1. INTRODUCTION

The Pike-San Isabel National Forest Supervisor proposes to implement the National Fire Plan (USDA Forest Service 2000a) with the Trout-West Fuels Reduction Project. The Fire Plan identifies Woodland Park as an urban interface community at risk from large, damaging, high intensity wildfire. The proposed project is intended to decrease the threat of wildfire to Woodland Park and surrounding communities by reducing hazardous fuels within the urban interface and the surrounding municipal watershed.

The National Fire Plan discusses two principles related to fire hazard reduction:

> Principle #4: *"Assign highest priority for hazardous fuels reduction to communities at risk and readily accessible municipal watersheds."*
>
> Principle #5: *"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."*

1.1 PURPOSE AND NEED

1.1.1 Reduction of Fire Hazard, Risk, and Values Lost

The potential for high intensity crown wildfires within the Trout-West area needs to be reduced, primarily adjacent to private lands, homes, developments, and critical watersheds of continuous dense forest. This is needed to provide public and firefighter safety, as well as to create sustainable municipal watersheds.

The risk of adverse effects from wildfire is high (and is increasing) within much of the Trout-West project area. Potential effects for wildfire are considered in the context of fire hazard, risk and value.

Fire hazard is the manner in which a wildfire will behave once started. The type, density, and structure of the wildland vegetation, as well as the amount of down, dead material, determine the fire behavior and hazard. Generally, the potential for high intensity crown fires is greater as tree density increases, the more continuous the canopy of the forest, and the more ground fuels and/or small trees to carry the fire to the crowns.

The Hayman, Hi Meadow, Big Turkey, Buffalo Creek, and Berry Wildfires provide nearby examples of high intensity fire behavior resulting from overly dense forests. Fire suppression, historical grazing and other land use practices, and past forest management policies aimed at maximizing conifer production have led to overly dense stand conditions and increased fire hazard.

Dry periods, which are not uncommon during the spring and fall, coincide with cured grasses and lowest live vegetation fuel moistures of the year. Strong weather fronts and Chinook (Foehn) winds often occur during this same time period, increasing the potential intensity of wildfires.

Fire risk is the potential for a fire to get started. The Trout-West Project lies within an area of the Pike National Forest that experiences a very high level of lightning storms with associated ground strikes. This area is one of the highest fire occurrence areas of the Pike National Forest. There have been 526 lightning fire ignitions that have occurred within the project area in the last 25 years.

Human-caused fires are on an upward trend. Vehicles (on and off-road), campfires, cigarettes, debris burning, etc. all can ignite fires. The risk of human-caused fire increases as population increases. More people live in the area, and more people come to the area to use the forest for recreation and other needs. The population of Colorado has increased by over a million people, primarily in the "Front Range," which is two hours or less from the project area. Approximately 20,000 people live in the Trout-West project area.

Human-caused fires also occur during the times of greatest fire danger, during the spring and fall, when lightning is minimal or nonexistent. Almost all the largest and most destructive wildfires in this area, in recent times, have occurred during this time period.

Value is the potential loss from wildfire, including human life and property; forest products; wildlife habitat; and air, water, and aesthetic qualities. Numerous subdivisions, homes, and other developments are within the analysis area. The subdivisions are often nestled within overly dense forest stands that have the potential to carry intense wildfire.

The Trout-West area contains a municipal watershed for the community of Woodland Park that is also a major tributary to the South Platte River and the Denver Metro Area watershed.

In the past, nearby large, high intensity fires have destroyed homes and National Forest infrastructure such as campgrounds and trails. They have also caused millions of dollars in damage to municipal water systems and water holding facilities. Flashfloods, resulting from the burned-over grounds, have killed people; destroyed homes, bridges, highways, and other facilities; and degraded fisheries. Finally, these fires have also cost millions to suppress.

The purpose of the Trout-West Fuels Reduction Project is to reduce the potential for damaging high intensity crown-type wildfires where high hazard, risk, and values overlap. Management direction guiding the proposed project is contained within the National Fire Plan, the Pike/Isabel National Forest Plan (Pike and San Isabel National Forests), and the Comanche and Cimarron National Grasslands Land and Resource Management Plan.

1.1.2 Implement Direction of the Forest LRMP and National Fire Plan

The Forest LRMP sets direction to maintain fuel conditions such that fireline intensity is greatly reduced. The proposed treatment of fuels would reduce the overall fuel loads so that when wildfires do occur, suppression forces would be capable of containing the wildfires at much less resource damage than would occur without treatment. Other natural resources would be less impacted by wildfire.

1.1.3 Reduce the Threat of Wildfire to Communities at Risk

Woodland Park has been identified as an urban interface community at risk from large, damaging, high intensity (stand replacement) wildfire. The proposed fuels reduction units would decrease the threat of wildfire to Woodland Park and the surrounding communities located within the project area. This would be accomplished through the use of wood removal and prescribed fire applications.

1.1.4 Meet Public Safety Expectations

The Forest provides for public safety and protection. The proposed project will enhance public safety by reducing the fire hazard and the potential for uncontrolled large damaging fires such as the Hayman, Buffalo, and High Meadows wildfires. The proposed fuels reductions that are adjacent to private land would create a zone that contains lower ground and aerial fuels, thereby decreasing the risk of fire to landowners. The proposed activities would provide a greater protection than that which currently exists.

1.1.5 Enhance Protection for the Trout Creek, West Creek, and Related Municipal Watersheds

The proposed project would provide enhancement to the Trout, West Creek, and municipal watersheds supporting communities in and around Woodland Park. The reduction of existing fuels would increase the level of fire protection to the project area. Reducing aerial and ground fuels would provide fire-fighting resources the capacity to suppress wildfires at smaller sizes, thereby minimizing the risk for stand replacement events. The reduction of stand replacement events minimizes the impact of wildfire on the area.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

Omi and Pollet, in their study "Effect of Thinning and Prescribed Burning on Crown Fires Severity in Ponderosa Pine Forests" (2002), found that fire severity and subsequently crown fire propagation could be lessened with fuel treatments. Omi and Pollet found fuel treatments to be effective in fire-dependent species such as ponderosa pine with its short fire-return. However, to be effective, fuel treatments need to be considered at the landscape level. The preponderance of this project is within the ponderosa pine type.

On a watershed basis, approximately 24,400 acres need treatment, of which approximately 23,800 acres are in Condition Classes 2 and 3. (See Section 4.2.1, Modeling Process, for condition class descriptions.) There are three types of treatments proposed for treating the fuels in the six treatment units. These consist of heavy treatment, light treatment, and no treatment. The proposed heavy treatments are thinning of stands where areas are currently overly dense when measured against the historical average density (Kaufman 2001). The proposed light treatments are thinning of stands where areas currently exist with more open stand densities that have a closer resemblance to the historic vegetation types. This treatment would slightly reduce or maintain the current fuel profile. No treatment is proposed for those areas that closely resemble the historical average stand density.

2.1.1 Treatments

Fuel (slash) treatment for all areas treated will consist of a single or combination of various treatment methods that are designed to meet stated management objectives: (1) overstory thinning, (2) total understory removal, and (3) prescribed underburning. In either of the first two treatments, if wood products can be extracted, these products need to be offered as a method to reduce project costs. The treatment objectives are to establish and maintain vegetative conditions such that fires spread on the ground surface, are of low to moderate fire intensity with flame lengths not greater than four feet, are manageable by fire suppression hand crews, and provide for a more open canopy that will not sustain crown fire spread.

Follow up slash treatments consist of applying light and/or moderate underburning. The objective is to reduce or eliminate 0- to 3-inch-diameter surface fuels, and ensure mortality of regeneration too small in size or too abundant to be cut during understory removal. In addition, there are areas where slash is piled on-site and/or taken to a landing site and later disposed of by burning.

A variety of activities within each of the above fuel treatments are designed to accomplish changes in surface fuel (slash) conditions in response to current resource objectives and management concerns, and at a level commensurate with restoring/protecting the project area against future high intensity damaging wildfires. These treatments may include leaving some slash residue on site by loping and scattering; removal of slash residue by whole-tree harvesting, piling, and burning (machine and/or hand piles); biomass (chipping); and/or prescribed burning. More detailed descriptions are given below.

Site-specific recommendations following field examination are in the analysis files.

Lop and Scatter

Residue in the form of limbs, broken, and/or unused bolewood would be left scattered on the site. This would primarily occur in areas with little or no on-the-ground covering. The objective is to provide for soil protection by lessening erosion, provide organic material for nutrient recycling, and provide for small mammal habitat.

Whole-Tree Harvesting

Whole-tree harvesting involves cutting and removing the entire tree to a landing site with mechanical equipment. Harvesting includes removing the trunk, branches, and leaves or needles, if present, in a single operation. Utilization of trunks would be in the form of a forest product such as sawlogs. The unutilized portions would be removed and disposed of as fuelwood, chipping, and/or by piling and burning.

Pile & Burn

Pile and burn may be accomplished by using hand piling and/or with mechanized equipment.

