A Strategic Wildfire Protection Plan for the South Fork Mill Creek Watershed, Mt. Hood National Forest, Oregon

Pacific Biodiversity Institute

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Introduction

This report has been adapted from a presentation made by Peter Morrison of Pacific Biodiversity Institute on August 29, 2005 to the collaborative group working on the South Fork Mill Creek Watershed at the Hood River Public Library. The report documents and elaborates on the presentation of a fire planning solution for the South Fork Mill Creek Watershed, Oregon. The focus of the collaborative group and of this report is on the management of National Forest lands within the Watershed.

Both the original presentation and this report are not intended to provide a one-size-fits-all approach to land management for the purposes of wildfire risk reduction. Rather it is intended to provide general lessons across the landscape as well as a specific approach tailored to the South Fork Mill Creek Watershed. Any questions on the meaning of any specific aspect of this report should be directed to the author.

Overview

This report and the associated PowerPoint presentation covers four aspects of a successful wildfire management. These three aspects are:

1. Understanding the scientific basis for a strategic fire planning.

2. Exploration of the efficacy of thinning, prescribed fire and other fuel treatments from case studies and fire behavior modeling.

3. A strategic fire plan for the South Fork Mill Creek Watershed developed by Pacific Biodiversity Institute and Bark.

The scientific basis for a strategic fire plan

The staff of Pacific Biodiversity Institute has reviewed the scientific literature on wildfire planning, and the effect of management activities and landscape conditions on wildfire behavior. We have also studied numerous wildfires as they burn across the western United States and observed how landscape conditions and management activities affect the course and severity of wildfires (Morrison et al 2000, Morrison el al 2001, Morrison and Harma 2002, Harma and Morrison 2003a, Harma and Morrison 2003b, Morrison and Swanson 1990, Morrison 1984). From this literature review and our wildfire studies we have determined that actual fire behavior can be very unpredictable and is often worsened by logging and thinning – even when they are supposedly designed to reduce wildfire potential. While this conclusion may be counterintuitive to some people, there is ample evidence that stand-level treatments often do not perform as expected during actual wildfires.

Scientific Uncertainty about the Effects of Landscape-Level Stand Treatments on Wildfire Behavior

There is considerable scientific controversy over the effects of stand and landscape-level treatments on fire behavior. Issues involved in wildfire planning are complex. There are often no easy answers. This is one of many areas where simplistic solutions often make things worse rather than better. There is a lack of good information on the efficacy of many stand-level treatments. The recent summary of the Conference on Fire, Fuel Treatments and Ecological Restoration: Proper Place, Appropriate Time (April 16-18, 2002, Fort Collins, Colorado) states: *"The scientific basis for ecological restoration and fuel treatment activities is growing, but remains largely unsubstantiated, with isolated exceptions."* (Omni and Joyce 2003).

In September 2002 two letters were sent to President Bush and members of the US Congress by 23 prominent forest scientists about the scientific basis for efforts to reduce risks from forest fires (Franklin et al 2002 and Christensen et al 2002). The scientists wrote:

"*The value of thinning to address fire risks in other forest ecosystems is still poorly understood. Although a few empirically based studies have shown a systematic reduction in fire intensity subsequent to some actual thinning, others have documented increases in fire intensity and severity. Models and theories have been advanced to explain these results, but reliable data remain scarce*." These scientists go on to say that removal of mature trees can increase fire intensity and severity.

In the light of such uncertainty and lack of solid information, a cautious approach is warranted.

Evidence that commercial timber harvest may create a more hazardous wildfire situation

The concern that commercial logging and thinning may actually increase wildfire risk is not new. Forest scientists have been concerned about this phenomenon for more than 60 years. A study by William G. Morris in 1941 of forests at Westfir, Oregon revealed how clearcutting and partial cutting affect fire weather. Morris (1941) reported that fire weather in clearcuts can be seven times more severe than in adjacent uncut timber. Fire weather in partial cuts is also more severe and depends on the amount of canopy removed.

Nearly 50 years ago, further exploration of the effect of forest cutting was conducted. C.M. Countryman (1955), a US Forest Service research forester, reported that cutting of old forests drastically modifies the fire climate and that opening of a virgin, mixed conifer stand can increase the rate of fire spread up to 4.5 times. Countryman explains the physics involved. Forest cutting opens up the canopy so that sunlight can penetrate to the forest floor. As a result, temperatures increase at the forest floor and understory vegetation levels. Both the fine fuels and large fuels that are present below the canopy dry out more rapidly due to the temperature increases. Opening of the canopy also causes more air circulation, which greatly stimulates drying of fuels and desiccation of brush, grass and other vegetation below the canopy. As a result, all the fuels in a stand where the canopy has been reduced significantly become much drier than in the surrounding uncut forest. Then during a wildfire, winds are able to penetrate the cut stands much more readily than the uncut stands. These winds are able to push a fire through a cut stand much more rapidly than through the uncut forest.

