlands is defined as "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Effects to wetlands are

regulated by the U.S. Army Corps of Engineers and the Environmental Protection Agency. According to PSICC inventory data, there are 10 acres of wetlands or riparian areas in the project area.

Floodplains are the level land along the course of a river formed by the deposition of sediment during periodic floods. Floodplain communities may be classified as wetlands. Floodplains provide numerous benefits including ground water recharge, fertile soils, wildlife habitat, and flood control. As a river's water exceeds its banks and enters a floodplain, it is forced to spread out, losing most of its velocity and capacity for rising, which is especially important following wildfires or large storm events. The floodplains in the project area are generally constrained by topography to narrow bands along streams that correspond closely to the riparian areas.

3.4.5 Soils

Soils were mapped as part of a cooperative effort between the Natural Resources Conservation Service (NRCS), the USDA, the PSICC, the Colorado Agricultural Experiment Station, and private contractors (NRCS 1994). Eleven soil map units (SMUs) were delineated. Soil permeability is moderate to very rapid. Surface runoff is moderate to rapid for most SMUs. Erosion hazard ratings, compaction potential, landslide and debris flow potential, and sediment delivery potential are discussed below.

3.4.5.1 *Erosion Hazard Rating*

Each SMU has an individual soil erosion hazard rating. These ratings are based on the inherent erodibility of the soil (K-factor) and average slope. A soil's K-factor is a function of the particle-size distribution, organic matter content, structure, and permeability of the soil or surface material. The erosion hazard ratings assume a bare soil surface, which would occur following a fire or intensive mechanical treatments.

As shown in Table 3-7, soils in about 77 percent of the project area have a low erosion hazard, while 16 percent have a moderate erosion hazard and seven percent have a high erosion hazard. In the proposed treatments, about 89 percent of the area has soils with a low erosion hazard rating, while six percent has a moderate erosion hazard rating and five percent has a high erosion hazard rating.

Table 3-7 Soil Erosion Hazard

Treatment	Erosion Hazard			Total
	Low	Moderate	High	
Light Thin/Prune, Pile Burn Only	82	0	0	82
Light Thin/Prune, Pile Burn or Broadcast Burn	336	13	44	394
Restoration, Pile Burn Only	144	22	0	166
Restoration, Pile Burn or Broadcast Burn	324	6	1	330
Defensible Space	99	29	7	135
No Treatment	294	189	62	544
Total	1,279	258	114	1,651

3.4.5.2 *Compaction Potential*

An SMU was classified as sensitive to compaction if it met one or more of the following criteria: 1) the natural drainage class is poor; 2) the permeability is low; or 3) the depth to seasonal high water table is less than one foot. None of the SMUs is rated as sensitive to compaction.

3.4.5.3 *Landslide and Debris Flow Potential*

Landslide and debris flow potential are ratings of the possibility of natural or man-caused mass movements. The possibility is directly translated to a risk to use and management. For example, the higher the mass movement potential rating, the higher probability of mass failure and the higher is the risk to management for activities planned for such areas. SMUs with low mass movement potential are on consolidated geologic materials such as gneiss, schist, granite, and sandstone. There is little mass movement risk to management. The potential for damage to watersheds caused by mass movement is minimal. SMUs with moderate mass movement potential are on poorly consolidated geologic materials such as interbedded sandstones, siltstone, and shales. A rating of moderate represents a certain amount of risk to the use and management.

All of the SMUs, including all of those in proposed treatment areas, have a low landslide potential. As shown in Table 3-8, soils in about 93 percent of the project area have a low debris flow potential, while seven percent have moderate debris flow potential. None of the soils has a high debris flow potential. In the proposed treatments, about 95 percent of the soils have low debris flow potential, while five percent have moderate debris flow potential. None of the proposed treatment areas contains soils with high debris flow potential.

Table 3-8 Debris Flow Potential

Treatment	Debris Flow Potential			Total
	Low	Moderate	High	
Light Thin/Prune, Pile Burn Only	82	0	0	82
Light Thin/Prune, Pile Burn or Broadcast Burn	350	44	0	394
Restoration, Pile Burn Only	166	0	0	166
Restoration, Pile Burn or Broadcast Burn	330	1	0	330
Defensible Space	128	7	0	135
No Treatment	482	62	0	544
Total	1,538	114	0	1,651

3.4.5.4 *Sediment Delivery Efficiency*

Sediment delivery efficiency is based on the ease with which eroded soil material reaches a stream channel and becomes sediment. It can be used to evaluate the hazard to water quality caused by erosion. This rating is based on several factors, including slope and density of drainage channels. Soil erosion on SMUs with a low rating generally occurs far enough from stream channels that transported soil is stabilized before it reaches the channel. The risk of sediment produced by management activities or natural events such as wildfire reaching a stream channel is low. On SMUs with a moderate rating, management practices or wildfire located near stream channels may produce sediment from soil erosion. Soil disturbance from management or wildfire in SMUs with a high rating may create sediment hazards and may require assessment and mitigation of these hazards

As shown in Table 3-9, soils in about 72 percent of the project area have low sediment delivery efficiency, while 15 percent have moderate sediment delivery efficiency and 13 percent have high sediment delivery efficiency. In the proposed treatments, about 84 percent of the soils have low sediment delivery efficiency, while six percent have moderate sediment delivery efficiency and 10 percent have high sediment delivery efficiency.

Table 3-9 Sediment Delivery Efficiency

Treatment	Sediment Delivery Efficiency			Total
	Low	Moderate	High	
Light Thin/Prune, Pile Burn Only	82	0	0	82
Light Thin/Prune, Pile Burn or Broadcast Burn	335	13	45	394
Restoration, Pile Burn Only	143	22	1	166
Restoration, Pile Burn or Broadcast Burn	322	6	3	330
Defensible Space	50	21	64	135
No Treatment	256	181	107	544
Total	1,188	243	220	1,651

3.4.6 Watershed Condition

Roads and trails provide access for management activities and public use, but can have adverse effects on watershed function. Unpaved roads are a large and chronic sediment source (Libohova 2004). The road system intercepts surface and subsurface flows and routes them more quickly to stream channels. In addition, roads have lower infiltration rates, generate greater runoff, and cause increased soil erosion from road surfaces, cuts, and fills. This can increase sediment delivery to surface drainages, cause higher peak flows, and accelerate timing of peak flows. This process is most prevalent where roads encroach on streams. Paved roads are less of a concern, but can still contribute to accelerated runoff and sediment production from cut and fill slopes. Primitive roads and trails generally have less bare soil because they receive less use and are not maintained regularly, but they can still contribute to sediment production and accelerated runoff as with unpaved roads. The lengths of existing roads in the project area and cumulative effects analysis area are provided in Table 3-10. Roads and trails in the project area and parts of the cumulative effects analysis area are based on PSICC GIS datasets. No equivalent data exist for other parts of the cumulative effects analysis area. In these areas, USGS topographic maps and recent (2011) National Agriculture Imagery Program aerial photographs were used to construct a comparable GIS dataset.

Table 3-10 Roads

Location	Road Type (miles)				
	Paved	Gravel/Native Surface	Primitive	Trails	Total
Project Area	0.4	6.3	4.2	2.3	13.2
Cumulative Effects Analysis Area	21.4	84.3	21.2	21.6	148.5

The WIZ is a riparian buffer that includes the floodplain, riparian vegetation, inner gorge, unstable areas, or highly erodible soils. The minimum width of the buffer on each side of a stream is the greatest of 100 feet or the mean height of mature, dominant, late-seral vegetation (USFS 2006). Neither the Forest Plan nor the WCPH has a numeric standard for disturbance allowed in the WIZ. Instead, these documents restrict any action in the WIZ that may damage stream health (USFS 2006). The current condition of the WIZ was evaluated based on GIS datasets for roads, trails, and streams in reference to a 100-foot buffer on either side of perennial and intermittent streams (Table 3-11). A 100-foot buffer was used because the height of the dominant vegetation is generally less than 100 feet. Twenty-three percent of the roads and

trails in the project area fall within the WIZ, while 22 percent of the roads and trails in the cumulative effects analysis area fall within the WIZ.

Table 3-11 Roads in the WIZ

Location	Road Type (miles)				
	Paved	Gravel/Native Surface	Primitive	Trails	Total
Project Area	0.2	2.3	0.2	0.3	3.1
Cumulative Effects Analysis Area	5.6	16.2	7.9	3.1	32.9

The extent of roads and trails crossing soils sensitive to erosion (moderate or high erosion hazard rating) is shown in Table 3-12. Two percent of roads and trails cross SMUs that are sensitive to erosion. Comparable data are not available for the entire cumulative effects analysis area.

Table 3-12 Roads on Soils Sensitive to Erosion

Location	Road Type (miles)				
	Paved	Gravel/Native Surface	Primitive	Trails	Total
Project Area	0.0	0.1	0.0	0.2	0.3

3.4.7 Analysis of Effects

This section describes the potential direct, indirect, and cumulative effects of implementing each of the alternatives on soil and water resources and compares and contrasts these effects between alternatives.

3.4.7.1 *Alternative 1 – No Action*

Water Quality

The risk of impaired water quality would increase under this alternative because of the long-term potential for large-scale wildfires. Degradation in water quality from wildfires can include increases in turbidity, TSS, nitrates, manganese, and dissolved organic carbon, which may indirectly affect the beneficial uses and aquatic habitat. Recent large fires, such as the Buffalo Creek and Hayman fires, had devastating effects on the Denver metropolitan water supply. More than one million customers were affected by taste and odor problems caused by fire (Hessel 2002).

Water Yield

Stream flows would remain unaltered. There would be no reduction in vegetation and no change in water yield or peak flow is expected. Water yield could be affected if large-scale wildfires were to occur. Intense wildfires and the area's propensity for high-intensity thunderstorms could lead to severe flooding, which occurred after the Hayman and Buffalo Creek Fires. Severe flooding after the Buffalo Creek Fire caused two deaths and substantial property losses (USFS 2000).

Riparian Areas, Wetlands, and Floodplains

Riparian areas, wetlands, and floodplains would remain unchanged. Current effects from roads, recreation, and other activities would continue. The risk of sedimentation or other damage from large-scale wildfire would slowly increase over time as fuels accumulate.

Soils

Sensitive soils would remain, but they would not be affected beyond the current condition. The amount of soils eroded would depend on future and current management activities. The risk of soil erosion from a large-scale wildfire would increase over time. Soils would be susceptible to development of hydrophobic conditions following a wildfire. The indirect effects of this may be severe erosion and sedimentation. Eighty-six percent of the soils on the Hayman Fire were estimated to be water-repellent, and soil erosion was estimated to have increased from 1 ton per acre to 86 tons per acre (Hessel 2002). Severe erosion after the Buffalo Creek fire filled in approximately one-third of Strontia Springs Reservoir (USFS 2000).

Watershed Conditions

Soil erosion from existing roads would continue at or near current levels. Unpaved roads would remain a chronic source of sediment, but the amount of sediment would depend on the amount of traffic and road maintenance. The risk of wildfire and adverse watershed effects from wildfire would not be reduced. In the long term, the risk of large-scale wildfire and corresponding adverse effects to the watershed are likely to increase. A study in the nearby Hayman Fire area indicated that the amount of fire-related sediment in the first year after a wildfire is nearly three orders of magnitude larger than the estimated mean annual sediment production rate from roads (Libohova 2004). In addition, much of the sediment from roads may not be delivered to stream channels because of the filtering effects of vegetation, unlike sediment eroded from areas burned by wildfire.

Cumulative Effects

Current and historic land uses continue to affect soil and water resources. Grazing, mining, logging, road construction, residential development, and fire suppression have historically affected the land. The effects from these uses include loss of bank stability from livestock, water quality impairments caused by heavy metal inputs upstream, loss of ground cover and soil erosion after timber harvest, increased sediment production and delivery to streams caused by road and residential construction, and large-scale wildfires caused by many years of unnatural disturbance regimes. The effects on soil and water resources from these uses include soil compaction from OHVs and hiking trails, stream flow alterations caused by an increased demand for water, and soil erosion caused by mechanical thinning, prescribed fire, and roads. Cumulatively, human use of the analysis area has altered, and would continue to alter, the landscape from its historic pre-European condition. No new effects would occur under this alternative, at least in the short-term. The potential for cumulative effects to soil and water resources from large-scale wildfires would not be reduced. If one of these fires were to occur, it is likely that it would cause the severe burning that occurred in the Hayman and Buffalo Creek Fires, and soil and water resources would be adversely affected.

3.4.7.2 *Alternative 2 – Proposed Action*

Water Quality

Mechanical treatments and prescribed fire have the potential to affect turbidity, TSS, temperature, nutrients, and bed load indirectly because of increased soil erosion in treated areas. No increase in sediment yield is anticipated from the loss of surface cover caused by mechanical treatments and prescribed fire.

Up to four miles of new temporary roads may be needed. Sediment barriers would be installed below any temporary road drainage structure outlets if needed to control down gradient and downstream sediment transport. Closed roads would be obliterated and monitored to prevent adverse water quality effects. New temporary roads needed for treatment access and log removal have the potential to increase the amount of sediment transported into streams. The effect of roads on water quality would depend on their connectivity to streams (Libohova 2004). The potential for sediment from treatment areas to enter streams would be minimized by avoiding construction of temporary roads and mechanical operations in the WIZ.

Water Yield

Removal of live trees is generally thought to increase water yield through reduced interception and transpiration. Where the annual precipitation exceeds 18 to 20 inches, a change in vegetation density can have a detectable effect on water yield. An increase or decrease in the density of vegetation cover would have a corresponding effect on runoff (MacDonald and Stednick 2004). However, in dry areas like Colorado, reduction in vegetation has little or no effect on runoff. Any water that would be gained from the removal of live trees is lost to increased evaporation from the soil surface (MacDonald and Stednick 2004). This would not be true if basic runoff processes, such as infiltration rate and soil moisture storage capacity, were altered by compaction, paving, or erosion during tree removal. The average annual precipitation for 30 years of record at Bailey, Colorado is 16 inches. Therefore, the proposed activities would not cause a measurable change in water yield or peak flow.