- **Hand Pile**—This type of treatment is labor intensive and usually the most costly to implement. Treatment involves hand labor to cut and place material into piles. This treatment would be used along view areas of trails, where slopes exceed 35 percent, and along private land boundaries. Piles would later be disposed of by burning.
- **Mechanical Pile**—This type of treatment utilizes mechanized equipment, such as bulldozers with brush rake attachments, grappler pilers, hot saws, and other similar equipment. Equipment is used to bunch slash into piles that would later be disposed of by burning. This type of treatment would be restricted to areas with slopes less than 40 percent. Parameters and/or mitigating measures include the need to minimize soil disturbance, damage to residual leave trees, and piles containing little or no soil.
- **Burning of Piles**—Burning of piles would typically occur during mid to late October through March, depending upon acceptable weather conditions (personal communication with Mike Hessler, Pike-San Isabel National Forest, regarding time periods for prescribed fire use, April 2002). Burning would be accomplished by igniting each pile. A prescribed burn plan would be required.

Biomass (chipping)

This treatment involves cutting and chipping vegetative material. Chipping is accomplished with machines. Trees chipped are usually of small diameter material, generally less then 6 inches in diameter. The trunk is separated from the limbs and run through a chipper. This can be done at the actual tree location, and/or removed to a close by site. In either case, the chips are scattered or removed to a common collection point. This material is disposed of on-site or removed for processing away from the project area.

Prescribed Burning

This treatment involves utilizing low to moderate intensity prescribed fire to reduce surface fuel volumes over a broad area. In all cases, a burn plan and smoke management plan must be prepared and approved before any ignitions can occur. All air quality standards for the state of Colorado must be met. The prescribed burn is usually performed during periods when fuel moisture conditions are sufficient to allow for ignitions. Small diameter residue (0- to 3-inch size class) can and usually will be consumed during such burns. Larger sized residue (greater than three inches) is not usually consumed under low and moderate intensity prescribed fires. Broadcast burning usually occurs during the March through April and September through October periods, depending upon weather conditions (personal communication with Mike Hessler, Pike-San Isabel National Forest, regarding time periods for prescribed fire use, April 2002). It is expected the material burned over each treated area will be approximately 70 percent consumed.

Fuel Wood

Depending on location, accessibility, and demand, material maybe removed as a fuelwood product. This activity would reduce the fuel loading created by felling of various sized trees. Local citizens would be allowed to remove fuelwood under the Forest Service free use permitting system. Commercial fuelwood cutting contracts maybe considered where sufficient volumes of material exist.

2.1.2 Fuels Treatment Prescriptions

2.1.2.1 General Provisions for All Areas Within the Project

- All burning is to be conducted in accordance with the approved project prescribed burn plan, smoke management plan, and the State of Colorado Air Quality Standards and permitting system.
- Minimize the amount of soil in slash piles where piling for burning occurs.

- Broadcast burning to be done in stages to assist in smoke mitigation. Use firing techniques that are designed to minimize the amount and length of smoldering time. Schedule burning during low visitor-use periods when weather conditions permit. Burn plans objectives would include removal of approximately 90 percent of 0- to 3-inch material, 30 percent of 3- to 12-inch material, and zero percent of 12-inch and larger material. Burning overall is expected to consume approximately 70 percent of combustible material. Residual fuel is expected to range between 4 and 6 tons per acre excluding the down log component required to satisfy wildlife requirements.
- All prescriptive treatments will be modified to accommodate wildlife, air, soil, water, and public safety mitigation requirements.

2.1.2.2 Neighboring Private Land Zone (within 600 feet of Private Lands)

- Remove trees larger than 6 inches diameter at breast height (dbh) by helicopter. Remove treetops by helicopter to off-site location for disposal.
- On tractor units, mechanically remove trees larger than 6 inches dbh. Use whole tree removal. Remove all trees less than 6 inches dbh. Mechanically remove all slash from this zone.

2.1.2.3 One-Mile Buffer Zone (Remainder of Interface Areas)

- On helicopter units, remove trees larger than 6 inches dbh by helicopter. Remove treetops by helicopter to designated landing sites for piling and/or hand pile on site. Piles will be burned later.
- On tractor units, remove trees larger than 6 inches dbh by whole tree methods. Mechanically treat slash by slashing and/or machine pile for burning.

2.1.2.4 All Remaining Areas of the Project

- On helicopter units, whole tree yard but tops maybe left on-site to facilitate broadcast and/or jackpot burning as needed.
- On tractor units, treat slash by slashing trees less than 6 inches dbh, broadcast burning, mechanical jack pot and/or mechanical pile for burning.

2.2 ALTERNATIVES

A detailed description of each alternative is provided in Chapter 2 of the Environmental Impact Statement for this project.

3. MANAGEMENT DIRECTION AND ASSUMPTIONS RELATED TO THE NO ACTION ALTERNATIVE

3.1 MANAGEMENT DIRECTION

Management direction for the project area is found in the Pike and San Isabel National Forests Land and Resource Management Plan (LRMP). The specific direction for fire and fuels management applicable to this area is found in the General Direction, Standards and Guidelines, individual Management Areas, and subsequent modifications to the LRMP. Any Proposed Action must adhere to the specifics formed in the LRMP document. Specifically the directions are:

- *Provide a level of protection from wildfire that is cost efficient and that will meet management objectives for the area consider the following:*
  a. *The values of the resource that are threatened by fire,*
  b. *The probability of fire occurrence,*
  c. *The fuelbed that fires will probably occur in,*
  d. *The weather conditions that will probably influence fires that occur,*
  e. *The costs of fire protection programs, the social economic, political, cultural, environmental, life and property concerns, and*
  f. *Management objectives for the area.*
- *Maintain fuel conditions that permit fire suppression forces to meet fire protection objectives for the area.*
  a. *Reduce or otherwise treat all fuels so the potential fireline intensity of an area will not exceed 400 BTU's /sec/ft on 90% of the days during the regular fire season; or break continuous fuel concentrations exceeding the above standards into manageable units with fuels breaks of fire lanes, or provide additional protection for areas exceeding the above standard when such protection will not be required for more than five years.*
- *Use prescribed fire to accomplish resource management objectives, such as reducing fuel load buildup, wildlife habitat improvement, etc.*
- *Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values.*
- *Use unplanned ignitions on areas identified in the Plan to achieve management objectives.*
- *Management Area 4b direction specifies that fuel conditions be maintained under conditions which permit fire suppression and prescribed fire to maintain habitat needed for selected species or species population levels.*

3.2 ASSUMPTIONS RELATED TO THE NO ACTION ALTERNATIVE

The following assumptions for fuels treatment considerations are made related to the No Action Alternative.

- Management direction from the LRMP will be implemented to the levels as dictated by annual funding.
- Some fuel treatment activities will continue to occur. These will be broadcast burning and pile burning. Treatment of activity fuels will continue.
- The increase of Condition Class 2 and 3 hazardous fuel conditions will occur as Condition Class 1 areas degrade from lack of treatment.
- The Wildland Urban Interface will continue to be threatened by potential large damaging wildfires.
- Populated areas will continue to increase with a related increase in human-caused fire ignitions.
- Large damaging wildfire threats to the Trout Creek and West Creek watersheds will continue with the assumption of at least one such fire to occur within the next 10-year period.
- All resources, including soil, water, air, wildlife, timber, etc. will remain at risk and future degradation beyond current status.
- The National Fire Plan implementation will not occur.

4. AFFECTED ENVIRONMENT

4.1 ISSUE – CROWN FIRE HAZARD (STAND REPLACEMENT FIRE HAZARD)

This issue relates to the current Crown Fire Hazard. Crown fire hazard is also referred to as a stand replacement or large damaging fire hazard. Regardless of nomenclature, the hazard relates to the current probability of a damaging wildfire to occur as compared to the expected hazard after fuels have been treated.

To determine existing conditions, outputs from the Forest Service national analytical model adapted by Hann and Strohm (see Section 4.3) were used. This analysis is the basis for comparability to the referenced or historical conditions. Outputs from this modeling of current conditions identify the total acres needing treatment. Each alternative will be compared against the current conditions, and an effectiveness rating will be assigned. In addition, an assignment of risk for a large damaging wildfire to occur within 10 years is made for each alternative. These factors form the basis for evaluation related to this issue.

4.2 EXISTING CONDITIONS

Fire historically has played a significant role in shaping the fire-adapted ecosystems of the interior western states. At the turn of the 20th century, selective logging, livestock grazing, and fire prevention and suppression activities began to change the composition, structure, and function of these fire-adaptive ecosystems. As suppression actions increased, natural recurrent underburning was eliminated. The result has been a transformation of forest stands moving from open park-like areas into more dense stands. Extended human development, fire suppression, prolonged fire exclusion, and climate changes have created over-accumulated vegetative conditions in these fire-adapted ecosystems that predispose areas to severe wildfire threats (USDA Forest Service 2000b).