It is ironic that the simple facts about logging and fire were well understood decades ago but seem to be conveniently ignored by many public agency personnel today. Over thirty years ago, the ***Journal of Forestry*** published an article by the Assistant Director of the US Forest Service's Pacific SW Forest and Range Experiment Station and a research forester in the PNW Exp. Station titled: "*The Fuel Buildup in American Forests: A plan of Action and Research*" (Wilson and Dell, 1971). The focus of this paper was primarily on the role that logging has played in increasing wildfire risk in our forests. They state that "*logging, thinning and road construction open up the forest and increase the amount of sunlight and wind at ground level*" which in turn increases fire severity and spread through logging slash.

The recent US Forest Service Chief, Mike Dombeck stated in the US Forest Service's fire management publication, Fire Management Today, *"Some argue that more commercial timber harvest is needed to remove small-diameter trees and brush that are fueling our worst wildlands fires in the interior West. However, small-diameter trees and brush typically have little or no commercial value. To offset losses from their removal, a commercial operator would have to remove large, merchantable trees in the overstory. Overstory removal lets more light reach the forest floor, promoting vigorous forest regeneration. Where the overstory has been entirely removed, regeneration produces thickets of 2,000 to 10,000 small trees per acre, precisely the small diameter materials* *that are causing our worst fire problems. In fact, many large fires in 2000 burned in previously logged areas laced with roads. It seems unlikely that commercial timber harvest can solve our forest health problems"* (Dombeck 2001).

The ***Sierra Nevada Ecosystem Project*** (a University of California study done in conjunction with the USFS PSW Research Station) states: "*Timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity*" (SNEP, 1996). The Sierra Nevada Forest Plan goes on to explain that reduction of forest canopy cover causes more severe fires by increasing the velocity of mid-flame winds. The Sierra Nevada Plan acknowledges, "… *in areas where the larger trees* (greater than 12 inches in diameter breast height) *have been removed, stand replacing fires are more likely to occur*."

Many other scientific studies conducted over the years have indicated that commercial logging activities that remove significant amounts of the forest canopy may have an adverse effect on fire behavior and increase wildfire risk (Beschta, et al, 1995; Fahnestock, 1968; Huff et al, 1995; Skinner and Weatherspoon 1996; Stephens 1998, USDA Forest Service. 1995; Weatherspoon and Skinner, 1995).

My own studies of the major wildfires that have occurred during the last three years indicate that logging often plays a significant role in creating a landscape condition where very large and damaging fires thrive (Morrison et al 2000, Morrison et al 2001, Morrison and Harma, 2002). Examples of some of the most newsworthy and damaging wildfires that have burned in landscapes that have been heavily modified by logging activities (including commercial thinning) include the Rodeo-Chediski fires in Arizona, the Valley-Skalkaho Fire Complex in Montana, the Jasper Fire in South Dakota, the Tyee Fire in Washington. In all these cases, intense fires occurred in heavily managed landscapes, burning between 80,000 and 500,000 acres.

Case Studies of the Efficacy of Various Management Activities and Fuel Treatments on Wildfire Behavior

Two case studies are examined here. The first is the case study of the Hayman Fire, which burned in the Front Range of Colorado, south of Denver Colorado in June 2002. This study was conducted by the US Forest Service and published in 2003 (Graham 2003). The second case study is of the Biscuit Fire, which burned in southern Oregon in July-September of 2002. This case study was conducted by the Pacific Biodiversity Institute and was published in 2003 (Harma and Morrison 2003a, Harma and Morrison 2003b).

Assessment of Fuel Treatment on Fire Severity Hayman Fire Case Study - 2003

A major part of the Hayman Fire Case study was a detailed analysis of a wide variety of stand and fuel treatments that had been conducted in the fire area during the decades prior to the fire.

Figure 58—Satellite imagery showing burn pattern of the Hayman Fire on June 20. Several features are well illustrated: (a) the Big Turkey wildfire (1998), (b) the origin of the southern major crown fire run on June 17 in untreated fuels south of the Turkey 1995 prescribed burn, (c) the area burned by this southern run on June 17 and enclosed by the green band of undamaged crowns indicating the ending position of the fire at the close of the burning period that day, and (d) the northern run that initiated by Thunder Butte (see fig. 57).

A post-fire satellite image of the Hayman Fire illustrates the presence of some unburned and lightly burned areas within the fire perimeter.