Riparian Areas, Wetlands, and Floodplains

Riparian areas, wetlands, and floodplains are particularly sensitive to ground disturbance, hydrological modifications, and vegetation removal. Under Alternative 2, ground disturbance would be caused by the construction of temporary roads and the use of ground-based yarding systems during mechanical treatments. The adverse effects of ground disturbance would be minimized by preventing treatments in riparian areas, wetlands, and floodplains and by minimizing crossings of the WIZ as described in Chapter 2. All treatments in these areas would follow the WCPH, relevant standards and guidelines for MA 9A of the Forest Plan, Executive Order 11990 for wetland protection, and Executive Order 11988 for floodplain protection.

Soils

The amount of erosion from forest management activities is proportionate to the amount of soil exposed by these activities. Erosion is a natural process. Human activities that accelerate this process typically cause compaction; modification of surface drainage patterns; or removal of vegetation, surface litter, and soil organic matter. Studies in Colorado suggest that erosion rates are acceptably low when there is less than 30 percent bare soil (Gary 1975, Benavides-Solorio 2003). A study of the effects of mechanical thinning near Trumbull, Colorado found that litter and downed wood increased by more than 70 percent, while the amount of live vegetation on the ground decreased by less than 10 percent after thinning. Erosion rates were not expected to change because bare soil was unchanged (Libohova 2004). Although soils would be disturbed and compacted by the operation of equipment in mechanical treatment units, regional standards (USFS 2006) restrict soil disturbance to less than 15 percent of an activity area, thereby maintaining acceptably low erosion rates.

Soil erosion has the potential to increase after a prescribed fire. However, because prescribed fires are designed to burn at lower intensities than wildfires, prescribed fires should have relatively small effects on water quality (MacDonald and Stednick 2004). Pile burning would remove the majority of the vegetation and soil organic matter in the small portions of each treatment unit where slash is piled and burned. Hydrophobic soils may be created in these locations. Soil under burned piles may be sterilized, exposing it to water and wind erosion and invasion by unwanted or noxious weed species. Large piles at landings or other locations would be ripped or otherwise scarified and seeded. This would reduce

hydrophobic soils and minimize the potential for soil erosion. Pile locations throughout treatment units would not be scarified or seeded because they would be small and would not cause adverse soil effects across the treatment units. Broadcast burning would remove most surface vegetation and some soil organic matter, but hydrophobic soils would generally not be created because burning intensity would be low. Localized areas of moderate- or high-intensity burning may create hydrophobic soils; however, these areas are expected to be small and would not cause adverse soil effects across the landscape.

Under Alternative 2, only about 11 percent of the area subject to mechanical thinning and prescribed fire treatments is sensitive to soil erosion (Table 3-7). Project design standards and mitigation measures listed in Chapter 2 would serve to minimize the risk of increased soils erosion in these areas. As noted in section 3.4.5.2, none of the soils is sensitive to soil compaction; therefore, no increased risk of compaction is expected. As noted in section 3.4.5.3 none of the soils has moderate or high landslide potential or high debris flow potential. Only five percent of soils in the treatment units have moderate debris flow potential. Given the well-drained nature of the soils and the generally low potential for landslides and debris flows, no increased risk of mass soil movement is expected. No substantial increase in sediment delivery efficiency is expected. At present, only 16 percent of the treatment areas have moderate or high rating for this parameter. The use of project design standards and mitigation measures listed in Chapter 2, such as keeping temporary roads out of the WIZ and minimizing drainage crossings, would minimize the risk of increased sediment reaching drainage channels. In the long term, increases in ground cover from grasses and shrubs would reduce the risk of sediment delivery compared with current conditions.

Watershed Conditions

There would be no long-term changes to the extent of roads and trails, roads and trails in the WIZ, or roads and trails on soils sensitive to erosion. Soil erosion from existing roads would continue at or near current levels. Unpaved roads would remain a chronic source of sediment, but the amount of sediment would depend on the amount of traffic and road maintenance, which is expected to increase slightly during project implementation. The construction and use of up to four miles of temporary roads may increase soil erosion and sediment delivery to streams in the short-term. However, the use of project design standards and mitigation measures listed in Chapter 2, such as keeping temporary roads out of the WIZ and minimizing drainage crossings, would reduce the risk of adverse changes to watershed condition. Temporary roads would be constructed according to the minimum standard needed for safe use by equipment. These roads would be closed thoroughly after use, and physical barriers would be used to prevent future use by motorized vehicles.

The risk of wildfire and adverse effects to the watershed would be reduced compared to the current condition. As described in section 3.3.6.2, the extent of future wildfires would be reduced by 50 percent and the extent of adverse watershed effects would be reduced by 67 percent. A study in the nearby Hayman Fire area indicated that the amount of fire-related sediment in the first year after a wildfire is nearly three orders of magnitude larger than the estimated mean annual sediment production rate from roads (Libohova 2004). Thus, the negligible increase in risk to the watershed from temporary roads would be more than offset by the reduced risk from wildfire.

Cumulative Effects

Current and historic land uses continue to affect soil and water resources. Grazing, mining, logging, road construction, residential development, and fire suppression have historically affected the land. The effects from these uses include loss of bank stability from livestock, water quality impairments caused by heavy metal inputs upstream, loss of ground cover and soil erosion after timber harvest, increased sediment production and delivery to streams caused by road and residential construction, and large-scale fires caused by many years of unnatural disturbance regimes. The effects on soil and water resources from these uses include soil compaction from OHVs and hiking trails, stream flow alterations caused by an

increased demand for water, and soil erosion caused by mechanical thinning, prescribed fire, and roads. Cumulatively, human use has altered, and would continue to alter, the landscape from its historic pre-European condition.

The cumulative effects of future large-scale wildfires may be reduced. Potential effects of wildfire include landscape-scale soil loss, dramatic increases in sediment to streams and rivers, water quality impairments, and degraded aquatic habitats. Nearly total loss of the litter layer was observed in high-severity burn areas of the Hayman Fire, and the threat of erosion in these areas was relatively high. In contrast, low-intensity areas of this fire retained some surface litter and were often found in a complex mosaic with unburned areas. In addition, unburned foliage from scorched and killed trees fell to the ground, helping to reduce erosion on the forest floor (USFS 2003). By reducing fuels and the potential for large-scale wildfires, the proposed project would reduce the potential cumulative effects to soil and water resources if such an event were to occur. However, it is important to note that the proposed project would only reduce this risk in a small area, while the majority of watershed would remain in its current condition.

3.4.8 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, implementation of measures in the WCPH would minimize the potential for adverse watershed effects.

3.5 Management Indicator Species

This section discusses current conditions and potential changes to the current condition from the proposed alternatives for management indicator species (MIS). The MIS report in the project file contains a more detailed discussion of the analysis for each species.

3.5.1 MIS Selection

The 1982 planning rule, which implements NFMA, requires the Forest Service to manage fish and wildlife habitat "to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19). MIS are used as surrogates for other species with similar life histories or habitat requirements in order to assess the effects of management activities. For the PSICC, terrestrial MIS listed in Amendment 30 of the Forest Plan are Rocky Mountain elk (*Cervus elaphus*) and Abert's squirrel (*Sciurus aberti*). Both occur in the project area, so both species were evaluated. Current population trends were assessed using available data from the Colorado Parks and Wildlife (CPW) and PSICC MIS monitoring database.

3.5.2 Habitat Modeling

The Habitat Capability (HABCAP) model was selected by Region 2 of the USFS to assess the effects of habitat alterations on wildlife resources. HABCAP uses HSS values to rate habitat conditions and indicate the relative potential value of the habitat for MIS. Habitat potential is a function of the landscape's capability of providing and sustaining habitat needs for each species. To this end, the model calculates cover and forage value indices, and includes a road effect on elk habitat based on road type and density. The model uses an estimated ideal set of conditions for each species in combination with an estimate of the sustainable conditions for the landscape (based in part on Brown et al. [1999], Foster Wheeler [1999], and Kaufmann et al. [2000]) to determine the optimum habitat conditions that could theoretically be achieved. These optimum conditions are then compared with the current and expected HSS values to calculate a Habitat Capability Index (HCI) value. A landscape at its optimum sustainable condition for a selected species would have a HCI of 100 percent. The HABCAP results include some current and future

values greater than 100 percent, which indicate that the associated forest conditions may not be sustainable.

HABCAP assumes that the modeling area is between 5,000 and 20,000 acres in size. The analysis area for this report occupies only 1,652 acres. For this reason, the HABCAP results may not accurately represent the habitat conditions for MIS. Habitat effectiveness and capability goals for each MA on the PSICC are listed in the Forest Plan; the project area is located in MA 2B. The Forest Plan standard relevant to MIS and the proposed project is: "Maintain habitat capability at 60 percent of potential capability." The results of the model were used to:

- Establish the existing quantitative habitat capability values
- Compare changes in habitat capability values by alternative and species
- Compare model outputs to Forest Plan MA standards
- Identify trends in relation to Forest Plan standards

Table 3-13 shows the results of HABCAP modeling for the two selected MIS.

Table 3-13 HABCAP Modeling

Species and Season	Habitat Capability Index		
	Current / Alternative 1	Alternative 2	Change
Elk Summer	0.66	0.67	+0.01
Elk Winter	0.93	0.92	-0.01
Abert's Squirrel Summer	2.22*	1.73*	-0.49
Abert's Squirrel Winter	2.22*	1.73*	-0.49

* Values greater than 1.00 indicate potentially unsustainable conditions

3.5.3 Rocky Mountain Elk

Rocky Mountain elk are important to forest management because of their high public interest and economic value. Elk use all forest ecosystems in Colorado either seasonally or year-round. Elk use forested stands for cover, but they are also grazers and browsers, consuming a variety of grass, forb, and shrub species. Forage availability is inversely related to the percent of tree canopy closure, so elk use areas where cover and forage are suitably arranged on the landscape. Elk can be disturbed by human activity, especially during calving season. Vehicles present a particular source of disturbance and high road densities degrade elk habitat (Naylor et al. 2009, Hoover and Wills 1984). The entire project area is suitable elk habitat, but there are no critical wintering or calving areas.

The CPW develops elk population estimates by Data Analysis Unit (DAU), which is a combination of one or more Game Management Units (GMUs) and represent a relatively discrete herd. The project area is in GMU 501, which along with GMUs 50 and 500 composes DAU 18. Since 2004 (earliest available population estimates), this herd has maintained a generally stable population trend with between 1,750 and 2,600 animals.

According to the 2009 PSICC annual monitoring report, all DAUs that contain a portion of the PSICC are above the CPW's long-term population objective. The PSICC is an important area for hunting and viewing elk, but contains a relatively low elk population compared with the remainder of Colorado.

Approximately 35,000 elk (12 percent of the statewide population) are located in DAUs that contain a portion of the PSICC (USFS 2009).

3.5.3.1 *Analysis of Effects*

Alternative 1 would not cause any new direct or indirect effects to elk because current conditions would be maintained. Alternative 2 is not expected to cause injury or mortality. Increased human activity associated with project implementation may temporarily disturb or displace elk from otherwise suitable habitats. Changes to vegetation would improve foraging habitat, and slightly reduce winter cover habitat. The net effect of these changes could be neutral or positive, since the altered cover habitat would still exceed the minimum amount that elk require.

HABCAP Analysis

The results of the HABCAP analysis for elk are shown in Table 3-13. Without treatment (as in Alternative 1), cover values would remain very high, indicating potentially unsustainable conditions. The potential for tree mortality from drought, insects, diseases, and wildfire would remain high and forage production would continue to slowly decline because of the dense forest structure. If Alternative 2 were implemented, tree density would be reduced slightly, creating a more productive and diverse shrub and herbaceous understory that would provide more forage for elk. All cover value indices for current and expected conditions are high, so effects of the slight reduction in winter cover would be negligible.

Habitat and Population Trend

The structure, composition, and landscape pattern of vegetation in many areas used by elk on the PSICC has been substantially altered from its pre-European conditions by cumulative human effects. The effectiveness of elk habitat has declined and the current conditions are not sustainable. Future USFS projects are likely to create more heterogeneous natural landscapes with diverse habitats that benefit elk (Ryke and Wagner 2002). Alternative 2 would promote this change, improving habitat effectiveness for elk by increasing foraging opportunities and availability of cover. Alternative 1 would maintain current habitat effectiveness for elk. In the long-term, both Alternatives 1 and 2 would lead to habitat effectiveness that is in excess of sustainable conditions. However, the potential for large-scale habitat changes from insect outbreak, disease, or wildfire would be higher under Alternative 1 than under Alternative 2 because fuels would not be reduced and forest health would not be improved. This would lead to habitat loss, but the landscape would recover eventually and would provide high-quality elk habitat. Elk populations are increasing in the state of Colorado and on the PSICC (Ryke and Wagner 2002) and are stable in DAU 18 (CPW 2012). No elk population studies have been conducted on the PSICC to measure the direct effects of forest management activities on elk population numbers (Ryke and Wagner 2002). Alternative 2 may contribute to an increase in the elk population because overall habitat conditions would improve. Current population stability would be maintained in the short-term under Alternative 1. In the long-term, the risk of large-scale habitat change may increase; however, the occurrence of such events and their effects on elk populations cannot be predicted with reasonable certainty.

Cumulative Effects

Overall, fire suppression has decreased habitat capability for elk in lower-elevation forests by increasing forest density and decreasing understory productivity and diversity. However, current conditions exceed Forest Plan standards. The potential for large-scale elk habitat loss from these forest conditions is a concern, though it is less so in the long term because suitable elk habitat would recover relatively quickly. Fuel treatment projects would benefit this species by decreasing stand density and increasing understory productivity and diversity. Continued prescribed burning would begin to restore natural fire regimes,

which would contribute to the creation and maintenance of elk habitat. The activities described in section 3.1 would contribute to cumulative effects to elk.