Historical conditions for the project area can best be described as areas with wildfires spatially widespread, having significant stand-replacing events. This resulted in a variety of vegetative structures on the landscape. Across the historical landscape, four distinct components were found. The first is forested patches having a distinct age cap where ponderosa pine was the predominant species and Douglas-fir was also found to be common. The age cap created a lower tree density in many patches than what is found today. It has been concluded this may be the result of the surface fire component of large fires that thinned understory trees. The second component is one in which there is no evidence of stand-replacement events. In this component, tree species are found to be in various ages and of differing health and decline. The third component is occupation of non-forested openings mostly by grasses and possibly by some large woody debris. Today, these same type openings contain a strong shrub component and tend toward being replaced with a forest cover. The fourth and last component is the riparian area that supports a variety of plants (Kaufman et al. 1999). In addition to species composition and successional stages, stand density using crown closure can be used to describe current vegetation conditions.

Crown closure is the percent of a fixed area covered by the vertical projection of the outermost perimeter of the tree. Today, 63 percent of the area has a crown closure of 40 percent or greater. In mature forest stands on National Forest land, 80 percent of the stands have a crown closure greater than 40 percent.

The Trout-West Fuels Reduction Project lies in an area along the eastern edge of the Rocky Mountains. Specifically, the area is a part of the Rampart Range that extends north of Denver and south of Colorado Springs. The project is located within a major upper watershed area of the Upper South Platte Watershed. This area has been identified by the Forest Service as having degraded vegetative conditions and is classified as an area at high risk to all types of wildfire. The *Landscape Assessment - Upper South Platte Watershed* (Foster Wheeler Environmental Corporation 1999), identified the Trout and West Creek watersheds as being a landscape area with high fire hazard.

The project area is located within the "red zone," as defined by the Colorado State Department of Forestry (Colorado State Forest Service 1999). A red zone classification identifies areas of extreme fire hazard and possible wildfire threats to surrounding communities. It is in these wildland-urban interface areas that human habitation and improvements continue to increase. These developments have been more noticeable within the last 20 years (Rogers et al. 2001). Consequentially, these facts negate returning the existing ecosystems entirely to historical pre-settlement conditions where stand-replacement events were an integral part of ecosystem development. However, an opportunity exists to effect change from current conditions to a less fire prone environment and to greatly reduce the threat of large, damaging, stand-replacement fires, thereby reducing the threat to communities and public safety.

In early June 2002 the 137,000-acre high intensity stand-replacing Hayman Fire burned the western portion of the Trout-West watershed, including the entire area surrounding the Cheesman Reservoir (the Denver municipal watershed). This fire burned approximately 25 percent of the analysis area associated with this project.

4.2.1 Modeling Process

The Forest Service developed the National Fire Plan and its associated strategies using computer modeling at the National level to identify and define three risk conditions under the classification of "condition class." These condition classes are used to identify and to "…simplify the complex and multiple combinations of vegetation cover types, densities, fuel types, successional pathways, and site potentials"(Hann and Bunnel 2001) that exist on forested lands. The Forest Service modified the national analytical model for condition class identification to be applicable at the local level. The draft *R2 Core Data Pilot Report* describes this process. An analysis of the Trout-West Watershed (approximately 124,000 acres) was conducted using the *Fire Regime Condition Class and Associated Data for Fire and Fuels Planning: Methods and Applications* (Hann and Strohm 2001). This analysis was completed prior to the Hayman Fire in June 2002 (pre-Hayman). This fire affected the analysis area and a revised analysis was performed (post-Hayman).

Table 1 describes the different Condition Classes and defines their departure from the historical or natural range of variability as used in this analysis.

Table 1. Condition Classes for Modeling Landscape Dynamics and Departure from Historical (Natural) Range of Variability for National Forests and Grasslands in the Lower 48 States.

Condition Class	Departure from HRV[1] or NRV[2]	Description
Class 1	None, minimal, low	Vegetation composition, structure, and fuels are similar to those of the historic regime and do not pre-dispose the system to risk of loss of key ecosystem components. Wildland fires are characteristic of the historical fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are within the historical range of variability. Smoke production potential is low in volume.
Class 2	Moderate	Vegetation composition, structure, and fuels have moderate departure from the historic regime and predispose the system to risk of loss of key ecosystem components. Wildland fires are moderately uncharacteristic compared to the historical fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are outside the historical range of variability. Smoke production potential has increased moderately in volume and duration.
Class 3	High	Vegetation composition, structure, and fuels have high departure from the historic regime and predispose the system to high risk of loss of key ecosystem components. Wildland fires are highly uncharacteristic compared to the historical fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are substantially outside the historical range of variability. Smoke production potential has increased with risks of high volume production of long duration.

[1] Historical Range of Variability (HRV)–the variability of regional or landscape composition, structure, and disturbances, during a period of time of several cycles of the common disturbance intervals, and similar environmental gradients, referring, for the United States, to a period prior to extensive agricultural or industrial development. It is not synonymous with the historical scenario (Hann et al. 1997a, after Morgan et al. 1994, cited in Hann and Bunnel 2001).

[2] Natural Range of Variability (NRV)–the ecological conditions and processes within a specified area, period of time, and climate, and the variation in these conditions that would occur without substantial influence from human mechanisms (synthesized from Morgan et al. 1994; Swanson et al. 1994; Hann et al. 1997a; Landres et al. 1999, Swetnam et al. 1999, cited in Hann and Bunnel 2001).

Source: Hann and Bunnel 2001.

4.2.1.1 Condition Class 1

Condition Class 1 areas are described as depicting pre-settlement or early settlement (1800s) vegetative and ecological conditions. Such areas experience frequent low intensity fires that did not kill larger fire-tolerant trees but did consume seedlings and saplings that encroached the understory, as well as other vegetation and dead fuels. These low intensity fires aided nutrient cycling, did not destroy the duff/humus layer, and left the soil intact and functioning. Little to no soil erosion occurs with minimal fire risk. Some stand-replacing fires would occur with the mean fire interval being 50 years (Kaufman et al. 1999). Numerous small fires would occur at lesser intervals. These type fires would not pose problems for fires suppression efforts.

4.2.1.2 Condition Class 2

Condition Class 2 areas are described as having missed one or more fire intervals. The consequence is the increasing understory vegetation growth creating a more dense cover. When they are not treated, fires burn with more intensity and suppression resource efforts will have greater difficulty effecting control. Biodiversity, soil productivity, and water quality become greatly impacted.

4.2.1.3 Condition Class 3

Condition Class 3 areas are similar to Condition Class 2 but fires burn at very high risk. The vegetation and dead fuels have greatly changed. The forest floor has large amounts of dead material; understory trees (seedling, saplings, small poles) are dense and reach into the overstory canopy, creating the condition known as ladder fuels. In drought years, severe high intensity fires occur. Usually all trees of small sizes are burned. Overstory trees are killed. Often only large tree skeletons remain. Biodiversity is severely impacted, some species are killed outright, the duff layer is totally removed, soil horizons are damaged/destroyed, water quality is heavily damaged, and the soil erosion potential is greatly increased.

Table 2 describes the fire regime classification with its associated frequency, severity, and the modeling assumptions used in the analysis.

Table 2. Natural (Historical) Fire Regime Classes for Modeling Landscape Dynamics for National Forests and Grasslands in the Lower 48 States.

Fire Regime Class	Frequency (Fire Return Interval)	Severity	Modeling assumptions
I	Frequent (0–35 years)	Low	Open forest or savannah structures maintained by frequent fire; also includes frequent mixed severity fires that create a mosaic of different age post-fire open forest, early to mid-seral forest structural stages, and shrub or herb dominated patches (generally < 40 ha (100 acres)).
II	Frequent (0–35 years)	Stand replacement	Shrub or grasslands maintained or cycled by frequent fire; fires kill non-sprouting shrubs such as sagebrush that typically regenerate and become dominant within 10–15 years; fires remove tops of sprouting shrubs such as mesquite and chaparral, which typically resprout and dominate within 5 years; fires typically kill most tree regeneration such as juniper, pinyon pine, ponderosa pine, Douglas-fir, or lodgepole pine.
III	Less frequent (35–100 years)	Mixed	Mosaic of different age post-fire open forest, early to mid-seral forest structural stages, and shrub or herb dominated patches (generally < 40 ha (100 acres)) maintained or cycled by infrequent fire.
IV	Less frequent (35–100 years)	Stand replacement	Large patches (generally > 40 ha (100 acres)) of similar age post-fire shrub or herb dominated structures, or early to mid-seral forest cycled by infrequent fire.
V	Infrequent (>100 years)	Stand replacement	Large patches (generally > 40 ha (100 acres)) of similar age post-fire shrub or herb dominated structures, or early to mid to late seral forest cycled by infrequent fire.

Source: Hann and Bunnel 2001.