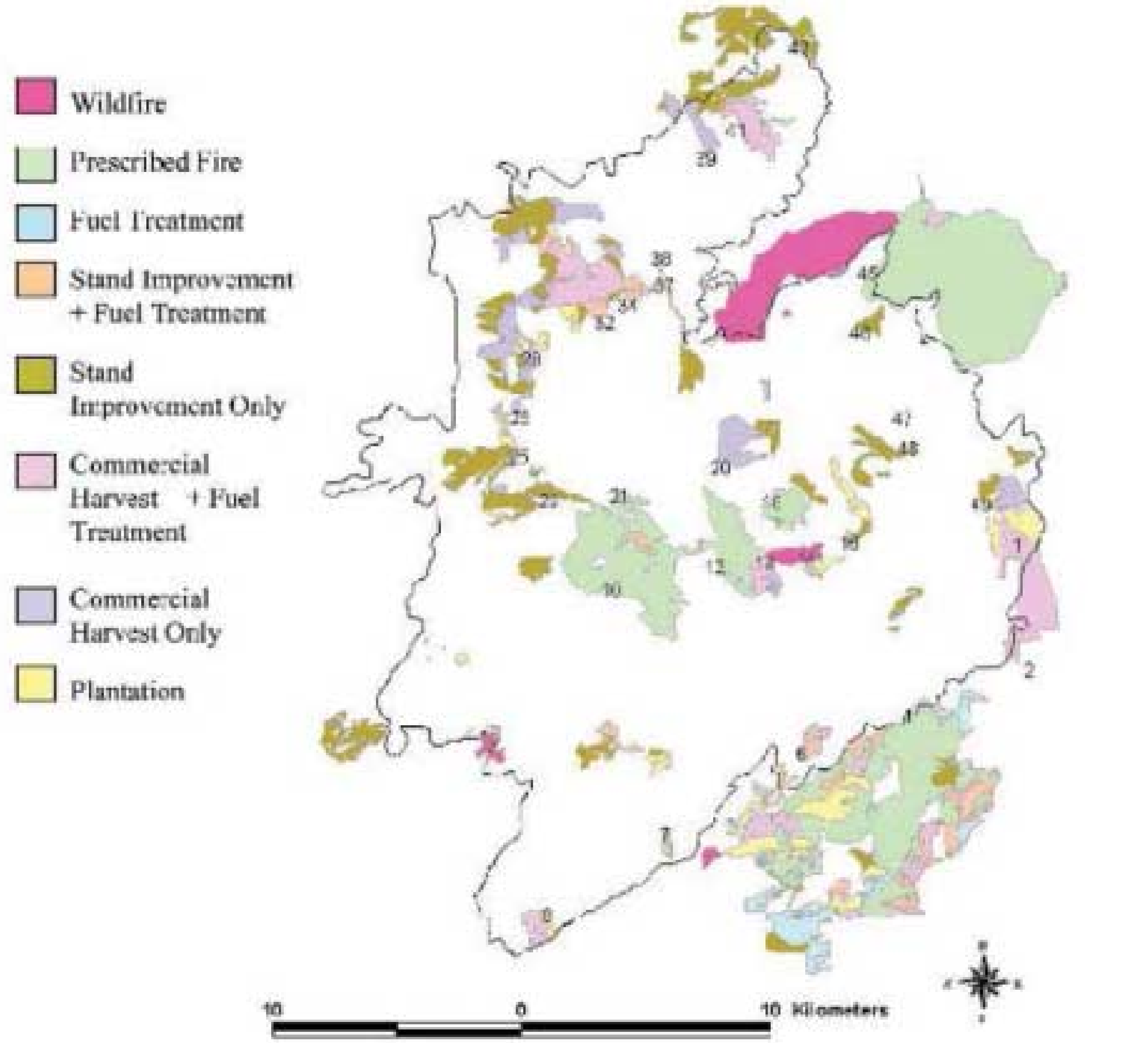


Figure 63—Approximate locations of helicopter photo points near fuel modified areas within the Hayman Fire.

The above map from the Hayman Fire Case Study illustrates the many types of fuel and stand treatments within the Hayman fire perimeter.

Most important findings of Hayman Fire Case Study

The Hayman Fire blew up on June 9, 2002 and overwhelmed most fuel treatment effects in areas burned by the heading fire that day. Several exceptions to this included the Polhemus prescribed burn (2001), the Schoonover wildfire (2002), and the Platte Springs wildfire (2002) that occurred less than 1 year earlier. These areas did actually appear to stop the fire locally; illustrating that removal of surface fuels alone (irrespective of thinning or changes to canopy fuels) can dramatically alter fire behavior within 1 year of treatment. Figure 23 below (from the Hayman Case Study) illustrates where the Hayman Fire stopped when it encountered the area burned in the Schoonover wildfire.