3.5.4 Abert's Squirrel

The Abert's squirrel is a habitat specialist closely associated with ponderosa pine. Although it is capable of using other tree species, it obtains most of its life requirements from ponderosa pine seeds, twigs, and symbiotic fungi. The Abert's squirrel forages for these resources on the ground and in the canopy. They also use the canopy for nesting and escape cover. They do not hibernate and must acquire sufficient food resources to survive winter. Tree size, arrangement, density, vigor, and productivity affect habitat suitability for the Abert's squirrel. Excessive tree removal (for example, wildfire or timber harvest) can reduce available habitat. Harsh, snowy winters increase mortality and drought in spring or summer reduces recruitment (Keith 2003). Squirrels are not known to respond to vehicle traffic on roads or trails specifically, but they do respond to direct approach by humans on foot by freezing or fleeing (for example, *Sciurus carolinensis* [Cooper et al. 2008]). The project area contains 1,045 acres of potential Abert's squirrel habitat. Monitoring of Abert's squirrels across the PSICC since 2006 show an increase from 2006 through 2009, then a decrease through 2012, indicating a fluctuating population trend (USFS unpublished data).

3.5.4.1 *Analysis of Effects*

Alternative 1 would not cause any direct effects to Abert's squirrels and current habitat capability would be maintained, but the risk of broad-scale habitat loss would remain high. There is a slight chance that Alternative 2 could cause injury or mortality to this species. Increased human activity associated with project implementation may temporarily disturb or displace Abert's squirrels from otherwise suitable habitats. Mitigation has been included as part of the proposed action to minimize effects to the local population.

Alternative 2 would reduce the stand density of ponderosa pine. Mechanical thinning and prescribed fire would maintain stands currently dominated by ponderosa pine and would promote the survival and re-establishment of ponderosa pine in stands where a remnant component currently exists. Management standards for Abert's squirrel are included in the Forest Plan and would minimize the potential for effects to Abert's squirrel habitats. The retention of a clumpy, more diverse forest structure would maintain suitability of Abert's squirrel habitats. In addition, thinning may enhance cone production, which can translate into high squirrel densities during periods of high cone availability (Dodd et al. 1998). This alternative would improve stand health and would decrease the risk of broad-scale crown fire, disease, or insect outbreak.

HABCAP Analysis

The results of the HABCAP analysis for Abert's squirrel are shown in Table 3-13. The dominant cover type is ponderosa pine, which is highly suitable for Abert's squirrel occupancy, as the high HCI values indicate. All indices were over 1.0, indicating conditions may not be sustainable. If Alternative 2 were implemented, the reduced tree density would bring the HCI value down closer to 1.0, indicating more sustainable conditions. The proposed treatments would increase tree growth and reduce the risk of tree loss. Site-specific squirrel surveys would be conducted before implementation and treatments would be modified as necessary to minimize the potential for the project to cause a declining trend in the local population. In the absence of treatment (under Alternative 1), tree growth in these stands would be reduced and the potential for tree mortality from drought, insects, diseases, and wildfire would be high.

Habitat and Population Trend

Abert's squirrel habitat on the PSICC has probably increased from historic conditions. Both alternatives would lead to conditions that are in excess of Forest Plan standards for Abert's squirrel habitat capability. However, the potential for large-scale habitat changes from insect outbreak, disease, or wildfire would be higher under Alternative 1 than under Alternative 2 because fuels would not be reduced and forest health would not be improved.

Abert's squirrel populations on the PSICC appear to be stable, but fluctuate from year to year. Some of this fluctuation is likely related to the variability in weather patterns in recent years (for example, mild vs. harsh winters or dry vs. wet summers). Some of the population fluctuation may also be related to insect outbreak, wildfire, and forest treatments. Since Abert's squirrels are so closely associated with ponderosa pine, we assume that their populations would be adapted to the natural fire regime of ponderosa pine. Alternative 2 would create conditions closer to the natural fire regime and Abert's squirrels are expected to respond within their natural range of population fluctuation. Alternative 1 would maintain current population levels in the short-term, but the long-term risk of insect or disease outbreaks or wildfire would remain. Occurrence of one of these events could cause a large-scale loss of habitat and subsequent decline in the Abert's squirrel population.

Cumulative Effects

Fire suppression may have contributed to increased habitat capability for Abert's squirrel because of increased tree density while it may have decreased capability in other areas because of decreased tree vigor and cone production as well as the invasion of other conifer species into ponderosa pine stands. In the short-term, fuel treatment projects could decrease habitat capability for Abert's squirrel, but could provide long-term benefit to this species by increasing forest health and reducing the risk of widespread habitat loss. Continued prescribed burning and other maintenance treatments would begin to restore natural fire regimes, which would also contribute to the maintenance of Abert's squirrel habitat on the landscape. The activities described in section 3.1 would contribute to cumulative effects to Abert's squirrels.

3.5.5 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, both alternatives would meet the Forest Plan standard for habitat capability in MA 2B (60%) for both MIS.

3.6 Special Status Species

This section discusses current condition and potential changes to the current condition from the proposed alternatives for special-status species.

3.6.1 Threatened, Endangered, and Proposed Species

A list of threatened, endangered, and proposed species that may be present in or affected by activities in Park County was obtained from the U.S. Fish and Wildlife Service's (USFWS) Environmental Conservation Online System (IPAC) (USFWS 2013). Table 2 in the combined Biological Assessment / Evaluation (BA/BE) lists each species that may be present in or affected by activities in Park County. Table 2 in the BA/BE also documents the rationale for excluding those species for which no further analysis is needed because they are not known or suspected to occur, and for which no suitable habitat is present. Analysis in the BA/BE indicates that two species, the Mexican spotted owl (*Strix occidentalis lucida*) and the Canada lynx (*Lynx canadensis*) or their habitats may be present or may be affected by the

proposed project. A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine whether field reconnaissance is needed to complete the analysis. Sources of information included Forest Service records and files, the Colorado Natural Heritage Program database, CPW information, and published research. Potential habitat maps for the Mexican spotted owl and Canada lynx exist for the PSICC. Both maps were reviewed by USFWS in 2007.

On April 26, 2011, representatives from the PSICC (Mikele Painter and Matt Schweich) and USFWS (Leslie Ellwood) conducted a site visit to discuss potential lynx habitat in the analysis area. During that visit, participants agreed on the appropriate treatment options. No other consultation actions have been conducted in relation to the proposed project.

Candidate species have sufficient information on their biological status and threats to warrant a proposal to list as endangered or threatened, but development of a listing regulation is precluded by other higher priority listing activities. Species that are candidates for listing under the ESA are automatically placed on the Region 2 Regional Forester's sensitive species list. The analysis and determination of effects for candidate species are included as part of the BE.

3.6.1.1 *Canada Lynx*

Lynx habitat can be described as moist boreal forests that have cold, snowy winters and a high-density prey base of snowshoe hares. The predominant vegetation of boreal forest is conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.). In the southern Rocky Mountains, the boreal forests that lynx use are characterized by scattered moist forest types with high hare densities (or alternate prey species like tree squirrels) in a matrix of other habitats (for example, dry forest or non-forest) with low prey densities. In these areas, lynx incorporate the matrix habitat into their home ranges and use it for traveling between patches of boreal forest. In all regions within the range of the lynx in the contiguous United States, timber harvest, recreation, and related activities are the predominant land uses affecting lynx habitat. Lynx are generally tolerant of humans, but for recovery of the species, it is important to maintain landscape connectivity between lynx populations and habitats (USFWS 2012a).

There are no known resident lynx on the South Platte Ranger District, but they have been observed using the District (Shenk 2009). No occupancy surveys have been conducted, but this analysis assumes lynx may be present at any time.

The project area is within the Mt. Evans lynx analysis unit (LAU), which encompasses 162,144 acres. Potentially suitable habitat was modeled by the PSICC in 2007 using USFS Region 2 GIS vegetation data. A baseline snow compaction map was developed in 2000. The PSICC is currently updating the map of potentially suitable lynx habitat using direction from the SRLA Implementation Guide (June 2009) and associated snow compaction routes; however, the map was not approved for use at the time of this analysis. In the LAU, 86,355 acres have been mapped as suitable habitat for lynx. Approximately 70 percent of the LAU is managed by the PSICC. There is no critical habitat in or near the project area.

Applicable direction from the 2008 Southern Rockies Lynx Amendment (SRLA) includes Objectives ALL O1, VEG O1, and VEG O3; Standards ALL S1, VEG S5, and VEG S6; and Guidelines VEG G4 and VEG G10. Other direction does not apply (Table 3-14).

Table 3-14 Inapplicable SRLA Direction

Objective, Standard, or Guideline	Inapplicable SRLA Direction
ALL G1	Not a highway project.
LAU S1	No LAU boundary changes.
VEG O2	Within 200 feet of structures, treatments would not provide hare habitat. Beyond 200 feet from structures, hare habitat would be neither reduced nor promoted.
VEG O4	Within 200 feet of structures, treatments would not provide hare habitat. Beyond 200 feet from structures, hare habitat would be neither reduced nor promoted.
VEG S1	Treatments would not regenerate forested stands.
VEG S2	Treatments would not regenerate forests.
VEG G1	Treatments would not recruit a high density of conifers, hardwoods, or shrubs where such habitat is scarce or not available.
VEG G5	Within 200 feet of structures, treatments would not promote alternate prey habitat. Beyond 200 feet from structures, lynx habitat would not be altered.
VEG G11	Denning habitat would be neither reduced nor promoted.
GRAZ, HU, LINK	Not a grazing or human use project, or in a linkage.

Existing conditions in the Mt. Evans LAU include vegetation changes caused by the 2006 Harris Park Fuels Management Project. Consultation for the Harris Park project used an older habitat model to determine that on federal and non-federal land 4,718 acres of lynx habitat in the Mt. Evans LAU would be affected, and 1,887 acres would be converted to unsuitable after implementation (USFWS 2006). The habitat model has been updated since the Harris Park consultation, but not all treatments covered by that consultation have been implemented. Using the 2007 habitat model, we estimate that 1,192 acres of lynx habitat have been treated on federal land since 2005 and another 1,161 acres of treatment are reasonably foreseeable, but not all of these acres have been or will be converted to unsuitable habitat. Some treatments have also occurred on non-federal land within the LAU, but the sum of those acres is not available.

Limited suitable lynx habitat occurs in the project area (Table 3-15). Small adjustments were made to the habitat map following the April 26, 2011 site visit with PSICC and USFWS personnel, and 51 acres were determined to be non-habitat for lynx. Using the site visit evaluation and the predicted condition after full implementation of the Harris Park project, Table 3-15 displays estimates of the existing conditions of lynx habitat in the Mt. Evans LAU and the current best estimate of lynx habitat. In total, the project area includes 455 acres of potentially suitable lynx habitat. The project area is not within an established habitat linkage.

Wildland Urban Interface (WUI) conditions exist in suitable lynx habitat within the Payne Gulch recreational residence group. It is notable that the current forest conditions immediately surrounding each of these residences does not provide high-quality habitat because much of the understory has been cleared or suppressed to accommodate human activity (for example, driveways, parking areas, picnic tables, or other leisure spaces). The coarse-scale habitat model does not identify these fine-scale characteristics that have existed since the residences were constructed between 1928 and 1957. Other recreation residence groups (Happy Top and Roark Gulch) do not occur in suitable lynx habitat.

Table 3-15 Current Estimate of Lynx Habitat

Habitat Type	Mt. Evans LAU[1] (acres)	HP estimate[2] (acres)	Percent of LAU[3]	Analysis Area[4] (acres)
Denning	16,563	16,893	19%	100
Winter foraging	27,853	26,518	32%	110
Other	41,091	39,470	48%	245
Suitable[5]	85,507	82,881	99%	455
Unsuitable	797	2,418	1%	0
Total lynx habitat	86,304	85,296	100%	455
Non-habitat	75,839	76,841	-	1,197
Total area	162,144	162,137	-	1,652

[1] The Mt. Evans LAU estimate is based on the 2007 habitat model and was used for analysis of this project.
[2] Harris Park post-treatment estimates are provided only for reference to previous consultations regarding the Mt. Evans LAU and were based on the 2004 habitat model.
[3] Current Mt. Evans LAU estimate.
[4] Based on the 2007 habitat model.
[5] Sum of denning, winter foraging, and other habitat types

Analysis of Effects

Under Alternative 1, lynx habitat would not be altered from current conditions and human activity levels would not change. There would be no direct, indirect, or cumulative effects on lynx.

Direct effects of implementing Alternative 2 would be a temporary increase in human activity levels while forest-thinning work was conducted. Potential disruptions include presence and noise of humans and machinery in the thinning units, and increased traffic on existing roads. Individual lynx may choose to avoid the area during this period. Direct human-lynx encounters are not expected, but in that unlikely event the interaction effects would be insignificantly minor. No individuals are expected to be harmed or killed. Disturbance levels would return to existing conditions when the work concludes, as there would be no long-term changes in human activity.

Indirect effects of implementing Alternative 2 include changes to vegetation within the WUI. Up to 52 acres of suitable lynx habitat could be treated to achieve defensible space in the Payne Gulch summer home group, which could include machine or hand thinning within 200 feet around each recreation residence. Stands identified as suitable for lynx or snowshoe hares would not receive thinning or prescribed fire treatments outside of the 200-foot zone around recreation residences. This treatment conforms to exception 1 of Standards VEG-S5 and VEG-S6 in the SRLA. None of the treatments would convert suitable habitat to unsuitable, and the proportion of habitats in the Mt. Evans LAU would remain the same (Table 3-16). Up to 21 acres of winter foraging and denning habitat could be converted to other lynx habitat. Given the current level of human occupancy and associated effects, implementing defensible space treatments would not create a drastic change in habitat suitability for lynx or snowshoe hare. There would be no effect to critical habitat because none occurs in or near the project area.

Cumulatively, actions proposed under Alternative 2 would contribute insignificantly to other federal and non-federal actions in the Mt. Evans LAU and across the PSICC. The degree and extent of direct and indirect effects would be relatively minor and future federal and non-federal actions in and near the project area are expected to be consistent with past actions.

Table 3-16 Lynx Habitat Change, Mt. Evans LAU

Habitat Type	Treated (acres)	Net Change (acres)	Post-treatment Habitat (acres)	Updated Habitat Distribution
Denning	1	-1	16,562	19%
Winter Foraging	28	-20	27,833	32%
Other	23	+21	41,112	48%
Suitable[1]	52	0	85,507	99%
Unsuitable	0	0	797	1%
Total Lynx Habitat	52[2]	0	86,304	86,304
Non-habitat	1,055[2]	0	75,839	75,839

[1] sum of denning, winter foraging, and other habitat types

[2] The coarse-scale habitat model is based on forest inventory stands and does not capture fine-scale characteristics such as cabins, driveways, and parking areas that may be considered non-habitat.