The historical vegetative conditions are those landscape conditions expected to exist in the absence of fire suppression activities and other modern human influences that have taken place over a long period of time. The comparison is called the historical range of variability (HRV). As a component to this examination of historical ranges of variability, the process further breaks the project area into units called Fire Regime Potential Vegetation Types (FRPVT). The FRPVT is a representation of areas with similar vegetation and similar fire regimes. There are six types identified for Trout-West and a seventh not entirely classified based upon vegetation (Hann and Strohm 2002)). These are described as follows:

A. **FRPVT 1**— Low Elevation Gentle Slope Ponderosa Pine
   Natural fire regime group I: frequent surface fires
   Ponderosa pine/herb with aspen in draws
   Flat to undulating topography: less than 15% slope
   Montane / lower elevation: less than 8500' (41,173 acres)

B. **FRPVT 2**— South Slope Low Elevation Ponderosa Pine
   Natural fire regime group I: frequent mixed fires
   Ponderosa pine/shrub/herb – small amount of Douglas-fir
   South-facing slopes: >15% slope Montane / lower elevation: less than 8700' (11,832 acres)

C. **FRPVT 3**— North Slope Low Elevation Ponderosa Pine – Douglas-fir
   Natural fire regime group I – frequent mixed fires
   Ponderosa pine – Douglas-fir/shrub-herb
   North-facing slopes: >15% slope Montane / lower elevation: less than 8300' (7,251 acres).

D. **FRPVT 4**— High Elevation Mixed Conifer – Aspen
   Natural fire regime group III – infrequent mixed fires
   Ponderosa pine-Douglas-fir-aspen-lodgepole pine-spruce
   Upper elevation: >8300' on north slopes; >8700' on south slopes
   Montane / all aspects (63,302 acres)

E. **FRPVT 5**— Riparian Valleys
   Natural fire regime group IV –infrequent replacement fires
   Valleys w/ meadow vegetation-willow-spruce – all elevations (5,246 acres)

F. **FRPVT 6**— High Elevation Grasslands
   Natural fire regime group II – frequent replacement fires
   High elevation grassy meadows with scattered ponderosa pine
   Expansive meadow area specifically in the Woodland Park-Divide area (5,562 acres).

G. **URBAN**— Those areas of urban influence such as shopping areas, industrial lots, parking lots, irrigated golf courses, etc. The key is that these types do not have sufficient vegetation-fuel to carry a wildfire nor to threaten structures. Housing developments with trees and lawns that do have sufficient vegetation-fuel to carry a wildfire or to threaten structures were attributed as "Urban Interface" and included in the appropriate FRPVT. (769 acres)

Table 3 shows the Trout-West Watershed modeling outputs that reflect the Fire Regime Potential Vegetation Types (FRPVT) and degree of departure from the historical Condition Class identified as the Historical Range of Variability (HRV). It also shows the total acres that need to be treated and maintained in order to bring the entire watershed toward a Condition Class I status.

Table 3. Vegetation Type (FRPVT) and Acres to be Maintained or Treated.

FRPVT #	Description	Acres	Cond. Class	HRV Dep.	Acres to Treat	Acres to Maintain	Total Acres to Treat
1	Undulating Pond. Pine	41,173	2	53	8,235	1,440	9,675
2	Low Elev. S-aspect Pond. Pine	11,832	2	39	710	576	1,286
3	Low Elev. N-aspect P. Pine/D. Fir	7,251	3	73	2,900*	219	3,119
4	High Elev. P. Pine/Aspen D. Fir/Spruce Lodgepole P.	63,301	2	55	13,926	2,947	16,873
Total		**123,558**	**2**	**54**	**25,771**	**5,182**	**30,953**

Source: Forest Service, R2 Core Data Pilot Project, 2001.

4.2.1.4 Analysis Revision

In June 2002 the 137,000-acre Hayman Fire affected approximately 25 percent of the analysis area. A reassessment analysis was conducted. Table 4 shows the reassessment of the modeling outputs reflecting the Fire Regime Potential Vegetation Types (FRPVT) and degree of departure from the historical Condition Class identified as the Historical Range of Variability (HRV) following the Hayman Fire. As in the previous analysis, it also shows the total acres that need to be treated and maintained to bring the entire watershed toward a Condition Class I status.

Table 4. Reassessment of Vegetation Type (FRPVT) and Acres to be Maintained or Treated.

FRPVT #	Description	Acres	Cond. Class	HRV Dep.	Acres to Treat	Acres to Maintain	Total Acres To Treat
1	Undulating Pond. Pine	41,173	2	45	4,941	1,770	6,711
2	Low Elev. S-aspect Pond. Pine	11,832	1	32	-----	663	663
3	Low Elev. N-aspect P.Pine/D.Fir	7,251	2	65	2,320	218	2,538
4	High Elev. P.Pine/Aspen D.Fir/Spruce Lodgepole P.	63,302	2	53	12,660	1,836	14,496
Total		**123,558**	**2**	**49**	**19,921**	**4,487**	**24,408**

Source: Forest Service, R2 Core Data Pilot Project, 2002.

The Hayman Fire burned approximately 2,730 acres in FRPVT 1 and approximately 3,390 acres in FRPVT 4 that had been considered for treatment prior to the fire. Both FRPVT types were in Condition Class 2 prior to the fire and remain as such following the fire. These two types comprise the greater vegetation types (approximately 87 percent) in the project area. The result is simply an acreage adjustment to the acres proposed for treatment. The Hayman Fire did cause a condition class change for FRPVT 2 from Condition Class 2 to 1 (from a departure of 39 to 32 – placing this just inside the 0 to 33 parameters of Condition Class 1). It also changed FRPVT 3 from Condition Class 3 to 2 (from a departure of 73 to 65 – to just within the 34 to 66 parameters for Condition Class 2). The overall weighted departure from the Historical Range of Variability (HRV) across all FRPVTs decreased from 54 to 49. However, with this HRV reduction the area still remains in Condition Class 2 status.

In summary, the impacts on the analysis area from the Hayman Fire translate into an approximate 20 percent reduction in overall recommended minimum fuel treatment acres (including both treatment and maintenance needs).

4.2.2 Project Area

The Trout Creek and West Creek defined watersheds contain approximately 123,600 acres that comprise the analysis area. In early June 2002, the 137,000-acre Hayman Fire burned west of the project area, consuming approximately 25 percent of the analysis area. Prior to the Hayman Fire, the area proposed for treatment was approximately 25,400 acres within seven treatment units. The fire consumed one entire unit proposed for treatment and that unit has been dropped from consideration.

The project area proposed for treatment (post-Hayman Fire) is approximately 20,200 acres and represents approximately 16 percent of the entire watershed.

The project area is comprised of six (6) treatment units that would receive a variety of prescribed treatments. A field reconnaissance was conducted during the field season of 2001. The purpose was to verify existing stand composition and fuel conditions on the units. No sampling data was collected during this field reconnaissance. However, 10 sample plots were later taken as a random check of fuel conditions in the various stands and differing aspects. A separate effort was undertaken in the R2 Core Data Pilot project that modeled the current vegetative conditions. A correlation was made to compare results of the field reconnaissance and modeling efforts. This resulted in identifying the current conditions. The existing conditions for each unit are discussed below.

4.2.2.1 Long John

The Long John treatment unit is located east of State Highway 67 and is in the southern portion of the Manitou Experimental Forest. The unit has mostly westerly facing slopes that vary from 0 to 60+percent. Elevations range from 7,600 feet to 8,400 feet. The vegetation consists of differing stands of ponderosa pine, Douglas-fir, aspen, spruce and limber pine. Dwarf mistletoe has heavily infected much of the ponderosa pine. Stand over-crowding is common. Aspen is greatly impacted because of shading from dominant trees.

4.2.2.2 Phantom

The Phantom treatment unit is located in the southwestern lower portion of the project. Elevations range from 8,200 feet to 9,469 feet (peak of Signal Butte). Slopes in this unit are predominately easterly facing and vary from 5 to greater than 60 percent. Vegetation consists of differing stands of ponderosa pine, Douglas-fir, and aspen. Dwarf mistletoe has heavily infected much of the ponderosa pine. In the past, some commercial harvesting has occurred on this unit. Stand over-crowding is common. There are some stands with heavy dense Douglas-fir seedlings and saplings that create volatile ladder fuels.

4.2.2.3 Rampart

The Rampart treatment unit is located along the eastern edge of the project area and is part of the Rampart Range. The unit is long and narrow, traversing north to south. Slopes range from 0 to greater than 60 percent and are generally oriented in a west- or east-facing direction. Elevations range from 8,200 feet to 9,400 feet. Vegetation consists of differing stands of ponderosa pine, Douglas-fir, aspen, and lodgepole pine. Dwarf mistletoe has heavily infected much of the ponderosa pine. Stand over-crowding is common. The lodgepole stands have the greatest amount of stems/acre. Aspen is impacted because of heavy shading from dominant trees.