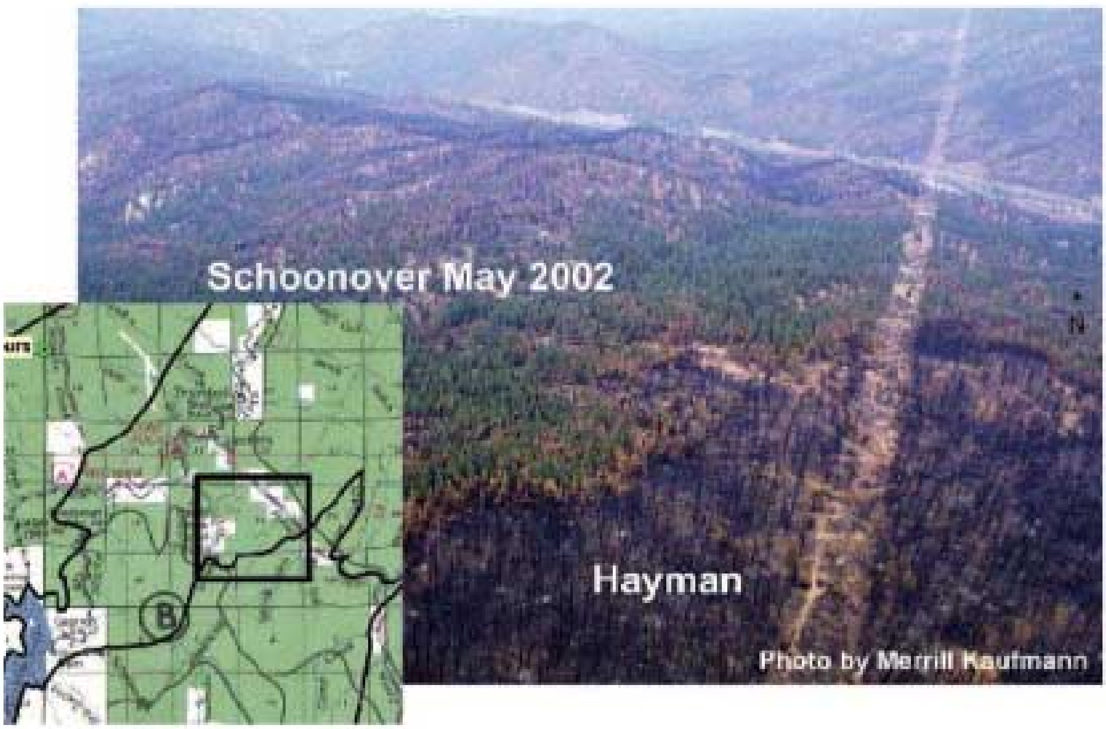
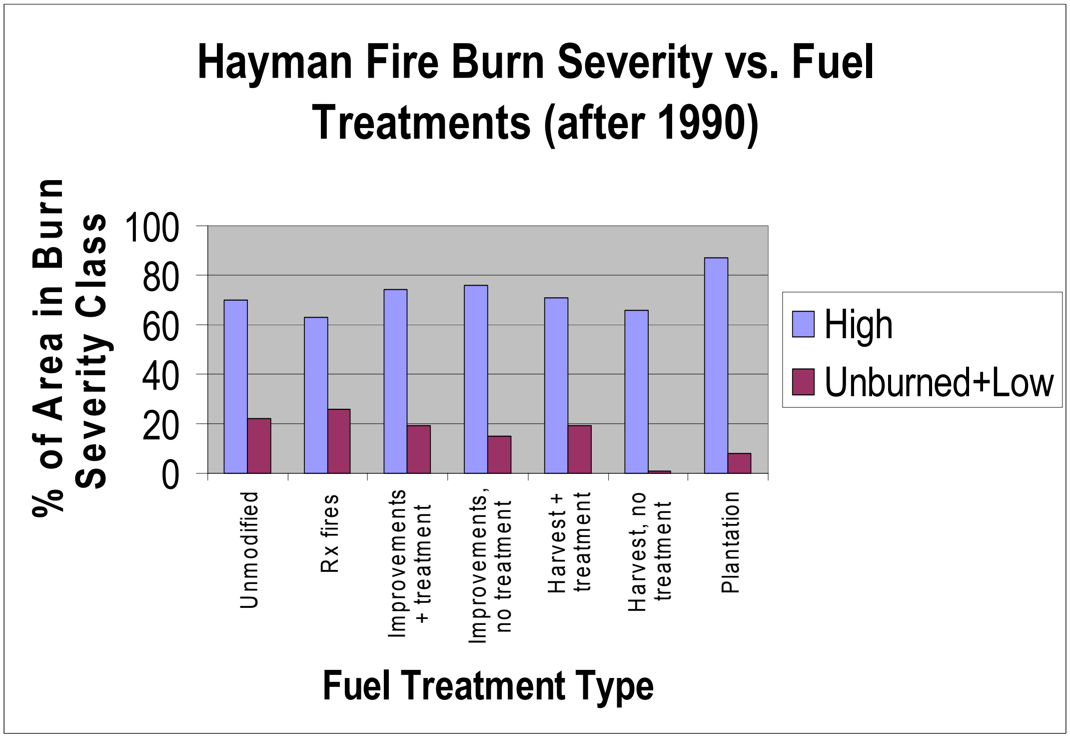
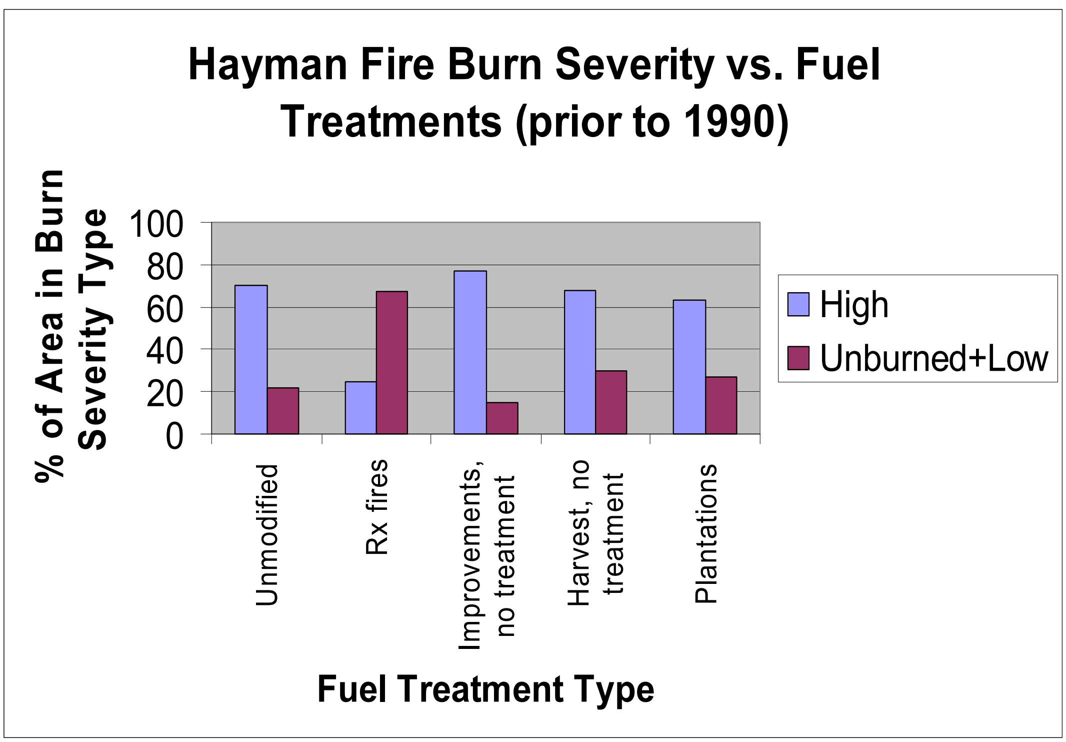