Determination

If Alternative 1 were implemented, there would be ***no effect*** on Canada lynx because current conditions would remain unchanged.

If Alternative 2 were implemented, ***the proposed action may affect, but would not likely adversely affect the Canada lynx***. This determination is based on the discountable chance that lynx would be disturbed by project activities and the insignificant changes to potentially suitable lynx habitat in the LAU. There would be no effect to critical habitat because none occurs in or near the project area.

Inter-agency Southern Rockies Lynx Project Decision Screens: Because the proposed project involves other listed species besides lynx, this BA will be sent to the USFWS for concurrence. However, we note that the effects determination is consistent with one of the pre-screened activities on Pre-screen 2, "Other Programs/Activities: Fuels reduction treatments within 200 feet of structures – NLAA". The use of exceptions will be submitted per the annual reporting requirements.

3.6.1.2 *Mexican Spotted Owl*

Mexican spotted owls (MSO) are residents of old growth or mature forests that possess complex structural components (for example, uneven aged stands, high canopy closure, multi-storied levels, high tree density). Canyons with riparian or conifer communities are also important components. Rock walls with caves, ledges, and other areas provide protected nest and roost sites. Owls are usually found in areas with some type of water source (for example, perennial stream, creeks, and springs, ephemeral water, small pools from runoff), which create humid conditions. Roosting and nesting habitats exhibit certain identifiable features, including large trees, high basal area, uneven-aged stands, multi-storied canopy, moderate to high canopy closure, and decadence in the form of downed logs and snags. Owl foraging habitat includes a wide variety of forest conditions, canyon bottoms, cliff faces, tops of canyon rims, and riparian areas. Juvenile owls disperse into a variety of habitats ranging from high-elevation forests to pinyon-juniper woodlands and riparian areas surrounded by desert grasslands (USFWS 2012b).

Marginally suitable mixed-conifer habitat occurs in the project area. No occupancy surveys have been conducted, but this analysis assumes owls may be present during spring and summer months in the project area. No critical habitat for the MSO occurs in or near the project area.

Actions that open up or remove mature or old growth forests (for example, logging, wildfire, or road or site construction that causes fragmentation of the forest) are detrimental to the local owl population. Human activity (for example, hiking, shooting, off-road vehicle activity) in or near nesting, roosting, or foraging sites may cause abandonment of an area, and indirectly may affect habitat parameters from trampling, vegetation removal, or increased fire risk (USFWS 2012b).

The revised MSO Recovery Plan (USFWS 2012c) describes two MSO management categories: protected activity centers (PACs, with core areas) and recovery habitats. On the PSICC, protected activity centers (PACs) were established at current and historic sites where owls were known or suspected to breed. No PACs occur in or near the project area.

Using Rocky Mountain Region spatial vegetation and topography data, a very conservative model of forested stands was created that meets the general description of restricted and protected owl habitat, two categories of habitat that were established by the original MSO Recovery Plan (USFWS 1995). A subset of restricted stands was identified to be managed for nesting and roosting target conditions. These habitat types have been combined in the revised recovery plan (USFWS 2012c), but the PSICC has not yet updated its habitat maps.

Some stands identified by the model may not actually be capable of providing habitat for owls (for example, because of poor growing conditions that are not capable of supporting trees of adequate size or density). Therefore, stands must be field-verified to determine if they might have the capacity to provide suitable owl habitat. Across the PSICC, more than 320,000 acres of forested stands are modeled as target or restricted habitat for the MSO. There are 324 acres of restricted habitat identified in the project area, consisting of xeric mixed conifer (ponderosa pine and Douglas-fir), aspen, or tree-dominated riparian cover types. Field verification confirmed that these areas could provide foraging or dispersal habitat, but are unlikely to serve as suitable roosting or nesting habitat. The project area lacks the cliff, canyon, or rock outcrop features that typify owl habitat on the PSICC, and owls are unlikely to occupy the area. A few stands of protected habitat occur, but these would be avoided by any proposed treatments.

Analysis of Effects

Under Alternative 1, no MSO habitat would be altered from current conditions and human activity levels would not change. There would be no direct, indirect, or cumulative effects on the MSO.

Direct effects of implementing Alternative 2 would be a temporary increase in human activity while forest thinning was conducted. Potential disruptions include presence and noise of humans and machinery in the thinning units, and increased traffic on existing roads. Mexican spotted owls are exceedingly rare on the district, but there is a discountable chance that they may occur in or near the project area. In that unlikely event, individual owls may choose to avoid the area during the period of project work. Direct human-owl encounters are not expected. No individuals are expected to be harmed or killed by thinning and associated activities. Disturbance levels would return to existing conditions when the work concludes, resulting in no long-term changes in human activity.

Indirect effects of implementing Alternative 2 include some changes to vegetation. Tree density and canopy cover would be slightly reduced by mechanical treatments on up to 220 acres of restricted owl habitat. Douglas-fir would occur in smaller proportions in the treated stands, reducing the mixed-conifer component of those stands. Protected habitat stands would remain unchanged. The proposed changes would not drastically alter habitat suitability in the project area, since current conditions are relatively marginal for the owl. Improved forest health and reduced risk of large-scale, high intensity wildfire would be beneficial to the owl by reducing the risk of loss of suitable habitat to insects, disease, or wildfire.

Cumulatively, actions proposed under Alternative 2 would contribute insignificantly to other federal and non-federal actions across the PSICC. The degree and extent of direct and indirect effects would be relatively minor. Future federal and non-federal actions in and near the project area are expected to be consistent with past actions.

Determination

If Alternative 1 were implemented, there would be ***no effect*** on Mexican spotted owls because current conditions would remain unchanged.

If Alternative 2 were implemented, ***the proposed action may affect, but would not likely adversely affect the Mexican spotted owl***. This determination is based on the discountable chance that owls would be disturbed by project activities and the insignificant changes to potentially suitable owl habitat. There would be no effect to critical habitat because none occurs in or near the project area.

3.6.2 Sensitive Species

Table 6 in the BA/BE lists each species that may be present in or affected by activities in Park County and provides a brief description of their habitat and range in Colorado. Table 6 also documents the rationale for excluding those species for which no further analysis is needed because they are not known or suspected to occur, and for which no suitable habitat is present. Analysis in the BA/BE indicates that 12 Forest Service Sensitive species or their habitats may be present or may be affected by the proposed project. The relevant natural history of these species, see Wrigley et al. (2012).These species include:

- Northern leopard frog (*Lithobates pipiens*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Flammulated owl (*Otus flammeolus*)
- Lewis' woodpecker (*Melanerpes lewis*)
- Loggerhead shrike (*Lanius ludovicianus*)
- Northern goshawk (*Accipiter gentilis*)
- Olive-sided flycatcher (*Contopus cooperi*)
- American marten (*Martes americana*)
- Fringed myotis (*Myotis thysanodes*)
- Hoary bat (*Lasiurus cinereus*)
- North American wolverine (*Gulo gulo luscus*)
- Townsend's big-eared bat (*Corynorhinus townsendii*)

A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine whether field reconnaissance is needed to complete the analysis. Sources of information included Forest Service records and files, the Colorado Natural Heritage Program database, CPW information, and published research.

Occupancy surveys were conducted in the project area for nesting northern goshawks in 2011 and 2012. Surveyors elicited one territorial response from an adult female in 2011, and one unidentified accipiter fly-by, but follow up searches in 2011 and 2012 did not reveal any goshawk nests. No other species survey efforts were undertaken; all 12 species are assumed to occur.

Northern leopard frogs could occur in the riparian and upland areas in Payne Gulch, although it is somewhat unlikely because the potentially suitable riparian habitat is of marginal quality. Bald eagles are known to use the area around Bailey and the North Fork of the South Platte River during the winter, and could roost in the large trees in the project area. The flammulated owl, Lewis' woodpecker, loggerhead

shrike, northern goshawk, and olive-sided flycatcher are likely to migrate through or breed during spring and summer in forested stands and forest edges. It is possible to highly likely that the fringed myotis, hoary bat, and Townsend's big-eared bat use the area for foraging, if not reproduction; bats would not be present in the winter. Martens could forage and possibly breed in mixed conifer or lodgepole stands. Wolverines are unlikely to reside in the area because it is not very remote and has unreliable snowpack, but they may disperse through the area. A tagged individual, male M56, has been sighted near Kenosha Pass since 2009 (Odell 2013). Kenosha Pass is less than 20 miles to the west and given the wolverine's impressive capacity for long-distance travel, it is entirely possible this or other individuals could disperse through the area.

3.6.2.1 *Analysis of Effects*

Alternative 1

Under Alternative 1, no sensitive species habitats would be altered from current conditions and human activity levels would not change. There would be no direct, indirect, or cumulative effects on any sensitive species.

Alternative 2

During project implementation, disturbance levels would temporarily increase but then return to existing conditions at the project conclusion, because there would be no long-term changes in human activity.

Northern leopard frog: Much of the proposed work would occur during winter when frogs are hibernating, so they would not be disturbed. The defensible space treatments may occur in summer, and some of the restoration and light thinning/pruning may occur in spring when adults are breeding. No activities would occur in riparian vegetation, so eggs, tadpoles, and metamorphs would not be affected. Adults in the upland vegetation could be disturbed or killed by humans or machinery. However, water sources are ephemeral and habitat quality is marginal, so the possibility of northern leopard frogs occurring is very low and adverse interactions are unlikely. Changes to vegetation would not alter long-term habitat suitability because riparian and wetland vegetation would not be affected.

Bald eagle: Activities conducted during winter could disturb roosting bald eagles and individuals may choose to avoid the project area temporarily. This alternative would generally not remove dominant overstory trees, so suitable roosting trees would remain available after project work was completed. No individuals would be harmed or killed by the proposed activities. Changes to vegetation would not alter long-term habitat suitability.

Flammulated owl: Activities conducted during spring and summer could disturb migrating or breeding birds. Unknown nest sites could be disturbed or destroyed, but contracts would contain language requiring workers to suspend operations and contact the District Biologist should they discover any potentially active nest site. Changes to vegetation would not alter long-term habitat suitability.

Lewis' woodpecker: Activities conducted during spring and summer could disturb migrating or breeding birds. Unknown nest sites could be disturbed or destroyed, but contracts would contain language requiring workers to suspend operations and contact the District Biologist should they discover any potentially active nest site. Changes to vegetation would not alter long-term habitat suitability.

Loggerhead shrike: Occurrence of this species is unlikely, but not impossible. Activities conducted during spring and summer could disturb migrating or breeding birds. Unknown nest sites could be disturbed or destroyed, but contracts would contain language requiring workers to suspend operations and contact the District Biologist should they discover any potentially active nest site. Changes to vegetation would not alter long-term habitat suitability.

Northern goshawk: Activities conducted during spring and summer could disturb migrating or breeding birds. Unknown nest sites could be disturbed or destroyed, but contracts would contain language requiring workers to suspend operations and contact the District Biologist should they discover any potentially active nest site. Changes to vegetation would not alter long-term habitat suitability.

Olive-sided flycatcher: Activities conducted during spring and summer could disturb migrating or breeding birds. Unknown nest sites could be disturbed or destroyed, but contracts would contain language requiring workers to suspend operations and contact the District Biologist should they discover any potentially active nest site. Changes to vegetation would not alter long-term habitat suitability.

American marten: Marten habitat generally coincides with that of Canada lynx (mixed conifer or lodgepole with high canopy cover). Most of these stands would be avoided by treatment operations. The only exception would be defensible space treatments near the recreation residences, where up to 52 acres of these habitats could be affected. Martens may use the areas around structures, but are unlikely to den in these areas because of regular human activity, so treatments would not affect denning sites. Martens primarily hunt at night, so foraging behavior would not be affected by daytime project activities. The amount of suitable marten habitat that would be treated would be minimal, and there is only a remote chance that individual martens would be present during project activities.

Fringed myotis: Occurrence of this species is unlikely, but not impossible. Activities conducted during spring and summer could disturb bats roosting in tree cavities or snags. Unknown roost sites could be disturbed or destroyed, but snags would not be removed unless they were a hazard to project workers, so the chances of snag roost destruction would be minimal. Nighttime foraging behavior would not be affected by daytime project activities. Changes to vegetation would not alter long-term habitat suitability.

Hoary bat: Activities conducted during spring and summer could disturb these tree-roosting bats. Individuals are unlikely to be killed because they can quickly move away from disturbances and are not absolutely tied to a specific roosting location. Nighttime foraging behavior would not be affected by daytime project activities. Although hoary bats depend on trees for roosting, they are very plastic in their tree roost requirements. Changes to vegetation would not alter long-term habitat suitability.

North American wolverine: The proposed action would not alter the level of habitat suitability for wolverine. Should an individual be present, it may choose to avoid traveling through the area while activities are in progress. However, the one wolverine known to be present in Colorado at this time has visited the South Platte Ranger District only on very rare occasions, and is unlikely to visit the project area during implementation. The chances of that individual or any other wolverine visiting the project area are very remote.

Townsend's big-eared bat: Occurrence of this species is unlikely, but not impossible. No caves or mines suitable for roosting are known and Townsend's are not known to use nearby buildings, so roosts would not be affected. Nighttime foraging behavior would not be affected by daytime project activities. Alternative 2 would not alter the level of habitat suitability.

Cumulatively, actions proposed under Alternative 2 would contribute insignificantly to other federal and non-federal actions across the PSICC. The degree and extent of direct and indirect effects would be relatively minor and future federal and non-federal actions are expected to be consistent with past actions.

3.6.2.2 *Determinations*

*For the North American wolverine and Townsend's big-eared bat, the proposed action would have **no impact** on either species*. This determination is based on the expected lack of human-wildlife encounters and no change in habitat suitability for either species.

For the northern leopard frog, bald eagle, flammulated owl, Lewis' woodpecker, loggerhead shrike, northern goshawk, olive-sided flycatcher, American marten, fringed myotis bat, and hoary bat, the proposed action ***may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing***. This determination is based on the temporary disturbance factors and maintenance of long-term habitat suitability. Furthermore, human-wildlife encounters are expected to be rare and minor.