4.2.2.4 Ridgewood

The Ridgewood treatment unit is located east of State Highway 67 and in the central and northern portions of the Manitou Experimental Forest. The unit has slopes ranging from 0 to greater than 60 percent. Slopes generally face west. Elevations range from 7,600 feet to 9,200 feet. There are some residences located within and adjacent to the unit. The Manitou Experimental Forest headquarters is located in the southern portion of the unit. Vegetation consists of differing stands of ponderosa pine, Douglas-fir, and aspen. Dwarf mistletoe has heavily infected much of the ponderosa pine. In the past, some commercial harvesting has occurred on this unit. Stand over-crowding is common.

4.2.2.5 Ryan Quilan

The Ryan Quilan treatment unit is located west of State Highway 67. Slopes in this unit are predominately east-facing and vary from 5 to greater than 60 percent. Vegetation consists of differing stands of ponderosa pine, Douglas-fir, and aspen. Elevations range from 7,800 feet to 9,000 feet. Dwarf mistletoe has heavily infected much of the ponderosa pine. In the past, some commercial harvesting has occurred on this unit. Stand over-crowding is common. There are some stands with heavy dense Douglas-fir seedlings and saplings that create volatile ladder fuels.

4.2.2.6 Skelton

The Skelton treatment unit is located west of Woodland Park and north of US Highway 24. Slopes in this unit are predominately east-facing and vary from 5 to greater than 60 percent. Vegetation consists of differing stands of ponderosa pine, Douglas-fir, and aspen. Elevations range from 8,200 feet to 9,100 feet. Dwarf mistletoe has heavily infected much of the ponderosa pine. In the past, some commercial harvesting has occurred on this unit. Over-crowded stands are common. There are some stands with heavy dense Douglas-fir seedlings and saplings that create volatile ladder fuels. A large number of standing dead trees exists in some areas. In the Douglas-fir/aspen types, aspen occupies approximately 50 percent of the vegetative cover but is heavily shaded by overstory conifer species.

4.2.3 Fuel Loading

4.2.3.1 Existing Dead and Down Fuel Loads

Fuel load data was not collected before this project initiation and no inventory data was conducted under this project. Therefore, to assist in determining an estimate of current fuel loads, a random sampling of 10 plots were taken during 2001. These sample plots were inventoried on varying aspects and in four major fire regimes. Table 5 presents a summary of data collected from the 10 plots. The current fuel load data shows an average of 18 tons per acre, with a low of 11 tons per acre and a high of 34 tons per acre.

Table 5. Summary Table Reflecting Tons/Acre based on 10 Fuels Inventory Sample Plots.

Plot Number	Understory				Ground Fuels			Dead and Down						Totals
	Grass	Shrub	Regeneration	Subtotal	Litter	Duff	Subtotal	1 hr.	10 hr.	100 hr.	1,000 hr.	10,000 hr.	Subtotal	
1	0.10	1.00	1.50	2.60	2.80	3.70	6.50	0.40	0.70	1.50	1.00	1.00	4.60	13.70
2	0.10	0.40	1.20	1.70	3.50	6.00	9.50	0.40	0.70	2.00	2.70	2.00	7.80	19.00
3	0.03	0.20	1.00	1.23	2.50	2.30	4.80	0.35	0.45	0.90	0.30	5.00	7.00	13.03
4	0.00	0.10	1.00	1.10	3.20	4.00	7.20	0.30	0.50	2.70	1.75	0.00	5.25	13.55
5	0.25	0.00	0.30	0.55	2.80	4.00	6.80	0.35	0.70	1.50	1.00	0.00	3.55	10.90
6	0.15	0.20	0.60	0.95	5.00	6.30	11.30	0.40	0.75	1.50	0.90	0.80	4.35	16.60
7	0.40	0.60	0.25	1.25	2.50	5.00	7.50	1.80	1.00	2.60	5.00	8.00	18.40	27.15
8	0.04	0.30	3.50	3.84	4.75	8.00	12.75	0.90	1.00	4.00	1.80	10.00	17.70	34.29
9	0.20	1.25	1.50	2.95	1.75	2.25	4.00	0.40	0.90	2.30	0.20	1.70	5.50	12.45
10	0.03	0.30	3.00	3.33	3.80	3.00	6.80	0.50	0.55	0.75	1.00	3.00	5.80	15.93
Totals	1.30	4.35	13.85	19.50	32.60	44.55	77.15	5.80	7.25	19.75	15.65	31.50	79.95	176.60
Average	0.13	0.44	1.39	1.95	3.26	4.46	7.72	0.58	0.73	1.98	1.57	3.15	8.00	17.66

Source: Rogers et al. 2001 and Teams Enterprise 2002.

4.2.3.2 Expected Slash to be Generated from Thinning Operations

The proposed thinning operations will generate slash, which creates additional on-site fuel loads. The average mean diameter (dbh) for merchantable trees was estimated to be 11.0 inches and sub-merchantable at 6.5 inches. An average of 72 trees are expected to be cut in the 11.0-inch category and 108 trees in the 6.5-inch category. Slash weights were then estimated using these values. The *Handbook for Predicting Slash Weight of Western Conifers* (Brown et al. 1977) was used to determine the estimated average tons per acre. For the 11.0-inch diameter class, the slash weight is estimated at 8 tons per acre. For the sub-merchantable 6.5-inch diameter class, the slash weight is estimated at 6 tons per acre. The average slash weight is estimated at 14 tons per acre. The following Table 6 reflects these calculations.

Table 6. Estimated Slash Weight Expected Following Thinning Operations.

Mean Avg. DBH[1]	Weight By Species[2]					Avg. # Trees Per Acre	Estimated Slash Weight	
	PP	DF	GF	ES	AVG.		Lb./Ac.	Tons/Ac.
11.0 > 3"	216	160	207	183	192			
11.0 < 3"	16	23	26	23	22			
Total	**232**	**183**	**233**	**206**	**214**	**72**	**15,408**	**7.7**
6.5" > 3"	77	72	87	78	79			
6.5" < 3"	16	23	26	23	22			
Total	**93**	**95**	**113**	**101**	**101**	**108**	**10,908**	**5.5**

[1] Mean Average Diameter for Trout-West Project Area Before Treatment.
[2] Values by Species Derived from Tables 1 and 4, USDA Forest Service General Technical Report INT-37. Species displayed are ponderosa pine (PP), Douglas-fir (DF), Grand fir (GF), and Engelmann spruce (ES).
Source: Teams Enterprise 2002.

4.2.3.3 Time Lag Fuels

Air quality evaluations require fuel loads to be stratified by time lag fuel categories. Since no data was field collected other than the 10 sample plots, it was necessary to use existing information. Therefore, data from the 10 sample plots was used to proportion the existing dead and down fuels by time lag classes. These values were applied to the estimated slash projected expected to be generated from fuel treatment operations. Table 7 reflects the estimated tons per acre for fuel loads distributed by time lag fuels categories. The estimate of slash generated was performed for the 11.0 and 6.5 inch mean average dbh stratification. The estimated tons per acre for dead and down and generated slash (both 11.0 and 6.5 mean average dbh) were summed by time lag classes. These values are used as input for air quality considerations.

Table 7. Estimated Tons per Acre of Existing Dead and Down Fuels and Slash Generated from Thinning Operations by Time Lag Fuels Distribution.

	Estimated Time Lag Fuels in Tons per Acre					
Fuel Component	**1 hr.**	**10 hr.**	**100 hr.**	**1,000 hr.**	**10,000 hr.**	**Totals**
Existing Dead and Down[1]	0.58	0.73	1.98	1.57	3.15	8.01
Generated Slash[2]						
11.0 Mean Ave. dbh	0.50	0.70	1.90	1.50	3.10	7.70
6.5 Mean Ave. dbh	0.70	0.80	2.20	1.80	0 [3]	5.50
Totals	**1.78**	**2.23**	**6.08**	**4.87**	**6.25**	**21.21**

[1]From Table 5 (Summary Table Reflecting Tons per Acre Based Upon Ten Fuel Inventory Sample Plots).
[2]Distribution of total estimated fuel volume based on Table 6 (Estimated Slash Weight Expected Following Thinning Operations).
[3]Assumes no estimate for 10,000-hour fuels in the 6.5 mean average dbh class. The 10,000-hour fuel component is for larger than 9-inch material.
Source: Teams Enterprise 2002.

5. ENVIRONMENTAL CONSEQUENCES

5.1 ISSUES AND ISSUE MEASUREMENT

A discussion for the issue of Crown Fire Hazard is found in Section 4.1 of this report. A comparison of the estimated effectiveness and estimated percentage of risk is calculated for each alternative. The effectiveness ratings are based on a scale of 0 to 10 with the higher number reflecting the greatest benefit (effectiveness) in meeting the stated Purpose and Need for this project. (See Section 1.1.) Risk is evaluated based on the amounts of treatment acres in Condition Classes 2 and 3 and their subsequent transition of acreages into Condition Class 1. In addition, the *Upper South Platte Protection and Restoration Project Risk Analysis* (Culver 2002) was used as a proxy to assist in the risk evaluation for this project. Under this analysis, the estimated average for a large damaging wildfire size was projected to be 10,500 acres (a composite average based on acres burned under the Hi Meadow and Buffalo Creek wildfires). Risk for this analysis is considered as the probability that a large damaging wildfire of 10,500 acres will occur within a 10-year period.