Figure 23—Green strip of underburned forest divides the Hayman Fire (left) and Schoonover wildfire (May 2002, right). The green strip was underburned by the Schoonover Fire 3 weeks before the Hayman Fire occurred and was not reburned by the Hayman Fire. Note the power line corridor in the picture and the inset map. (Photo by Merrill Kaufmann)

The Hayman Fire Case Study examined how various types of fuel treatments affected fire behavior and fire effects of the Hayman Fire. In the Case Study the authors broke out the fuel treatments that were accomplished after 1990 and prior to 1990 into two separate groups for analysis purposes. The graphs presented below illustrate the differences between various fuel treatments for both time periods.

Prescribed fire was the most effective fuel treatment of any type in both time periods. The graphs below illustrate that thinning, logging and other stand treatments did not significantly improve fire severity over untreated stands.





Note: only 3 acres existed in the categories of harvest or improvement with treatment, these were excluded from the graph because the area was to small to be statistically significant.

Figure 72—Photo point 12 and 13 facing northwest shows areas within the Turkey prescribed burn in 1990 and 1995.

The Hayman Fire Case Study presents extensive photo documentation of the effect of various stand and fuel treatments on the behavior and severity of the wildfire. Figure 72 above illustrates how a forest that had been underburned by prescribed fire twice (in 1990 and 1995) survived with very little damage from the Hayman Fire despite nearly complete mortality of the trees in the surrounding landscape.

Figure 47 below illustrates how the Hayman Fire was stopped by the Polhemus prescribed fire unit, which was accomplish the in autumn prior to the Hayman Fire.