3.6.3 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, Alternative 2 would meet all applicable SRLA direction and would follow direction in the MSO Recovery Plan. Effects to sensitive species would comply with the requirements of FSM 2670.

3.7 Access

This section describes current access and potential changes to access from the proposed alternatives.

3.7.1 Existing Access

A limited number of roads access the project area (Figure 2-1). The primary highway from population centers is U.S. Highway 285, which is a main corridor that connects the Denver metropolitan area to portions of the high country and the South Park area. Highway 285 is a paved, two-lane road that has been widened to four lanes east of the project area to allow better traffic flow for the increasing residential population.

Primary access from Highway 285 is provided by PCR 64 to the west side of the project area and PCR 68 to the east side. These roads provide public access to private property and NFS lands and are maintained for winter use. The total length of county roads is about three miles.

NFSR 111 provides access up Payne Gulch from PCR 64, ending close to the Lost Creek Wilderness boundary. NFSR 110 provides access from PCR 64 east into the Happy Top area. A trace of this road continues east to connect with PCR 68, but is not maintained. Both of these roads are open to motorized use for administrative purposes and for recreation residence permittees, but not to the public. Several other short NFSRs provide access to specific destinations, for example to the Payne Gulch trailhead. The total length of NFSRs is about 3.5 miles, although only about 0.25 miles is open to motorized public use.

Several existing, non-system routes (for example in the Happy Top recreation residence group) provide access to small portions of the project area. Most are used legally by recreation residence permittees to access their cabins. A few of the routes have developed illegally from OHV use. There is no legal motorized public use on these routes. The total length of these routes is about four miles.

Two non-motorized trails (Payne Gulch and Brookside-McCurdy) totaling about 2.3 miles provide access to the Lost Creek Wilderness.

Traffic volume for roads in the project area is not available, though it is generally light except on PCR 68, which provides access to a number of residences and NFS lands to the east. Forest Plan standards specify that an open local road density of 4.0 miles per square mile should not be exceeded for MA 2B. The existing road density (entirely within MA 2B) is 2.5 miles per square mile.

3.7.2 Analysis of Effects

This section discusses the anticipated direct, indirect, and cumulative effects of implementing each of the alternatives on access, and compares and contrasts these effects between alternatives.

3.7.2.1 *Alternative 1 – No Action*

Alternative 1 would not affect existing access. The various roads and trails would continue to provide the current level of access. No temporary roads would be constructed or obliterated. Existing non-system routes that have developed from illegal vehicle use may be obliterated, but that action would occur independently of the proposed project. Existing traffic levels would not change in the short-term, but may increase over time as residential development occurs and recreational use increases. This alternative would not contribute to cumulative effects to access.

3.7.2.2 *Alternative 2 – Proposed Action*

Project-related traffic would include trucks hauling equipment and personnel to treatment units and wood products out of treatment units. Treatment units on the west side of the project area would generally be accessed directly off PCR 64, while those on the east side would be accessed off PCR 68. NFSR 110 provides access from PCR 64 east into the Happy Top area and would be used for project traffic in the central part of the project area. NFSR 111 would not be used by project traffic. Traffic control devices, including any regulatory, warning, destination, and information signs, would be installed where needed for the safe and orderly operation of roads. Projections for increased traffic from project activities were not developed because of substantial uncertainty about the extent and timing of implementation of the treatments.

NFSRs used for the project would be maintained as needed to accommodate safety or environmental considerations. No new NFSRs would be constructed nor would any existing NFSRs be decommissioned. Minor reconstruction of NFSRs may be necessary to access some areas. Reconstruction would generally have a positive effect on other resources by fixing problem areas that are currently causing resource damage. The project would not change administrative, permitted, or legal public access from the current situation.

Trails would not be used for equipment access. Trail crossings may be needed to access some treatment units. Trail crossings would be restored to their pre-treatment conditions once operations are complete. Trails may be temporarily closed to public access during treatment to protect public safety, but would be re-opened once operations are complete.

Up to four miles of new temporary roads would be constructed and then closed and obliterated once the project is complete. Obliteration of temporary roads may include ripping, seeding, mulching, or other activities as needed to minimize the risk of soil erosion. Temporary roads would be thoroughly obliterated using physical barriers as needed to prevent future use by motorized vehicles, including OHVs. Closed temporary roads would be monitored to ensure compliance with closures.

There would be no long-term change in road density of MA 2B because only temporary roads would be constructed. The road density for MA 2B would temporarily increase from 2.5 miles per square mile to 4.1 miles per square mile if all temporary roads were constructed and open at the same time. However, once the project is complete, road density would decrease back to the current 2.5 miles per square mile.

3.7.3 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including

the PSICC Forest Plan. Specifically, existing access would be retained. Post-treatment road density would comply with Forest Plan standard 6270, which requires motorized trail and local road density to be less than four miles per square mile in MA 2B.

3.8 Visual Resources

This section describes the current condition for visual resources and describes potential changes from the proposed alternatives.

3.8.1 Current Conditions

The project area is managed with the VQO of partial retention (Forest Plan III-117). The project area is composed of high-quality scenery that provides a setting for a wide variety of outdoor activities, and provides a scenic setting for nearby residential areas. The project area can be seen from travel routes, residential areas, recreational sites, and dispersed use areas, including U.S. Highway 285, PCR 64, PCR 68, and communities and subdivisions.

Timber harvest operations in the 19th and early 20th centuries and subsequent fire suppression policies since the 1920s have created a dense forest with trees of similar ages and sizes. When viewed from a distance, the area presents a uniformly forested terrain with interspersed openings. When viewed in the middle ground, the landscape appears more stippled with light and dark patches created by variety in vegetation, natural openings, hills, canyons, stream channels, and rock outcroppings. Closer views reveal specific forest vegetation with trees, grassy openings, and rocks creating a mosaic of texture, size, and color.

Existing disturbances include past vegetation management units, recreational facilities, recreation residences, PCRs, NFSRs, and trails. Public use of the area includes access to recreation residences, hunting, hiking, bicycling, and sightseeing. Recreational use is enhanced by the scenic quality of the area. Concern for scenic quality is high for both recreationists and local residents.

The project area has a high level of sensitivity to modification of the landscape, indicating a high number of users with concerns for scenic qualities. The most sensitive viewing areas are residential areas, recreation residences, roads, and trails. Most residences are located outside of NFS lands in several subdivisions and communities to the north and east. The project area is visible primarily in the foreground distance zone (0.0 to 0.5 mile) because topography and the dense forest canopy limit viewing distances.

3.8.2 Analysis of Effects

This section describes the anticipated direct, indirect, and cumulative effects of implementing each of the alternatives on visual quality, and compares and contrasts these effects between alternatives.

3.8.2.1 *Alternative 1 – No Action*

Existing conditions would be maintained in the short term, but may deteriorate in the long term. Current visual quality, which is a function of the cumulative effects of past and present management activities, would be maintained, and VQOs would continue to be met. However, forest health would not be improved and there would be an increased risk of a large-scale wildfire. Visual quality may be reduced with the deteriorating condition of the vegetation and would be substantially reduced if a large-scale wildfire were to occur. The VQOs may not be met in the long term.

3.8.2.2 *Alternative 2 – Proposed Action*

Alternative 2 may affect the visual landscape by altering forest canopy structure and increasing contrast between treated and non-treated areas. Vegetation treatments that increase ecological diversity usually enhance scenic quality as long as the treatments imitate natural growth patterns and shapes in the surrounding landscape. Mechanical treatments would directly affect visual resources in the short term as equipment is used and an accumulation of downed trees and slash is created. The visual effect of both equipment use and slash would be temporary. Once the debris is disposed of, treatment areas would appear natural to the casual observer, although some individuals may find them to appear managed. Treatment units that have been thinned are characterized by a more open and park-like setting, having a long-term, direct beneficial effect on the visual landscape (Ryan 2005).

Prescribed fire treatments would generally occur after mechanical treatments are completed. Burning of slash piles would create direct, temporary visual effects to foreground views. Broadcast burning can create changes to the overall color and texture of the treatment area. These effects would vary in duration depending on the length of time before vegetation becomes re-established. This treatment activity would occur primarily in areas that are in middle to background views. Smoke from both pile and broadcast burning would have a short-term effect on both recreationists and residents. Effects of smoke would only last for the time of burning. The treated areas would harmonize with the natural landscape after vegetation is re-established. Over the long term, forest health would be improved, benefiting visual resources.

In general, temporary roads would be screened from sensitive viewing areas by intervening vegetation. However, these roads would degrade visual quality in the short-term in some areas, especially where visible from public travel routes. The effect of these roads would be temporary with the duration of the effects depending on the length of time for vegetation to become re-established to a level that minimizes the linear band created by contrast between the disturbed areas and surrounding vegetation. No long-term visual effects from temporary roads are anticipated.

Once the short-term direct effects of the project are no longer visible, there would be no effect to scenic integrity at the background and middle ground levels because the existing pattern of forest and openings would not be noticeably altered. At the foreground viewing level, the more open, park-like forested stands would be more visually pleasing (Ryan 2005). Cumulatively, the preservation and enhancement of existing scenic integrity, combined with the reduced risk of large-scale wildfire and its accompanying drastic reduction in scenic beauty, would serve to maintain visual quality.

3.8.3 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, the VQO of partial retention would be met in accordance with Forest Plan standards 6259, 6135 (MA 9A), and 6223 (MA 2B) because the proposed activities may be evident, but would be visually subordinate to the characteristic landscape, and not recognizable as an unnatural occurrence.

3.9 Cultural Resources

This section discusses current condition and potential changes from the proposed alternatives for cultural resources.

3.9.1 Current Conditions

To meet its responsibilities under Section 106 of the National Historic Preservation Act (NHPA), the USFS completed intensive Class III archaeological surveys for the proposed project. Site forms and NRHP eligibility evaluations for all previously and newly recorded cultural resources in the project's area of potential effect (APE) were forwarded to the Colorado (State Historic Preservation Officer / Office of Archeology and Historic Preservation (SHPO/OAHP) for review and concurrence. The project area contains both historic and prehistoric properties, although the latter at a much lower frequency than the former. A total of 72 cultural sites and 13 isolated finds are documented in the APE.

Prehistoric properties are sites with materials and items common to the American Indian cultures of Colorado. The use of these sites usually pre-dates 1860 and could even be several thousand years earlier. One prehistoric site and four prehistoric isolated finds are known. The low amount of prehistoric surface items and features suggests short duration and transitory use of the area by American Indian groups. No traditional practices areas are known to occur.

The prehistoric isolated finds consist of lithic material such as chert and agate flakes, a jasper biface fragment, and a petrified wood spear point fragment. The only prehistoric find recorded as a site consists of a culturally modified/scarred tree. American Indian groups harvested the cambium layer of ponderosa pine (and possibly other conifers) by removing a strip of bark from these trees for use as food, medicine, or for ceremonial purposes. Although the identified tree has not been dated, similar trees in other locations on the PSICC have had their peeling scars dated to the early 19th century (1820 to 1860). This site was determined officially eligible to the NRHP because of its potential to assist with our understanding of prehistoric occupation of the area and should be protected from project effects.

Historic properties are sites with materials and items common to European immigrant cultures of the Western Frontier, which generally date after 1860 on the PSICC. The field investigation identified 71 historic sites and nine historic isolated finds (IFs). The nine historic IFs represent isolated artifacts and exploratory or short duration mining ventures represented by isolated adits, shafts, or prospect pits.

The historic sites include road segments such as PCR 64, South Platte Stage Road, and other unnamed historic travel ways. They also include two historic water management features, the Glen Isle Water line and reservoir and an unnamed ditch and reservoir. The most numerous historic properties are associated with the recreation movement of the early to mid-1900s. These include one historic recreation camp known as the Historic Neighborhood House Camp and three summer home groups, Payne Gulch Summer Home Group, Roark Gulch Summer Home Group, and Happy Top Summer Home Group, which together encompass 54 individual sites. The project area also contains three former habitation sites that are likely associated with the aforementioned summer home groups and trash dumps or scatters that appear to date to the early to mid-1900s.

The construction of summer home groups began with congressional passage in 1915 of the Term Occupancy Act to allow private development of recreation residences and commercial recreation facilities on NFS lands. Following the passage of the Act, many National Forests identified suitable locations for recreational development, established recreation residence tracts, and divided the tracts into individual lots for the purposes of planned recreation development. By the 1950s, the emphasis on establishing new recreation residences began to decline, although public demand for outdoor recreation opportunities such as camping and hiking grew. The development of new recreation residence tracts ended in 1968 and by 1976 new lots could no longer be developed within existing tracts. The recreation residences in the Happy Top group date from 1952 to 1997, while the Roark Gulch residences date from 1933 to 1956 and the Payne Gulch residences date from 1928 to 1957.

Based on the NRHP criteria of eligibility, none of the IFs is eligible for nomination / inclusion to the NRHP. With the exception of the recreation residences, all historic sites have been determined officially not eligible to the NRHP. Only one recreation residence has been determined officially not eligible. All the other recreation residences were determined either officially eligible or "need data" by the Colorado SHPO/OAHP. Therefore, with the exception of the one residence determined officially not eligible, the recreation residences in all three groups should be treated as eligible to the NRHP and protected from project effects.

3.9.2 Analysis of Effects

This section describes the anticipated direct, indirect, and cumulative effects of implementing each of the alternatives on cultural resources, and compares and contrasts these effects between alternatives.

3.9.2.1 *Alternative 1 – No Action*

No direct effects to cultural resource properties or sites of American Indian traditional use would occur under this alternative. Cultural resources would continue to be in jeopardy of damage or loss caused by wildfire. An indirect effect would be the continued build-up of fuel within and around site boundaries over time, increasing the likelihood of high-severity wildfire. A wildfire could damage or destroy fire-susceptible or combustible materials found in archaeological sites and historic buildings. In addition, sites would be under slightly greater threat of damage from fire suppression equipment and tactics. Other indirect effects of such a fire could include erosion of archaeological deposits on slopes destabilized by the loss of vegetation. Because some of the eligible cultural resources are fire-susceptible, for example the numerous historic summer home group cabins, fire poses the most substantial threat to these resources. Any damage or loss of cultural resources would be permanent and irreparable because they are non-renewable.