5.1.1 Short Term

In the short term (10 years) following treatment and depending upon the alternative implemented, the project area will receive the greatest level of protection against large damaging wildfire. The location and amount of follow-up maintenance that may occur on this project during this period is expected to be minimal. However, it is critical during this time frame to begin consideration and planning for implementing maintenance treatments beyond the tenth year. Not to do so sets the stage for vegetative conditions to begin regressing toward the unacceptable vegetation conditions that currently exist. The environmental consequences of each alternative are discussed below.

5.1.2 Long Term

The long-term effects (10 to 50 years and beyond treatment) of this project are totally dependent upon the degree of maintenance treatment that occurs during this period. Without implementation of a maintenance treatment program that addresses the entire project area, vegetative conditions will begin a regression from Condition Class 1 to Condition Class 2 and ultimately Condition Class 3. By the 50^{th} year and beyond, large, damaging, high intensity wildfire occurrence will become more prevalent.

With the implementation of a maintenance treatment program across the project area, the benefits derived from the proposed vegetative changes will continue into and beyond the 10- to 50-year period. The related effects by each alternative are discussed in the following sections.

5.2 NO ACTION

5.2.1 Direct and Indirect Effects

There would be no treatment on the existing Condition Class 2 and 3 acreages under No Action. Zero percent of existing dead and down fuels would be removed. No reduction would occur in the number of stems per acre to reduce crown closure and overstocked stands. The large amount of dead and living fuel as well as the continuity of fuel from the ground to the upper canopy (ladder fuels) would continue to build. This would foster continuance of conditions leading to high and extreme fire intensity levels that result in unacceptable extreme fire behavior.

Suppression resources would continue to face a high level of difficulty and hazardous conditions in attempting to control wildfires. Flame lengths (8 feet and greater) would exceed levels that provide for suppression success.

Current threats to the Wildland Urban Interface (including homes, other building and human improvements on private lands) resulting from severe wildfire conditions would continue.

Conditions for potential wide-scale, high to extreme stand-replacing fires would continue at the current rate and potentially increase over time. There is a 100 percent risk that a large damaging (stand-replacement) wildfire would occur in the project area within the next 10 years. There is the same risk for more than one additional large damaging wildfire to occur in the watershed. (See Table 8 in the Comparison of Alternatives section.) The watershed is projected to burn entirely over a 30-year period.

Conditions under the No Action alternative would have a significant negative effect on air quality and public and firefighter safety. Hydrologic and soil functions and wildlife habitat would continue to be negatively impacted. The Trout Creek, West Creek, and related municipal watersheds would continue to be threatened by the continued high risk for hazardous and large, damaging, high intensity crown fires. Severe degradation of these watersheds would result in the event such wildfires occur.

5.2.2 Cumulative Effects

The cumulative effects of No Action would result in continuance of the current vegetative conditions. Cumulatively, there would be an increase in the degradation of approximately 2,001 acres in Condition Class 1 areas located within the project area. These acreages would regress into Condition Class 2 acreages. The Trout Creek and West Creek watersheds would be at greater risk in both the short and long term.

Two projects that may have an effect within the analysis area but are not directly tied to the project area are the Polhemus Prescribed Fire and the Trout Creek Timber Sale. The Polhemus Prescribed Fire (a broadcast burn) was conducted during the fall of 2001 and covered approximately 8,000 acres as a low intensity burn through all four vegetation types. The Trout Creek Timber Sale was conducted in vegetation type FRPVT 1. The Hayman Fire consumed approximately 950 acres of the timber sale area. While the two areas provide a reduction of risk and fuel hazard to their immediate areas of treatment, sufficient acreages have not been treated to effectively reduce the Fire Regime Condition Class without implementing other treatments throughout the project area.

5.3 EFFECTS COMMON TO ALL ALTERNATIVES

The effects common to all alternatives occur from the treatment of the Neighboring Private Land Zone up to one-half mile of the one-mile Buffer Zone. Treatments of the hazardous fuel conditions in this area produce the same end results under all alternatives. However, it must be noted that in responding to general public concerns over broadcast burning, the one-mile Buffer Zone receives pile and burning treatments, whereas Alternative D specifies broadcast burning only. (See Section 2 for a detailed description of treatment.) Upon completion of treatment, these areas would become Condition Class 1.

5.4 PROPOSED ACTION ALTERNATIVE

5.4.1 Direct and Indirect Effects

Implementation of this alternative would greatly reduce the risk for hazardous and large, damaging, high intensity crown fires. Under this alternative, 20,170 treated acres would change into low departure acreages. In treated areas, the number of stems per acre would be reduced. A reduction of crown closure would occur (from 25 percent and greater crown closure down to 15 to 20 percent). The large amount of dead and living fuel as well as the continuity of fuel from the ground to the upper canopy (ladder fuels) would be interrupted. This would greatly reduce the risk for the continuance of conditions that lead to high and extreme fire intensity levels, resulting in unacceptable extreme fire behavior. However, wildfires would continue to occur, burning with faster spread rates but with lower fire intensities. Smoke generated from prescribed fires (broadcast and pile burning) would produce some emissions that may affect the public but to a much lesser extent than that of large damaging wildfires.

Suppression resource actions would have greater success because of the lighter (more grass and shrubs) fuels that would exist following treatment. Resistance to control (suppression) would be less difficult and ground fires, as they occur, would be expected to burn at flame lengths four feet high or less. Fuel ladders would not be common. Canopy openings would negate the establishment of crown fire propagation.

The risk for a large, damaging, high intensity (stand-replacement) fire to occur would be considerably lessened. Wildfires would continue to occur, but would not be as damaging or extensive.

Within and adjacent to the treated areas, there is a estimated 2 percent risk in any given year and a 10 percent risk for a large, damaging, high intensity wildfire to occur within the next 10 years. For the balance of the watershed, there is an estimated 3 percent per year and a 15 percent risk for such an event within 10 years. Current threats to the Wildland Urban Interface (including homes, other building and human improvements on private lands) resulting from severe wildfire conditions would be greatly minimized. The conditions for potential wide-scale, high to extreme stand-replacing fires would be greatly lessened. Conditions resulting from implementation of this alternative would significantly improve public and fire fighter safety.

In the treated areas, hydrologic and soil functions and wildlife habitat would have improved protection from large, damaging wildfires. For the balance of the watershed, similar benefits would be received, as the threat from damaging wildfire would be less. The strategic location of the treated areas would provide for a buffer from such wildfires. The Trout Creek, West Creek, and related municipal watersheds would be less threatened from the high risk for hazardous and damaging high intensity crown fires.

5.4.2 Cumulative Effects

The cumulative effect from implementing this alternative would be to bring vegetative conditions in areas currently identified as Condition Class 2 and 3 into Condition Class 1. Two projects that may have an effect within the analysis area but are not directly tied to the project area are the Polhemus Prescribed Fire and the Trout Creek Timber Sale. The Polhemus Prescribed Fire (a broadcast burn) was conducted during the fall of 2001 and covered approximately 8,000 acres as a low intensity burn through all four vegetation types. The Trout Creek Timber Sale was conducted in vegetation type FRPVT 1. The Hayman Fire consumed approximately 950 acres of the timber sale area. The Proposed Action in combination with the treatments of these two areas would provide effective reductions in the Fire Regime Condition Classes. The consequence of these actions would move the entire Trout Creek and West Creek Watersheds toward the more favorable environmental conditions experienced prior to the European settlement period. Fire, when occurring across the landscape, would not have the far-reaching negative consequences that it currently does. Implementation of a program across the watershed would maintain vegetation in Condition Class 1, thereby providing an opportunity for wildfires to resume its more natural role in a fire dependant ecological system.

The Wildland Urban Interface (including homes, other building and human improvements on private lands), and public and firefighter safety would be provided a greater level of protection against potential wide-scale, high to extreme stand-replacing fires.

Hydrologic and soil functions and wildlife habitat would have long-term improved protection from large, damaging wildfires. The Trout Creek, West Creek and related municipal watersheds would be provided a high level of protection from the high risk for hazardous and damaging high intensity crown fires.

5.5 ALTERNATIVE A: NO BURNING

No burning will occur in the project area under this alternative.

5.5.1 Direct and Indirect Effects

The effects of implementing this alternative are very similar to the Proposed Action except as noted below. Under this alternative, 19,220 treated acres would change into low departure acreages. The no burning of dead and down fuels and activity-generated slash is the reason for the variation in acreages between this alternative and the Proposed Action. Smoke emissions would not be generated because of the lack of burning activities.

The risk for a large, damaging, high intensity (stand-replacement) fire to occur would be considerably lessened. Wildfires would continue to occur, but would not be as damaging or extensive.

Within and adjacent to the treated areas, there is a estimated 2 percent risk in any given year and a 10 percent risk for a large, damaging, high intensity wildfire to occur within the next 10 years. For the balance of the watershed, there is an estimated 3 percent per year and a 15 percent risk for such an event within 10 years.