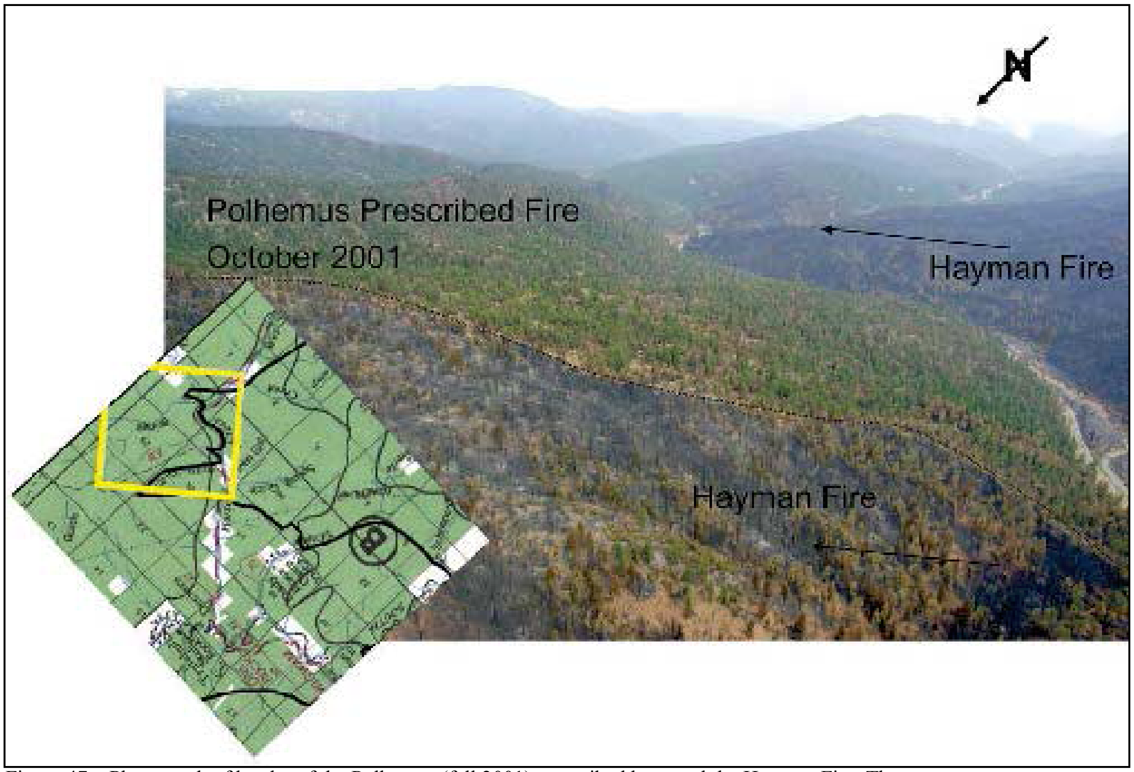


Figure 47—Photograph of border of the Polhemus (fall 2001) prescribed burn and the Hayman Fire. The Hayman Fire moved from the southwest (right side) and did not burn into the Polhemus prescribed fire unit (green) but burned as an intense surface fire and crown fire in the adjacent area on the same slope. (Photo by Karen Wattenmaker)

The following photos (Figures 85 and 86) from the Hayman Fire Case Study illustrate how the Hayman Fire burned through the Brush Creek and Goose Creek timber sale areas. Both of these areas experienced high severity wildfire, despite the stand-level treatments. Nearly complete mortality of the unlogged trees occurred in both timber sale areas.

Figure 85—Photo points 34 and 35 showing Goose Creek timber sale area in foreground (1986-1993). Activity fuels were pile-burned in 1993-1995. The Hayman Fire burned here the afternoon of June 9 as a high intensity surface fire.

Figure 86—Photo points 39 and 40 showing the Brush Creek timber sale that was followed by prescribed burning. The Hayman Fire burned here the afternoon of June 9 in crownfire and high-intensity surface fire.

Cheeseman Reservoir Thinning Project Overwhelmed

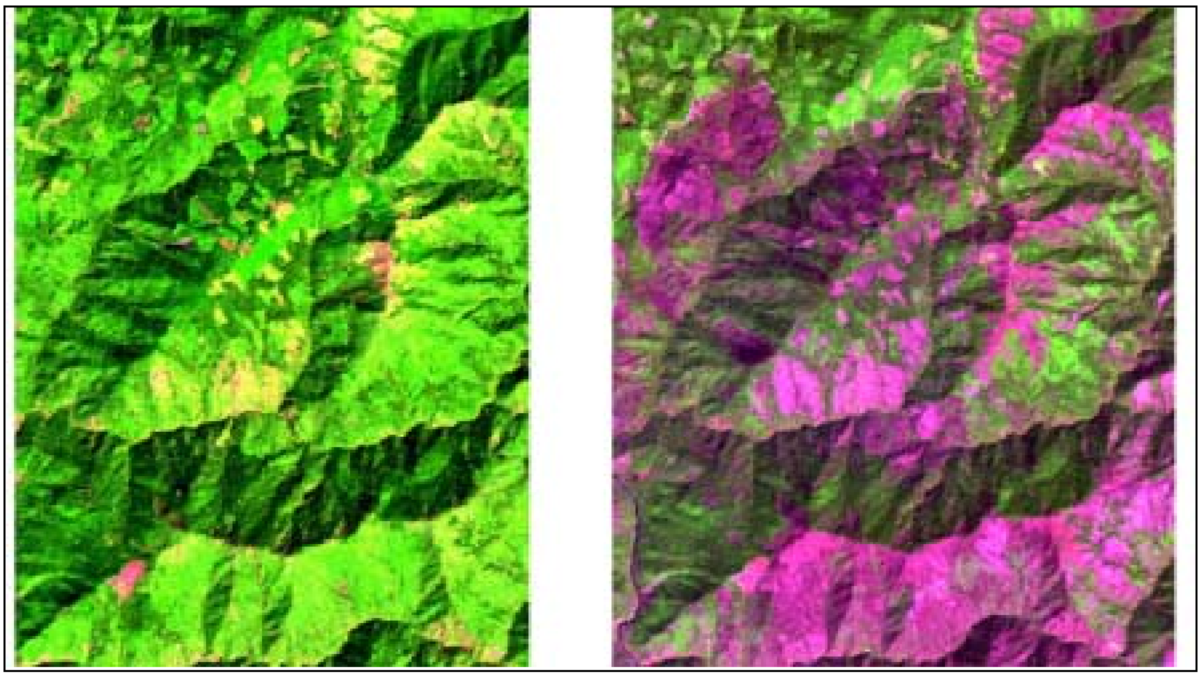
The Cheeseman thinning project was accomplished in 2000. The prescription for this project was a thinning from below that removed all but the largest trees in the stand. The harvest was accomplished by a fellerbuncher with slash piled. Most of the slash piles were subsequently burned. Despite these activities the Hayman Fire killed or torched most of the trees along the ridge and in the fuel break (fig. 77).