3.9.2.2 *Alternative 2 – Proposed Action*

Alternative 2 has the potential to affect cultural properties directly through damage or destruction caused by proposed activities; however, specific site protection and management requirements were developed in consultation with the Colorado SHPO/OAHP to ensure the protection of eligible cultural resource property values at risk. These protection and management requirements (section 2.2.2.2) have been effective on past projects in preventing adverse effects to cultural resources and would continue to be used to avoid effects for current and future activities. All treatment areas have been surveyed for the presence of cultural resources using intensive Class III survey methods. The potential to encounter or disturb unknown cultural resources is low. With the mitigation measures in place, no adverse effects to eligible cultural resource properties are anticipated. Direct effects to eligible properties would include non-significant changes to the setting caused by the vegetation treatments. An indirect effect would be a reduction in the risk of a high severity wildfire. Although the risk of such a fire would not be eliminated, it would be lessened by the reduction in fuel load. Reduced fuels would make the cultural properties less vulnerable to damage or destruction by intense wildfires and associated fire suppression tactics. Fires that burn at a lower intensity are also less likely to create the type of erosion that could damage or displace archaeological deposits. Some damage or destruction of cultural resources deemed officially ineligible to the NRHP could be caused by the proposed activities; these effects would be considered non-significant.

3.9.3 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, the USFS has met its responsibilities under section 106 of the NHPA, including completion of consultation with the Colorado SHPO/OAHP.

3.10 Economics

This section discusses current condition and potential changes from the proposed alternatives for economics and related topics.

3.10.1 Local and Regional Economy

Unincorporated communities and residential subdivisions near the project area include Bailey and Shawnee as well as other interspersed residential areas. These communities form the wildland/urban interface along the project boundary, and are most likely to be affected by the project. Changes in flexible work place, transportation, and communications have allowed people to continue working for city-based companies while living in rural or mountain communities. Many full-time residents commute to jobs outside of the immediate area. Other residents depend on tourism-based and resource-related activities for their economic livelihood.

3.10.2 Population

Population growth in Park County has been high for the last two decades (Table 3-17). The high growth rate has occurred despite the large proportion of public land in the area, primarily because residences in the area are located near U.S. Highway 285 and within a 30- to 40-mile commute to jobs on the Front Range of Colorado. It is anticipated that this area will continue to grow at a higher rate than the average in Colorado for the foreseeable future (Table 3-17). It is likely that the communities in the county will continue to draw new residents. The growth trend for the area may be slower in future decades than it was between 1990 and 2000 because of the limited availability of land to develop for residential uses as well as reduced economic vitality. Population growth has many implications related to fire hazard and the need for fuel management. With more people comes greater hazard of human-caused wildfire. Increased population also tends to increase property values and development, which increases potential losses from wildfire.

Table 3-17 Population Growth

Area	Population				Growth Rate (percent)		
	1990	2000	2010	2020	1990-2000	2000-2010	2010-2020
Colorado	3,294,473	4,301,261	5,029,196	5,915,922	31	17	18
Park County	7,174	14,523	16,206	22,380	102	12	38

Data from 1990 to 2010 are from US Census Bureau (2012). Projections for 2020 are from the Colorado Department of Local Affairs (2012).

3.10.3 Employment and Income

About 64 percent of workers who live in Park County commute to jobs outside the county, compared with an average of 33 percent for the state of Colorado (Colorado Department of Local Affairs [DOLA] 2012). Jobs in Park County are dominated by government employment. The majority of government employees are local government, primarily county workers. For other job sectors, natural resources and tourism are more important in the local economy relative to the state economy. The agriculture sector has a greater share of the local economy than it does for the state, illustrating the importance of rural, resource-based jobs. The accommodation and food sector is also of relatively greater importance, as is typical of economies that depend on tourism and recreation. Wildfires in 2002 and 2012 had a role in reduced tourist visits to Colorado, as media coverage of wildfire incidents was extensive in the national press.

3.10.4 Housing

Table 3-18 summarizes 2011 property values and estimated taxes for all types of property in and adjacent to the project area (Park County 2012). Of all property types, residential properties are most at risk for damage from wildfire. Residential properties are most likely to be located next to forested areas and at greater distances from major access roads than other property types. The residential properties shown in Table 3-18 include recreational residences in the project area. Commercial and mixed-use properties are generally located near U.S. Highway 285, and would have a smaller risk of damage from wildfire because fire protection providers would have easier access to these properties. It is likely that many vacant properties would be developed with residential units to accommodate projected population growth in the near future.

Table 3-18 Property Values (2011)

Property Type	Number	Total Value	Estimated 2011 Taxes
Agricultural	15	$1,255,519	$6,248
Commercial	41	$6,310,024	151,558
Exempt	26	$14,536,612	n/a*
Mixed Use	10	$4,101,216	$70,114
Mobile Home	10	$264,171	$1,782
Residential	235	$34,513,875	$186,740
Vacant Land	23	$1,906,288	$35,738
Total	360	$62,887,705	$452,177

* Includes properties exempt from property taxes such as local, state, and federal governments, public utilities, and others.

3.10.5 Community Infrastructure

The PSICC shares wildfire suppression resources with other federal government agencies nationwide. Interagency wildfire crews are dispatched where they are needed. Contractors are also employed for wildfire suppression activities. Fire protection is provided by the PSICC and the Platte Canyon Fire Protection District. The services provided by the fire district include fire suppression, medical emergency services, rescue and extrication, hazardous materials response, and service calls. There is a broad range of hospitals, clinics, and other medical services within a one to two hour driving distance in Front Range urban communities.

3.10.6 Analysis of Effects

This section discusses the anticipated direct, indirect, and cumulative economic effects of implementing each alternative, and compares and contrasts the alternatives. Current and projected population trends are described above and are expected to continue regardless of which alternative is selected.

3.10.6.1 *Alternative 1 – No Action*

Local and Regional Economy

There is a broad range of possible outcomes on the social and economic resources of Park County from the implementation of this alternative. The analysis focuses of the potential effects of large-scale wildfire. The total cost of the Hayman Fire approached $200 million, which includes $42 million in suppression costs, $24 million in rehabilitation costs to date, the possibility of another $37 million in rehabilitation costs, $39 million in insured property losses, another $5 million in uninsured property losses, $34 million

in timber destruction, and $47 million in other resource losses, the bulk of which is $37 million for losses to the water storage system (Kent et al. 2003). Beyond the immediate costs of a large-scale fire, a long-term reduction in economic vitality can be predicted if a portion of the local population moves away after a fire and recreation and tourism activity is reduced.

Population

Direct effects of wildfire at the wildland-urban interface would likely cause a temporary decrease in the population of communities and subdivisions. The rate of residential development would decrease in the years following a wildfire because the area would be less attractive. This effect would continue until damages to local property owners and businesses are recovered, and the economy can provide the opportunities of the pre-fire economy.

Employment and Income

In the aftermath of the Hayman Fire, there were slight changes in employment, business revenue, and income. However, some indicators increased, while others decreased, with little clear pattern (Kent et al. 2003). The conclusion to be drawn from these data is that the Hayman Fire probably affected the local economy, but not in any clear way. At least some declines in tourism revenue were probably offset by spending associated with suppression and rehabilitation efforts (Kent et al. 2003).

A large-scale wildfire that involves major fire damage to properties would have greater effects to the local economy, and would be felt through all businesses in the local economy for a longer period. The direct effects to the local economy would continue until the scenic landscape has been re-established and property damages have been recovered. Indirect effects include the economic recovery of the area that would take place after the re-establishment and recovery of resources and properties.

Housing

The 2011 Fourmile Fire caused destruction of 168 out of the 474 (35 percent) homes located in the fire perimeter. The value of these losses was estimated by Boulder County at more than $125 million (Graham et al. 2012). The lack of fuel treatments under Alternative 1 would maintain the current risk to private property. There are approximately 235 houses in or adjacent to the project area. Based on the 35 percent destruction of homes in the Fourmile Fire, 76 houses could be destroyed by a large-scale fire in or near the project area. The destruction of 76 homes would cause a $13.8 million loss of residential property value. An estimated $103,000 of residential property tax revenues, based on 2011 property values and mill levies, would not be received. This analysis is based on the 2011 level of development. In the future, the number of homes and the value of properties are likely to increase. In the long term, a large-scale wildfire could cause substantially higher losses than those discussed above.

Community Infrastructure

It is likely that all existing fire protection resources would be involved in any large-scale wildfire suppression effort. Interagency wildfire crews would be dispatched from other areas as needed. Many local firefighters are volunteers, and would incur lost income because they would not be working at their regular jobs for the duration of a wildfire.

Local emergency care and ambulance service is provided by the Platte Canyon Fire Protection District. In the event that a wildfire causes numerous injuries, the district may find it difficult to provide adequate emergency care. There is the potential for injuries and loss of life for firefighters as well as residents and visitors. Health problems could appear or be exacerbated by the inhalation of smoke. Local emergency care would need to be supplemented by additional personnel from nearby agencies.

Cumulative Effects

Implementation of Alternative 1 would not have any measureable cumulative effects on the economy of the analysis area because there would be no changes to the major influencing factors (for example, population or jobs), which are outside the scope of the project. Though unlikely, a large-scale wildfire could influence the local economy. However, lack of fuel reduction in the project area is unlikely to influence in any substantial way the effects of a large-scale wildfire on the local economy.

3.10.6.2 *Alternative 2 – Proposed Action*

Local and Regional Economy

Alternative 2 would include planning, mechanical treatment, prescribed burning, and associated costs. The cost of the treatments in the defensible space around the cabins would be the responsibility of the permittees. Implementing this alternative may not produce a net benefit to the government in terms of cost/benefit ratio. However, intangible benefits to natural resources (for example, lowered risk of wildfire, increased resistance to insects and disease, reduced costs for future firefighting, and reduced potential for adverse effects to watersheds) and public and private property may be more important than the direct monetary cost. The cost would also be justified because the wildfire hazard to the recreation residences would be reduced. Timber production would not be emphasized; however, commercial timber products may be sold to help offset costs. The proposed project may also benefit the local community by providing work in the form of service contracts for project activities and as a source of low-cost fuelwood.

Population

The project would not have noticeable direct or indirect effects on population. The skills and services required for the project would be provided by current USFS personnel and by local contractors or timber merchants. The long-term effect of vegetation treatment activities would be to decrease the potential for large-scale wildfire. This may contribute to the attractiveness of the region as a residential destination, causing continued growth of the local economy and the permanent population.

One possible indirect effect of this alternative would be a perceived loss of privacy for homeowners adjacent to treated areas because the forest structure would be thinned and sight distances increased. However, this would only affect a small number of homeowners immediately adjacent to treated areas. This effect may be offset by the perception that the risk of future wildfire has been reduced, with evidence of this change available for viewing on adjacent forestlands. Because of property losses associated with the recent Fourmile, Waldo, and other fires, it is likely that many residents would prefer the reduced fire hazard, even at the cost of reduced privacy. For example, surveys of residents in a nearby community showed a strong preference for using various types of fire and fuels management tools, as opposed to taking no action at all (Kent et al. 2003).

Employment and Income

Minimal merchantable timber would be produced under Alternative 2. The primary goal for treatment is fuel management, which targets trees that are typically smaller than commercial size. Timber harvest and other service contracting opportunities may be available to local wood products companies and some employment may be supported by thinning, harvesting, and other activities. If contractors from outside the community are selected for the project, a minor economic benefit may be realized by local stores, restaurants, and other businesses; however, this effect is expected to be relatively small compared to the effect of ongoing residential and recreational activities.

Employment and income from tourism activity is important in the local area. Much of this activity is based on recreational opportunities on NFS lands. Treatment activities would temporarily displace some dispersed uses, primarily non-motorized backcountry recreation. There are several nearby substitute sites

for this displaced activity. Treatments would most likely take place during the winter, when recreational use is relatively low. It is not likely that the overall number of persons engaging in these activities would change because of treatment; therefore, there would be no measurable economic effect from the displacement of recreational activities.

Housing

It is anticipated that the workforce to implement the proposed treatments would comprise a combination of current USFS personnel and contractors. Contractors could be local or could come from outside the area. In the event that additional workforce from outside of the region is required for project activities, there would be a relatively small demand for temporary housing that could be accommodated by existing resources. Nearby communities provide a range of temporary and seasonal housing. In addition, outside contractors may use travel trailers during the time they are working on the project.

Treatments proposed for Alternative 2 would reduce the hazard to private property from wildfires. Many existing homes have been built near NFS lands. In addition, timber stands are interspersed among many homes on private lands adjacent to NFS lands. There are approximately 235 houses in or adjacent to the project area. The proposed treatments would substantially reduce the risk to private property (USFS 2002). Based on the reduction in both predicted fire size and intensity, a large-scale fire could destroy 26 residences, which would cause a $4.5 million loss of residential property value. In addition to the loss of the property value, residential property tax revenues would be reduced. An estimated $34,000 of residential property tax revenues, based on 2011 property values and mill levies, would not be received in the event that the properties are destroyed. This means that implementation of Alternative 2 represents a 67 percent reduction in loss of residences and taxes compared with the current condition.

Another housing-related concern is the potential inability of homeowners to secure insurance. There has been increasing discussion in recent years that insurance companies may deny policies to homeowners in fire-prone areas. As yet, there does not appear to be clear indication that this is happening. By reducing potential fire behavior and fire danger on adjacent lands, this alternative may reduce the chance that residents would lose their homeowners insurance.

Community Infrastructure

Existing fire protection resources may need to be improved in response to ongoing residential and commercial development on private lands. The proposed project would not affect this growth. Successful implementation of this alternative would reduce the potential for extreme fire behavior and large-scale wildfire. This would reduce the hazard to local firefighting resources at a time when the demand for protection of homes and other resources is increasing.

Cumulative Effects

Implementation of Alternative 2 is not expected to have any measureable cumulative effects on the economy of the analysis area because there would be no changes to the major influencing factors (for example, population or jobs), which are outside the scope of the project. Though unlikely, a large-scale wildfire could influence the local economy. However, completion of fuel reduction is unlikely to influence in any substantial way the effects of a large-scale wildfire on the local economy.