5.5.2 Cumulative Effects

The cumulative effects from implementing this alternative are the same as under the Proposed Action.

5.6 ALTERNATIVE B: TREATMENT OF WILDLAND URBAN INTERFACE ZONE

This Alternative is similar to the Proposed Action except only the Wildland Urban Interface zone will be treated.

5.6.1 Direct and Indirect Effects

Implementation of this alternative would reduce some of the risk for hazardous and large damaging high intensity crown fires in the areas treated. Under this alternative, only 13,570 acres would be treated. These acreages would change vegetative conditions into low departure acreages. However, there would continue to be approximately 16,430 acres remaining at great risk. In treated areas, the reduction in the number of stems and ladder fuels would be similar to the Proposed Action. There are less treated acres requiring pile burning, therefore smoke generated from these activities would produce less emissions. The effect on the public would be lessened from these activity treatments. However, with fewer acres treated under this alternative, more acres remain untreated and the overall risk to the watershed is greater. With a higher level of risk, the smoke generation from large damaging wildfires would continue to negatively impact the air quality from such events.

Suppression resource actions would have success in the treated areas because of the lighter (more grass and shrubs) fuels that would exist following treatment. Resistance to control (suppression)

would be less difficult and ground fires, as they occur, would be expected to burn at flame lengths four feet high or less in the project area. Fuel ladders would not be common. Canopy openings would negate the establishment of crown fire propagation.

The risk for a large, damaging, high intensity (stand-replacement) fire to occur would be considerably lessened. Within and adjacent to the treated areas, there is a estimated 5 percent risk in any given year and a 50 percent risk for a large damaging high intensity wildfire to occur within the next 10 years. For the balance of the watershed, there is an estimated 6 percent per year and a 30 percent risk for such an event within 10 years.

In the treated areas, hydrologic and soil functions and wildlife habitat would have improved protection from large, damaging wildfires. For the greater portion of the untreated watershed, similar benefits would not be received, as the threat from damaging wildfire would continue. The strategic location of the treated areas would provide for a buffer from such wildfires. The Trout Creek, West Creek, and related municipal watersheds would be less threatened from the high risk for hazardous and damaging high intensity crown fires.

5.6.2 Cumulative Effects

The cumulative effects from implementing this Proposed Action would bring vegetative conditions in areas currently identified as Condition Class 2 and 3 into Condition Class 1. Projects that have been completed, such as the Polhemus Prescribed Fire and the Trout Creek Timber Sale, do contribute to an increase in the effectiveness of this alternative when combined with the proposed Alternative B treatments. However, these projects by themselves are not sufficient in size to reduce the Fire Regime Condition Classes. The combination of these projects with the proposed Alternative B treatments would move the entire Trout Creek and West Creek Watersheds toward the more favorable environmental conditions experienced prior to the European settlement period. Fire, when occurring across the landscape, would not have the far-reaching negative consequences that it currently does, but not to the extent realized under the Proposed Action. There is less opportunity for wildfire fire to resume its more natural role under this alternative.

The Wildland Urban Interface (including homes, other building and human improvements on private lands), and public and firefighter safety would be provided a high level of protection against potential wide-scale, high to extreme stand-replacing fires.

Hydrologic and soil functions and wildlife habitat would have long-term improved protection from large, damaging wildfires in the treated areas. The Trout Creek, West Creek, and related municipal watersheds would be provided a high level of protection from the high risk for hazardous and damaging high intensity crown fires.

5.7 ALTERNATIVE C: NO NEW TEMPORARY ROADS

This alternative is similar to the Proposed Action but no new temporary roads will be constructed

5.7.1 Direct and Indirect Effects

The effects of implementing this alternative are very similar to the Proposed Action, except as noted below. Implementation of this alternative would greatly reduce of the high risk for hazardous and large damaging high intensity crown fires. Under this alternative, 20,170 treated acres would change into low departure acreages. The lack of temporary road access during treatment activities does have some negative effect upon fire suppression capabilities specific to the limited operational periods. This is not considered to be very significant.

5.7.2 Cumulative Effects

The cumulative effects from implementing this alternative are the same as under the Proposed Action.

5.8 ALTERNATIVE D: TREATMENT LIMITED NEAR PRIVATE LANDS

Under this alternative, the Proposed Action is modified and treatment actions are limited to within one-half mile of private lands.

5.8.1 Direct and Indirect Effects

Implementation of this alternative would treat only 6,750 acres or approximately 20 percent of the project area, and would change those acres into low departure. In treated areas, the number of stems per acre would be reduced but not to the extent realized under the Proposed Action. A lessening of crown closure would occur but not necessarily to the desired 10 to 20 percent. Without the greater level of crown closure reduction, the risk for a large damaging wildfire remains higher. Outside of treated areas, the current and unacceptable crown closures would remain on 23,250 acres of the project area. The large amount of dead and living fuel as well as the continuity of fuel from the ground to the upper canopy (ladder fuels) would be interrupted only on approximately 23 percent of the area needing treatment. This would not greatly reduce the risk for the continuance of conditions leading to high and extreme fire intensity levels throughout the watershed. Wildfires would continue to occur within the one-half mile of treated area adjacent to private lands. Within this zone, fires would burn with faster spread rates, but with lower fire intensities. Outside of the treated area, wildfires would continue to burn under conditions similar to No Action.

Suppression resource actions would have greater success in the one-half mile treated area because of the lighter (more grass and shrubs) fuels that would exist following treatment. Resistance to control (suppression) would be less difficult and ground fires, as they occur, would be expected to burn at flame lengths four feet high or less. Fuel ladders would not be common in this zone. However, in the greater project area, suppression success would remain similar to current conditions with greater resistance to control, flame lengths greater than four feet, fuel ladders more common, and high canopy closures. These factors continue the risk for large, damaging, high intensity wildfires.

Within and adjacent to the treated areas, there is a estimated 8 percent risk in any given year and a 80 percent risk for a large, damaging, high intensity wildfire to occur within the next 10 years. For the balance of the watershed, there is an estimated 10 percent per year and a 100 percent risk for such an event within 10 years.

Current threats to the Wildland Urban Interface (including homes, other building and human improvements on private lands) resulting from severe wildfire conditions would be minimized. The conditions for potential wide-scale, high to extreme stand-replacing fires would be somewhat lessened. Except in the treated zone, public and firefighter safety in the balance of the watershed would not be significantly improved.

In the treated areas, hydrologic and soil functions and wildlife habitat would have improved protection from large, damaging wildfires. For the balance of the watershed, these resources would be affected in a manner similar to No Action. The Trout Creek, West Creek, and related municipal watersheds would remain threatened from the high risk for hazardous and damaging high intensity crown fires.

5.8.2 Cumulative Effects

The cumulative effects from implementing this alternative would be similar to the cumulative effects under No Action. This alternative would not bring vegetative conditions in areas currently identified as Condition Class 2 and 3 into Condition Class 1. In not doing so, the entire Trout Creek and West Creek Watersheds would remain in unfavorable environmental conditions. The opportunity for wildfire fire to resume its more natural role in a fire dependant ecological system would not occur.

The Wildland Urban Interface (including homes, other building and human improvements on private lands), and public and firefighter safety would be provided a level of protection against potential wide-scale, high to extreme stand-replacing fires, but not to the same level as the preferred alternative.

Hydrologic and soil functions and wildlife habitat would have continued threats from large, damaging wildfires. The Trout Creek, West Creek, and related municipal watersheds would not be provided a high level of protection from the high risk for hazardous and damaging high intensity crown fires.

5.9 ALTERNATIVE E: RAPID RETURN TO HISTORICAL WATERSHED CONDITION

This alternative is similar to the Proposed Action but moves the watershed more rapidly to the Historical Condition.

5.9.1 Direct and Indirect Effects

The effects of implementing this alternative are very similar to the Proposed Action, except as noted below. Under this alternative, 26,320 treated acres would change into low departure

acreages. The entire project area would more rapidly reflect the historical vegetative condition. Natural wildfire would resume its more applicable role in this fire dependent ecosystem. Wildfires would continue to occur, but would not be as damaging or extensive.

5.9.2 Cumulative Effects

The cumulative effects from implementing this alternative are similar to the Proposed Action.

5.10 COMPARISON OF ALTERNATIVES

A comparison of alternatives is shown in Table 8. This table displays a summary for the expected effectiveness and risk of implementing each alternative. Each alternative reflects the degree of effectiveness for reducing the Condition Class across the watershed from 2 to 1. The greater numerical value on a scale of 0 to 10 reflects a greater benefit. The second portion of this table reflects the expected risk of a large, damaging wildfire to occur over a 10-year period for each alternative considered. It should be noted that within the first decade (years 1 through 10) a gradual implementation of treatments would occur. By the tenth year, full effectiveness should be realized. Effectiveness is projected to remain through the end of the third decade (year 29).