However, in a different section, trees along the Reservoir entrance road still supported green foliage (fig. 78).

Figure 78—Photo looking north at Cheesman Reservoir and thinning operation along southern edge.

Analysis of Vegetation Mortality and Prior Landscape Condition, 2002 Biscuit Fire Complex, Oregon

Pacific Biodiversity Institute conducted an assessment of the Biscuit Fire Complex in southern Oregon and examined the effect of past logging on wildfire behavior (Harma and Morrison 2003a, Harma and Morrison 2003b). We examined the landscape condition before the fire and after the fire using Landsat Enhanced Thematic Mapper satellite imagery.



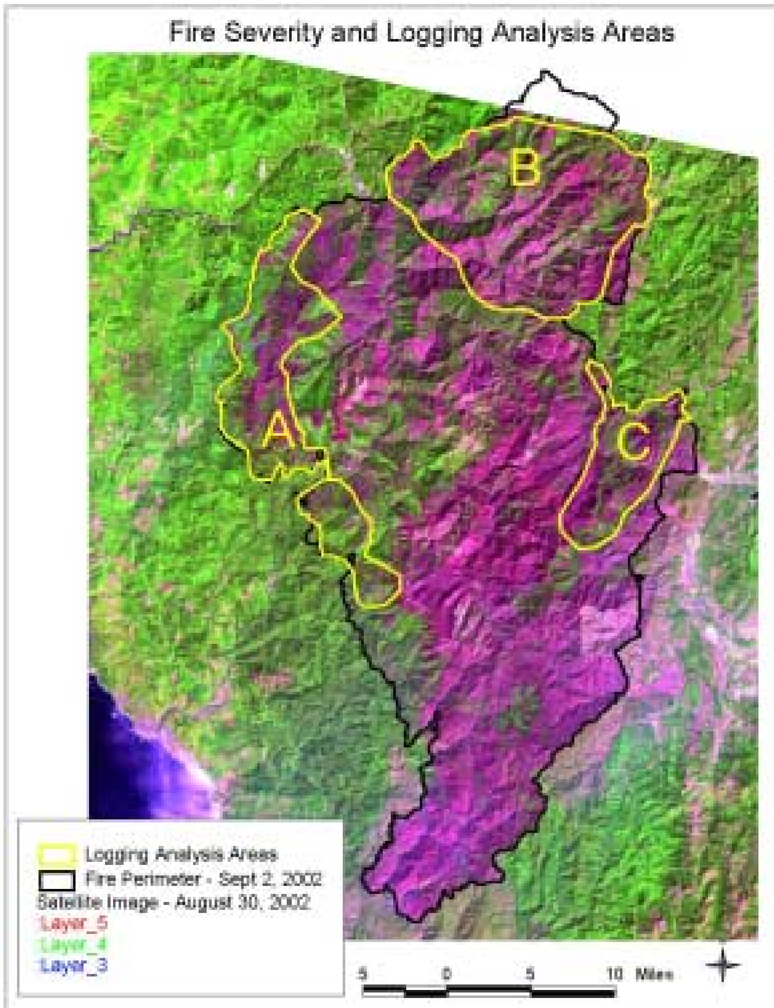
The above images illustrate Landsat Enhanced Thematic Mapper satellite imagery of part of the Biscuit Fire from 2001 and 2002 immediately after the fire. We used this imagery and data on past logging activities to assess the effect of past management on vegetation mortality from the wildfire.

We examined three study areas representing three different ecological and landscape conditions within the fire area. These study areas are described below and are illustrated in the map on the following page.

- Area A is dominated by Douglas-fir and mixed conifer forests and has gentle slopes (majority between 0% and 27%). Approximately 24% of this area has been logged.