3.10.7 Financial Efficiency

There would be costs associated with the implementation of Alternative 2 that would not occur under Alternative 1. Net costs for Alternative 2 include planning, mechanical thinning, piling and prescribed burning, and associated costs. Other costs would be realized under both alternatives. These include fire suppression and rehabilitation costs, road and trail reconstruction and maintenance, noxious weed control,

monitoring, reforestation, and stream restoration. This analysis also assumes that there would be losses of private property from a large-scale wildfire. The fire risk analysis has shown that the risk of a large-scale fire (greater than 10,000 acres) is relatively low (12 percent in the next 20 years). Nevertheless, the comparison of the potential effects of such an event between alternatives is important because it directly addresses the purpose and need for the project. Alternative 2 would indirectly reduce the potential loss of private property, while Alternative 1 would not.

Because this analysis includes only costs, the present net value (PNV) is negative. The difference between alternatives, however, is positive. The difference is the net savings realized by applying the treatments. The PNV and net savings of each alternative are summarized in Table 3-19. There would be a net cost of approximately $1.0 million to the USFS from implementing Alternative 2; however, the net savings to city and county governments and private property owners would be substantially higher. A net savings of approximately $8.3 million would be realized under Alternative 2, primarily from reduced risk of loss of private property to wildfire. Counties and municipal water providers would also realize net savings.

Table 3-19 Comparison of Present Net Value and Net Savings

Cost Category	Alternative	
	1 – No Action	2 – Proposed Action
Present Net Value		
All Partners (total)	-$14,236,947	-$5,935,219
County	-$106,820	-$35,138
Municipality	-$70,606	-$23,237
Private Property Owners	-$13,781,563	-$4,533,409
USFS	-$277,958	-$1,343,435
Net Savings		
All Partners (total)	n/a[1]	$8,301,728
County	n/a	$71,682
Municipality	n/a	$47,369
Private Property Owners	n/a	$9,248,154
USFS	n/a	-$1,065,477

[1] n/a = Not applicable

Alternative 2 would have a beneficial effect on non-priced values relevant to the purpose and need of the proposed action. These values include forest health, scenery, riparian protection, watershed improvements, and fuel reductions. Non-priced values cannot be quantified; however, the benefits to non-priced values may exceed the priced values of Alternative 2 because of the importance of recreation and tourism to the local and state economies. The non-priced values relevant to the purpose of and need of this project are summarized in Table 3-20.

Table 3-20 Comparison of Non-Priced Values

Indicator	Alternative	
	1 – No Action	2 – Proposed Action
Restore the forest to more sustainable conditions that are resilient to fire, insects, and diseases.	Tree stands would remain unnaturally dense and vulnerable to large-scale losses from fire, insects, or disease.	Forest conditions would be improved on 1,107 acres, creating a more heterogeneous natural landscape with diverse habitats.
Provide habitats for MIS, special-status species, and other wildlife.	Habitats would be maintained in the short term. Habitat conditions for some MIS and special-status species would be degraded as the forest grows less open and large fires threaten to cause long-term habitat loss. Species that depend on snags and open habitats may benefit from poor forest health or large-scale wildfire.	Creating more open forest conditions would improve habitat for some MIS and special-status species, but cause small-scale habitat loss for others. The hazard of large-scale habitat loss to fire, insects, or disease would be reduced.
Provide recreational experiences.	The current risk of large-scale fire may worsen over time. Such an event could dramatically reduce recreational use.	The risk of large-scale events would be reduced.

3.10.8 Forest Plan and Regulatory Consistency

Alternative 1 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Alternative 2 would be consistent with applicable laws, policies, and regulations, including the PSICC Forest Plan. Specifically, an economic analysis was completed to comply with agency direction found in FSM 1970 and FSH 1909.17.

3.11 Unavoidable Adverse Effects

The effects of implementing the proposed treatments under Alternative 2 would be minimized by the use of mitigation measures and project design standards. However, some adverse effects cannot be avoided. There may be some decrease in long-term soil productivity because of topsoil disturbance during vegetation removal and prescribed burning operations. There may also be a slight decrease in soil quality because of erosion. Some small areas of forested habitat may be changed into openings. A more open structure would be created in some stands with a currently closed structure. This would adversely affect those wildlife species that depend on the more closed habitat structure. Some adverse effects would be caused by the use of prescribed fire. Some large woody debris and soil organic matter would be consumed. The severity of these effects would depend on the intensity and duration of the prescribed fire. Recreationists and forest visitors would notice some disturbance to the landscape. This is an unavoidable effect of vegetation treatment activities. Timber harvesting activities may temporarily disrupt normal recreational uses of the area. Effects would include noise, dust, wood debris, smoke, and disturbance of understory vegetation. Based on the implemented cultural resource survey strategy and results, it is unlikely that unknown cultural resources would be encountered or disturbed. However, there is no

assurance that every cultural resource site has been located in advance of all planned management activities. Some ground-disturbing activity could unavoidably affect an undiscovered historic or prehistoric site. Sites discovered in this manner would be immediately protected from further disturbance with a site-specific management plan. Some sites could be inadvertently destroyed or damaged.

3.12 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources refers to the use or commitment of a resource that cannot be reversed. For example, nonrenewable resources, such as the minerals in an ore body being mined, would be removed forever during the milling of the ore and would be irreversibly committed. None of the alternatives involves an irreversible commitment of resources because the vegetation that would be removed from the treatment units would be replaced by incremental growth of remaining vegetation.

An irretrievable commitment is the short-term loss of resources, resource production, or the use of a renewable resource because of land use allocations, or a scheduling or management decision. The proposed treatments that are part of Alternative 2 would cause an irretrievable commitment of the vegetation that is removed for sale or other disposal. In other words, once treatments have occurred and wood products have been removed from treatment units, those timber resources could not be retrieved. Similarly, other vegetation that is burned in prescribed fires could not be retrieved once the burning is complete. Nevertheless, new vegetation would grow and eventually replace any that had been irretrievably committed. Any soil lost to erosion would be considered an irretrievable commitment of the soil resource. There would be a short-term irretrievable loss of productivity in skid trails and slash piles. Mitigation measures would be used to minimize loss of soil productivity. Conversion of wildlife habitats would be irretrievable because the quality of these habitats would be changed in the long term for many species.

3.13 Short-term Use Versus Maintenance and Enhancement of Long-term Productivity

Long-term productivity refers to the capability of forestland, in this case, to produce and provide resources into the future. Application of the soil and other mitigation measures described in Chapter 2 is intended to ensure that this project would maintain long-term soil productivity. Effects to other resources are limited in time and intensity and would not reduce their long-term productivity. The soil resource is a key ingredient for maintaining the long-term productive potential of an area. Accelerated erosion and effects detrimental to the soil resource would be minimized through careful project design and mitigation measures. Soil protection measures in the Forest Plan would maintain critical soil parameters and nutrients, ensuring long-term productivity.

The short-term use of vegetation would be for fuel reduction. The long-term productivity of vegetation would be enhanced because the risk of large-scale wildfire would be reduced. Short-term use of NFS lands may cause a minor increase in total sediment yields. These effects are negligible and would not affect long-term productivity of water resources. None of the activities would adversely affect channel stability. Beneficial uses would not be adversely affected.

The proposed activities would increase openings and reduce forest density. This change would favor wildlife species that prefer habitats that are more open or a mosaic of open and forested habitats. Populations of these species would be expected to increase with increased availability of preferred habitats. A concurrent reduction in species associated with more closed forested habitats would also occur.

Over the long term, vegetation treatment would create a greater mixture of multi-aged timber stands that would increase habitat diversity. The forest would have a lower risk of large-scale wildfire and subsequent loss of forested habitats. Fire exclusion has created unnatural closed canopy conditions, increasing the risk of crown fires. Prescribed fire would reduce fuel loads, moderating potential fire behavior. This would enhance the long-term productivity of vegetation by reducing the potential for severely burned soil and loss of forested habitats.

Recreational use of the area would be only slightly affected. Noise and the feeling of increased human presence would be a short-term effect of the proposed treatments. The visual effects vary in duration and intensity depending on the location of the observer. Initially, the appearance of harvested areas would interrupt the natural appearance of the landscape. Following implementation of all treatments, the more open forest would appear natural. Long-term reduction of wildfire risk would be a benefit to visual quality in the area.

3.14 Other Considerations

3.14.1 Prime and Unique Farmland

In 1980, the CEQ directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the NRCS. Prime or unique farmland is defined as soil that produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are no prime or unique farmlands in the analysis area; therefore, this topic was dismissed from further analysis in this document.

3.14.2 Environmental Justice

Executive Order 12898 requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. No alternative under consideration would have disproportionate effects on the health or environment of minority or low-income populations or communities. The alternatives would affect all populations equally. Environmental justice was, therefore, dismissed from further analysis in this document.

3.14.3 Possible Conflicts with Other Land Use Plans, Policies, and Controls

All alternatives discussed in this EA would be consistent with the objectives of federal, state, regional, or local land use plans, policies, and controls for the project area.

3.14.4 Energy Requirements and Conservation Potential of Alternatives

The energy required to implement each of the alternatives in terms of the use of petroleum products is minimal when viewed in the context of production costs and the effect on national and worldwide petroleum reserves.

3.14.5 Applicable Laws and Regulations

Based on the issues identified in Chapter 2, the principal federal laws applicable to this proposal include the Clean Air Act, CWA, ESA, NFMA, NHPA, American Indian Religious Freedom Act, and Native American Graves and Repatriation Act. Compliance with these laws is discussed below or referenced elsewhere in this document.

3.14.5.1 *NFMA/Forest Plan*

Timber production on federal land is a use allowed by several acts of Congress. It is a part of the mission of the USFS to manage the timber resource on a multiple-use/sustained-yield basis. The NFMA restricts timber production to lands classified as suitable for timber management (36 CFR 219.14). NFMA also set certain management requirements for Forest Plans pertaining to conservation of such resources as soil and water, and plant and animal diversity (36 CFR 219.27). The Forest Plan standards and guidelines were established to meet these requirements. Each of the alternatives would be consistent with NFMA requirements.

3.14.5.2 *Endangered Species Act*

Under section 7 of the ESA, each federal agency must ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species. If a threatened or endangered species, or species proposed for listing as threatened or endangered, occurs in an area where a project is proposed, a BA must be prepared.

3.14.5.3 *Heritage Program Laws*

Several federal laws provide for the preservation of historic, prehistoric, and other cultural resources. These include the NHPA, the American Indian Religious Freedom Act, and the Native American Graves Protection and Repatriation Act. These laws require that adequate and extensive review of undertakings be conducted in order to assess the possible effects of project activities on cultural resources. They provide that federal agencies conduct adequate consultation with pertinent SHPO and Tribal Historic Preservation Officers, Indian tribes, local governments, federal permittees, and other interested parties, regarding potential project effects to eligible cultural resources and appropriate mitigation measures. These laws also provide that federal agencies conduct adequate government-to-government consultation with pertinent Indian tribes in order to be informed of any possible conflicts with access to or use of sites with traditional religious significance.

The project APE has been intensively surveyed for the presence of cultural resources and NRHP eligibility determinations have been made in consultation with the SHPO/OAHP.

Mitigation measures to protect eligible cultural properties would be incorporated into any project contracts or other work plans. The likelihood of harming cultural resources by implementing any alternative is remote. The pertinent tribes were contacted during the scoping stage for the project and they did not express any concerns to the PSICC. The SHPO/OAHP concurred with a "No Historic Properties Affected" determination. Therefore, the proposed project is consistent with the applicable heritage program laws.

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4.0 List of Acronyms, Glossary, and References

4.1 Acronyms

APE	Area of Potential Effect
BA	Biological Assessment
BE	Biological Evaluation
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council of Environmental Quality
cfs	Cubic feet per second
CPW	Colorado Parks and Wildlife
CSFS	Colorado State Forest Service
CWA	Clean Water Act
DAU	Data Analysis Unit
DOLA	Colorado Department of Local Affairs
EA	Environmental Assessment
ESA	Endangered Species Act
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
GMU	Game Management Unit
HABCAP	Habitat Capability Model
HSS	Habitat structural stage
HUC	Hydrologic Unit Code
IDT	Interdisciplinary Team
IF	Isolated Find
LAU	Lynx Analysis Unit
MA	Management Area
MIS	Management Indicator Species
MPB	Mountain pine beetle
MSO	Mexican spotted owl
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFP	National Fire Plan
NFS	National Forest System
NFSR	National Forest System Road
NHPA	National Historic Preservation Act
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
OAHP	Office of Archeology and Historic Preservation
OHV	Off-highway vehicle
PCR	Park County Road
PNV	Present Net Value
PSICC	Pike and San Isabel National Forests and Cimarron and Comanche National Grasslands
SHPO	State Historic Preservation Officer
SMU	Soil Map Unit
SRLA	Southern Rockies Lynx Amendment
TSS	Total Suspended Sediment
USDA	United States Department of Agriculture
USFS	United States Department of Agriculture, Forest Service
USFWS	United States Department of Interior, Fish and Wildlife Service
USGS	United States Department of Interior, Geological Survey
VQO	Visual Quality Objective
WCPH	Watershed Conservation Practices Handbook
WIZ	Water Influence Zone
WUI	Wildland Urban Interface

4.2 Glossary

Active crown fire

A crown fire in which the entire fuel complex becomes involved, but the crowning phase remains dependent on heat released from the surface fuels for continued spread.

Activity fuel

Surface fuel generated by vegetation management activities, such as slash.

Aspect

The compass direction that a particular sloped area faces.

Basal area

The cross-sectional area of all stems in a stand measured at breast height and expressed in square feet per acre.

Biological Assessment

An analysis conducted for major Federal construction projects requiring an environmental impact statement, in accordance with legal requirements under section 7 of the Endangered Species Act. The purpose of the assessment and resulting document is to determine whether the proposed action is likely to affect an endangered, threatened, or proposed species" (FSM 2670.5.2).

Biological Evaluation

A documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed, or sensitive species" (FSM 2670.5.3).

Broadcast burning

A type of prescribed burning where contiguous blocks are burned at the same time. The goal is to have fire burn across most or all of the surface within the block

Cable yarding

A method of moving logs to a landing, using large cable winches and booms.