The *Upper South Platte Protection and Restoration Project Roadless Area Economic Report* (Culver 2002) included a fire risk assessment that was used as a proxy to provide values for the estimated wildfire size and risk of occurrences. Therefore, the projected size of a large damaging wildfire would be approximately 10,500 acres for the project area. Such a fire is nearly certain to occur in the project area within a 10-year period. Similar risks are attributed to the rest of the analysis area; under No Action, the entire watershed is predicted to burn in a 30-year period. Treatment within the project area has the potential to reduce risk of damaging wildfire in treated and untreated areas in the watershed (Ibid.).

The project would be increasingly effective as it is implemented. Expected completion of treatments is by the tenth year. At that time (year 10), it would be fully effective in reducing the risk of damaging wildfire for a 20-year period.

5.10.1.1 Project Effectiveness

The *Upper South Platte Protection and Restoration Project Roadless Area Economic Report* (Culver 2002) included a fire risk assessment that was used to provide values for the existing risk of damaging wildfire. The Upper South Platte project estimated the average size of a damaging wildfire was 10,500 acres, and such a wildfire would be nearly certain within a 10-year period.

The Trout-West Interdisciplinary Team (IDT) applied the Upper South Platte predictions to the watershed analysis area. Four such fires are predicted for the Trout and West Creeks watershed, given the size of the watershed, Condition Class analysis, and observed fire behavior during the Hayman Fire. One 10,500-acre wildfire is likely within the project area, and three within the watershed, outside the project area.

Under No Action, the entire watershed is predicted to burn in a 30-year period. Treatment within the project area has the potential to reduce risk of damaging wildfire in treated and untreated areas in the watershed, as is explained in the fire risk assessment for the Upper South Platte Project (Ibid.).

The project would become increasingly effective each year as more and more of the project was implemented. Expected completion of treatments is by the tenth year. At that time (year 10), it would be fully effective in reducing the risk of damaging wildfire, and would remain effective for a 20-year period.

Fire Regime Condition Class modeling was conducted prior to the Hayman Fire and redone after the fire (see Tables 3 and 4 in Section 4). The Proposed Action and action alternatives were also amended after the fire.

Post-Hayman Fire Acres to Treat/Maintain are shown in Table 8. These values were compared with treatment acreages in the alternatives to determine whether each alternative fully reduces Fire Regime Condition Class. Table 8 shows the acreage treated in the Proposed Action and Alternative E. These alternatives treat an adequate number of acres to fully reduce Condition Class, particularly in Vegetation Types 1 and 4. Note that the predominant type needing treatment is Vegetation Type 4 and this type is the predominant type proposed for treatment in the Proposed Action and Alternative E.

Table 8. Fire Regime Condition Class Analysis Acres Needing Treatment and Compared Against the Proposed Action and Alternative E.

FRPVT #	Post-Hayman Fire Total Acres to Treat/Maintain	Alternative E Treat/Maintain	Proposed Action Treat/Maintain
1	6,711	5,860	4,489
2	663	1000	766
3	2,538	750	575
4	14,496	18,710	14,340
Total	**23,814**	**26,320**	**20,170**

Source: Teams Enterprise 2002.

Alternatives A and C treat acreage similar to the Proposed Action, and while there are differences between them, the overall effectiveness is the same.

Alternative B is estimated to be 60 percent effective when judged against No Action and the Proposed Action. The lesser amount of treated acres reduces the effectiveness of this alternative. As a result, risk is moderated in the project area but not to the extent found under the Proposed

Action and Alternative E. Hazardous fuel conditions would remain over a much larger area of the watershed, since only the Wildland-Urban interface zone is treated.

Alternative D is next to the least effective, being slightly better than No Action. Risk is very high due to the sizeable acreages remaining untreated. This risk factor is the same as No Action. There would be minimal movement in reducing the hazardous fuels within the project area given that only an estimated 20 percent of the fuels would be treated. The recent Hayman Fire bears out the projected risk associated with the No Action and Alternative D.

Table 9 summarizes the effectiveness rankings and percentage of risk for a large damaging wildfire. Table 10 shows acres of predicted wildfire each year once each alternative has been fully implemented.

Table 9. Summary of Effectiveness Ranking and Percentage of Risk for Large Damaging Wildfires by Alternative.

Alternative	Effectiveness Ranking		% Of Risk by Year					
			1		5		10	
	Project Area	Balance of Watershed	Project Area	Balance of Watershed	Project Area	Balance of Watershed	Project Area	Balance of Watershed
No Action	0	0	10	10	50	50	100	100
Proposed	9	5	2	3	10	15	20	30
A	8	4	2	3	10	15	20	30
B	6	3	4	6	20	30	40	60
C	9	5	2	3	10	15	20	30
D	2	1	8	10	40	50	80	100
E	10	5	2	3	10	15	20	30

Source: Teams Enterprise 2002.

Table 10. Acres of Wildfires Expected to Burn in the Watershed Area Based Upon Percentage of Risk for Large Damaging Wildfires by Alternative.

Alternative	Acres by Year		
	1	5	10
No Action	4,200	21,000	42,000
Proposed	1,150	5,750	11,500
A	1,150	5,750	11,500
B	2,310	11,550	23,100
C	1,150	5,750	11,500
D	3,990	19,950	39,900
E	1,150	5,750	11,500

Source: Teams Enterprise 2002.

6. GLOSSARY

Aerial Fuels – All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

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

Aspect – Direction towards which a slope faces.

Board Foot (bf) – The amount of wood contained in an unfinished board that is 1 inch thick, 12 inches long, and 12 inches wide.

Broadcast Burn – Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of a fuel hazard or as a silvicultural treatment, or both.

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

Chipping – The reduction of woody residue by a portable chipper to chips that are left to decay on the forest floor.

Crown Fire (Crowning) – The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Dead Fuels – Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.

Diameter at Breast Height (dbh) – The diameter of a tree measured 4 feet 6 inches above the ground.

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

Extreme Fire Behavior – "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One of more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, or strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Fine (Light) Fuels – Fast-drying fuels, generally with comparatively high surface area-to-volume ratios, which are less than one-quarter inch in diameter and have a timelag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fire Behavior – The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Intensity – A general term relating to the heat energy released by a fire.

Flame Height – The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are titled due to wind or slope.

Flame Length – The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Fuel – Combustible material. Includes vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees, which feed a fire. (See Surface Fuels.)

Fuel Bed – An array of fuels usually constructed with specific loading, depth, and particle size to meet experimental requirements; also, commonly used to describe the fuel composition in natural settings.

Fuel Loading – The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area and commonly expressed in tons per acre.

Fuel Reduction – Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

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

Fuel Type – An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Ground Fuel – All combustible materials below the surface litter, including duff, tree or shrub roots, punchy wood, peat, and sawdust that normally support a glowing combustion without flame.

Hazard Reduction – Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Heavy Fuels – Fuels of large diameter such as snags, logs, and large limb wood that ignite and are consumed more slowly than flash fuels.

Incident – A human-caused or natural occurrence, such as wildland fire, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural resources.

Ladder Fuels (Some times referred to as Fuel Ladders) – Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Large Fire – 1) For statistical purposes, a fire burning more than a specified area of land, e.g., 300 acres. 2) A fire burning with a size and intensity such that its behavior is determined by interaction between its own convection column and weather conditions above the surface.

Litter – Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Live Fuels – Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms rather than by external weather influences.

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

National Fire Danger Rating System (NFDRS) – A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

Prescribed Burning – The application of fire to fuels in either a natural or modified state under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, reduction of fuel hazard, etc.)

Prescribed Fire – Any fire ignited by management actions under certain predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescribed Fire Plan (Burn Plan) – This document provides the prescribed fire burn Boss with information needed to implement an individual prescribed fire project.

Prescription – Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Resources – 1) Personnel, equipment, services, and supplies available, or potentially available, for assignment to incidents. 2) The natural resources of an area, such as timber, crass, watershed values, recreation values, and wildlife habitat.

Slash – Debris left after logging, pruning, thinning or brush cutting; includes logs, chips, bark, branches, stumps, and broken understory trees or brush.

Snag – A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Stand Replacing Fire – A fire that consumes an entire stand of trees. These fires are generally of high to extreme intensities and burn large numbers of acres.

Suppression – All the work of extinguishing or containing a fire, beginning with its discovery.

Surface Fuels – Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

Thinning – Cutting trees to reduce the number of stems per acre to redistribute growth potential or benefit the quality of the residual stand.

Timelag – Time needed under specified conditions for a fuel particle to lose approximately 63 percent of the difference between its initial moisture content and its equilibrium moisture content. If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after four time lag periods.

Underburn – A fire that consumes surface fuels but not trees or shrubs. (See Surface Fuels.)

Wildfire (Wildland Fire) – Any non-structure fire, other than prescribed fire, which occurs on wildland.

Wildland – Land other than that dedicated for other uses such as agriculture, urban, mining, or parks.

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

Please note: All references for Appendix C are listed in the Final Environmental Impact Statement.