Canopy

The more or less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

Canopy cover

The extent to which the canopy blocks an open view of the sky. Typically expressed as a percentage.

Canopy fuel

Fuel present in the canopy, including all live and dead fuels above the surface fuel layer.

Chipping

The process of feeding wood material (slash) into a chipper to produce chips, small pieces of wood.

Co-dominant

This term refers to trees that are approximately equal in height to the dominant trees in a stand.

Council on Environmental Quality

An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Cover habitat

Cover is a general term that includes thermal and hiding cover. Thermal cover provides moderation of daytime highs in summer months and nighttime lows in winter months, helping animals maintain energy reserves despite extreme temperatures. Hiding cover provides security from human disturbance by screening animals from audible and visual disturbance and is most important along roads.

Cover type

The vegetative species that dominates a site.

Critical habitat

Under the Endangered Species Act: (1) The specific areas within the geographic area occupied by a federally listed species on which physical and biological features are found that are essential to the conservation of the species and that may require special management or protection; and (2) The specific areas outside the geographic area occupied by a listed species that are determined to be essential for the conservation of the species.

Crown base height

The vertical distance from the ground to the bottom of the live crown of an individual tree, or the average distance in a stand.

Crown fire

A fire that spreads through the tree canopy in conjunction with, or independent of, surface fire.

Crown fire hazard

A physical situation (based on fuels, weather, and topography) with potential for causing harm or damage because of crown fire.

Crush

Break slash into smaller pieces by driving over it with mechanical equipment.

Cultural (heritage) resources

The physical remains of human activity (such as artifacts, ruins, burial mounds, or petroglyphs) and conceptual content or context (such as a setting for legendary, historic, or prehistoric events or a sacred area of native people) of an area of prehistoric or historic occupation.

Cumulative effects

The combined effects resulting from sequential actions on a given area, including past, present, and reasonably foreseeable actions.

Direct attack

Fire suppression activities that take place immediately adjacent to the flaming front.

Direct effects

Effects that are caused by an action and occur at the same place and time.

Dominant

Trees that are the tallest in a stand.

Duff

Partially decomposed organic matter lying beneath the litter layer and above the mineral soil. It includes the fermentation and humus layers of the forest floor.

Ecosystem

A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake).

Eligible cultural resources (properties)

All cultural resources determined "officially eligible" to the NRHP by the Colorado SHPO, all cultural resources with a Colorado SHPO eligibility determination other than "officially not eligible", and all unevaluated cultural resources.

Endemic

Naturally occurring in a particular location at typical levels.

Environmental Assessment

A concise public document for which a federal agency is responsible that serves to: (1) briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact; (2) aid an agency's compliance with NEPA when no environmental impact statement is necessary; and 3) facilitate preparation of an environmental impact statement when one is necessary.

Epidemic

An event, such as an insect infestation, that occurs at a rate in excess of typical levels.

Fire behavior

The manner in which a fire reacts to fuel, weather, and topography.

Fire line

An area void of fuel, meant to contain either a prescribed fire or wildfire.

Fire regime

A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, seasonality, intensity, duration and scale (patch size), as well as regularity or variability.

Fire Regime Condition Class

A fire regime condition class is a classification of the amount of departure from the natural regime and is defined as follows:

Condition Class 1. Fire regimes are within the natural (historical) range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the natural (historical) range.

Condition Class 2. Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals (either increased or decreased). This result in moderate changes to one or more of the following: fire size, intensity, and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical) range.

Condition Class 3. Fire regimes have been substantially altered from their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.

Fire risk

The probability of an ignition occurring as determined from historical fire record data.

Fire suppression

All work and activities connected with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Flame length

The height of flames at the flaming front.

Fledging habitat

See Post-fledging area.

Floodplain

The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

Foraging habitat

Areas used by wildlife to obtain food.

Forb

An herbaceous plant other than a grass or grass-like plant.

Fuel break

An area cleared of most fuel, especially dead and down fuel and thick ladder and canopy fuel. Designed to provide firefighting forces a strategic location to slow or stop a wildfire.

Fuel load

The oven-dry weight of fuel per unit area, generally expressed in tons per acre.

Fuel management

Management activities undertaken to alter the amount of fuel in treatment units.

Fuel model

A set of surface fuel bed characteristics (load, surface area to volume ratio by size class, heat content, and depth) organized for input to a fire model. Standard fuel models (Anderson 1982) have been stylized to represent specific fuel conditions.

Fuelwood

Wood used for conversion to some form of energy, for example, in residential use or in cogeneration plants.

Geographic information system

A type of computer program used to store and analyze geographic data.

Ground fuel

Fuels that lie beneath surface fuels, such as organic soils, duff, de-composing litter, buried logs, roots, and the below-surface portion of stumps.

Habitat capability

The estimated ability of an area to support wildlife, fish, or plant populations. Habitat capability is modeled using HABCAP and is a function of forage and cover values.

Habitat effectiveness

The percentage of available habitat that is usable by wildlife during the non-hunting season. This concept assumes that some portion of suitable habitat is not used fully because of human disturbance. For example, big game species tend to avoid using otherwise suitable habitats near open roads.

Habitat structural stage

A hierarchical system of classifying vegetation based on both size and density of vegetation present.

HSS 1: Grasses and forbs
HSS 2: Seedlings and saplings
HSS 3A: Young, open forest
HSS 3B: Young, moderately dense forest
HSS 3C: Young, dense forest

HSS 4A: Mature, open forest
HSS 4B: Mature, moderately dense forest
HSS 4C: Mature, dense forest
HSS 5: Late succession ("old growth")

Hand thinning

Removal of live or dead vegetation primarily by hand labor. For example, using chain saws to thin understory vegetation.

Hazard tree

A tree that poses a significant threat to a user or improvement. Hazard trees include dead, dying, or strongly leaning trees within striking distance of improvements or use areas.

Hazardous fuels

Accumulations of fuel that could contribute to uncontrollable fire behavior.

Helicopter yarding

A method of moving logs to a landing, using helicopters.

Herbicide

A chemical compounds used to kill undesirable vegetation.

Historic range of variability

Historic range of variability is a method to understand the dynamic nature of ecosystems; the processes that sustain and change ecosystems; the current state of the ecosystem in relationship to the past; and the possible ranges of conditions that are feasible to maintain. It is a useful tool for determining a range of desired future conditions, and for establishing the limits of acceptable change. Best available science and local management expertise are used to determine the historic range of variability.

Hydrophobic soil

Soil that does not absorb water. High intensity fires can alter soil chemistry so that it is no longer capable of absorbing water, which quickly runs off the surface, often initiating excessive soil erosion.

Indirect attack

Fire suppression activities that take place some distance from the flaming front. This method is typically used when fire behavior is too intense for direct attack.

Indirect effects

Secondary effects that occur in locations other than the initial action or significantly later in time.

Infiltration

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infrequent, high-severity fire regime

Regime in which fires kill or top-kill aboveground parts of the dominant vegetation, changing the aboveground structure substantially. Approximately 80 percent or more of the aboveground dominant vegetation either is consumed or dies because of fires. Applies to forests, shrublands, and grasslands.

Interdisciplinary team

A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to analyze the entire range of resource issues. Through interaction, participants bring different points of view to bear on the problem.

Intermediate

Trees that form an intermediate layer beneath the dominant tree canopy but above the understory.

Intermittent stream

A stream or a portion of a stream, that does not flow year-round but only when it (a) receives base flow solely during wet periods, or (b) receives groundwater discharge or protracted contributions from melting snow or other erratic surface and shallow subsurface sources.

Ladder fuel

Combustible material that provides vertical continuity between vegetation strata and allows fire to climb into crowns of trees or shrubs with relative ease.

Landscape-scale

An event that occurs across large tracts of land.

Large-scale wildfire

A wildfire, often covering large tracts of land, and substantially changing the ecosystems it affects.

Litter

The top layer of the forest floor including freshly fallen leaves, needles, fine twigs, bark flakes, fruits, matted dead grass, and a variety of miscellaneous vegetative parts that are little altered by decomposition. Litter also accumulates beneath rangeland shrubs. Some surface feather moss and lichens are considered litter because their moisture response is similar to that of dead fine fuel.

Lop and scatter

A term used in treating fuels during and after harvesting is complete, where the unmerchantable portions of the tree (usually the smaller top of a tree and the limbs) are cut off and scattered about to reduce slash concentrations.

Management area

An area for which a single set of management prescriptions is developed and applied.

Management area prescription

A set of standards and guidelines that apply to a specific management area.

Management indicator species

Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

Mechanical fuel treatment

An activity that alters fuel loads using mechanical equipment. Includes hand treatments using chain saws and other similar equipment.

Mitigation

Avoiding or minimizing effects by limiting the degree or magnitude of the action and its implementation; rectifying the effect by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the effect by preservation and maintenance operations during the life of the action.

Monitoring

The periodic evaluation on a sample basis of management practices to determine how well objectives have been met and how closely management standards have been applied.

Nesting habitat

Habitats used by wildlife (birds) for nesting.

Noxious weed

A plant specified by law as being especially undesirable, troublesome, or difficult to control.

Passive crown fire

A crown fire in which individual or small groups of trees torch out, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior from the occasional torching of an isolated tree to a nearly active crown fire.

Peak flow

The highest annual flow in a stream.

Perennial streams

Streams that flow continuously throughout most years.

Piling and burning

A fuels treatment method comprised of piling fuel into piles that are burned. Piling may be accomplished by hand labor or with large machinery such as bulldozers, depending on terrain, accessibility, fuels, and other concerns.

Population viability

The ability of a population to persist through time.

Prescribed fire

Any fire ignited by management actions to meet specific objectives. An approved written burn plan must exist and NEPA requirements must be met before ignition. This term replaces management ignited prescribed fire.

Present Net Value

The difference between the total discounted value of all outputs to which monetary values or established market prices are assigned and the total discounted costs for management.

Project design standards

Standards that are used in developing a proposed action. These are intrinsic to an action, as opposed to mitigation, which is developed to reduce the effects of an action that is already complete.

Proposed action

In terms of NEPA, the project, activity, or action that a federal agency intends to implement or undertake and which is the subject of an environmental analysis.

Rate of spread

The relative speed with which a fire increases in size.

Recreation Opportunity Spectrum

Provides a framework for stratifying and defining classes of outdoor recreation environments, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum, of which two classes are present in the project area:

Roaded Natural. These lands are characterized by a predominantly natural environment with moderate evidence of other resource utilization. Evidence of the sights and sounds of other users is moderate, but in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from other users.

Rural. The lands in this category are characterized by a substantially modified natural environment. The sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities for intensified motorized use and parking are available.

Recreation Residence

Privately owned structures placed on NFS lands under special use permit, not for use as primary residences or for commercial use.

Regeneration

The process where trees reproduce themselves by either artificial (hand planting of small seedlings) or natural (by seed) means. Often used to refer to the young trees themselves.

Riparian area

A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.

Scoping

An early and open process designed to identify the environmental issues and significant factors to be addressed in the analysis process.

Sensitive species

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

Shaded fuel break

A fuel break with a residual overstory of trees. The trees serve to reduce the amount of grass and shrubs growing in the understory by competing for available light, water, and nutrients. The canopy cover is typically low and tree crowns are not connected to low or stop a crown fire.

Slash

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

Snag

A standing dead tree usually greater than five feet in height and six inches in diameter at breast height.

Soil compaction

The process by which the soil grains are rearranged, resulting in a decrease in void space and causing closer contact with one another, thereby increasing bulk density.

Soil map unit

An area with similar soil types and properties delineated for mapping purposes.

Soil permeability

The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water move downward through saturated soil.

Spotting (spot fires)

A process where embers from a fire are lifted or blown ahead of the flaming front and start new fires.

Stand-replacing fire

A wildfire that burns at high intensity, effectively causing mortality of entire stands of trees.

Standards and guidelines

An indication or outline of policy or conduct. Standards have specific, quantifiable measures, while guidelines provide more general direction and flexibility of management options.

Stem density

The number of trees per unit area, typically trees per acre.

Suppressed

Trees growing in the understory that are shaded by overstory (dominant and co-dominant) trees.

Surface fire

A fire spreading through surface fuels.

Surface fuel

The loose surface litter on the soil surface, for example, fallen leaves or twigs, needles, bark, cones, branches, grasses, shrub and tree reproduction, downed logs, stumps, seedlings, and forbs interspersed with or partially replacing the litter.

Temporary road

Those roads needed only for the purchaser or permittee's use. The Forest Service and the purchaser or permittee must agree to the location and clearing widths. Temporary roads are used for a single, short-term use, e.g., to haul timber from landings to Forest Development Roads, access to build water developments, etc. Temporary roads must be obliterated as part of a timber sale contract.

Torching

The transition of surface fire into the crown of a single tree, typically caused by ladder fuels, high flame lengths, or low crown base height. Torching often leads to crown fire behavior

Tractor yarding

A method of moving logs to a landing on the ground using mechanical equipment such as a skidder.

Understory

The trees and other woody species that grow under a more or less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth.

Visual Quality Objective

A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. VQO refers to the degree of acceptable alterations of the characteristic landscape. One VQO class is present in the project area:

Partial Retention. This VQO allows activities that alter the landscape that may be evident, but must be visually subordinate to the characteristic landscape, and not recognizable as an unnatural occurrence. This objective must be met as soon after project completion as possible or within a maximum of one year.

Water influence zone

A zone located on either side of a stream that is 100 feet or height of the tallest tree, whichever is greater, in width. Special management requirements are applied to the WIZ.

Watershed

A region or land area drained by a single stream, river, or drainage network.

Wetland

A transitional area between aquatic and terrestrial ecosystems that is inundated or saturated for periods long enough to produce hydric soils and support hydrophytic vegetation.

Wild and Scenic River

Those rivers or sections of rivers designated as such by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and amended, or those sections of rivers designated as wild, scenic, or recreational by an act of the legislature of the State or States through which they flow.

Wildland-urban interface

The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

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5.0 List of Preparers

The following individuals comprise the ID team that conducted the environmental analysis and prepared this EA.

Table 6-1 List of Preparers

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Appendix A Colorado State Forest Service Guidelines for Defensible Space

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