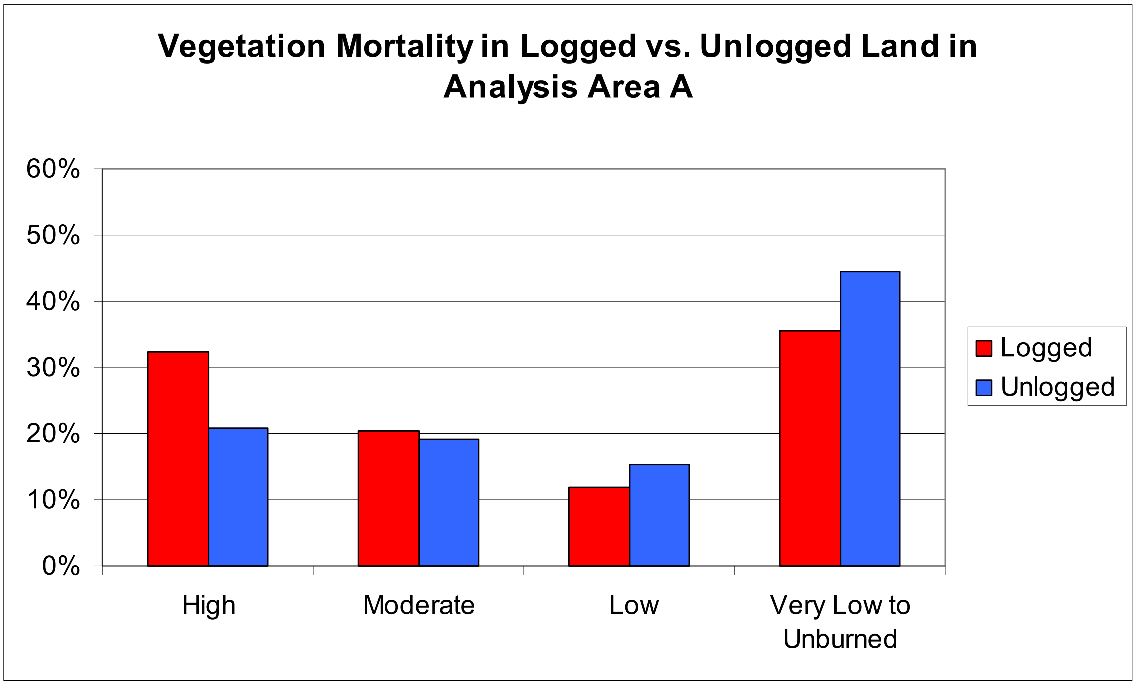
- Area B is dominated by Douglas-fir and pine forests and is at a higher elevation with steep slopes (majority between 25% and 55%). Approximately 12% of this area has been logged.

- Area C is characterized by Douglas-fir and pine, and has moderately steep slopes (25% to 45%). Approximately 15% of this area has been logged.

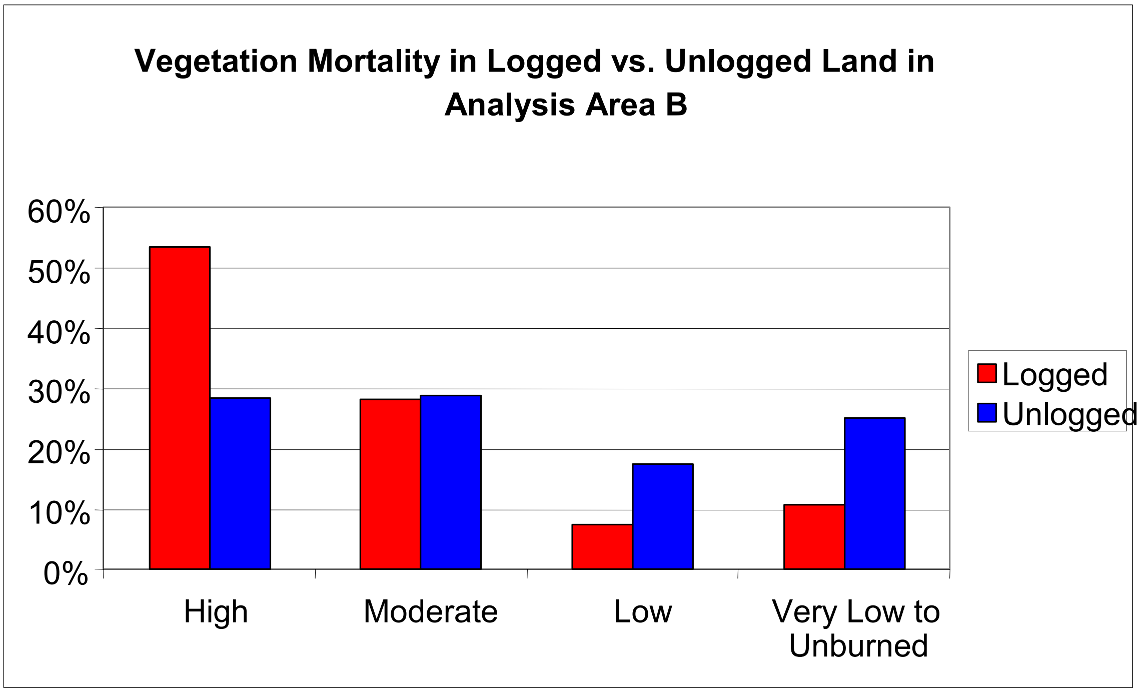


Landsat ETM satellite image of Biscuit Fire with three study areas outlined.

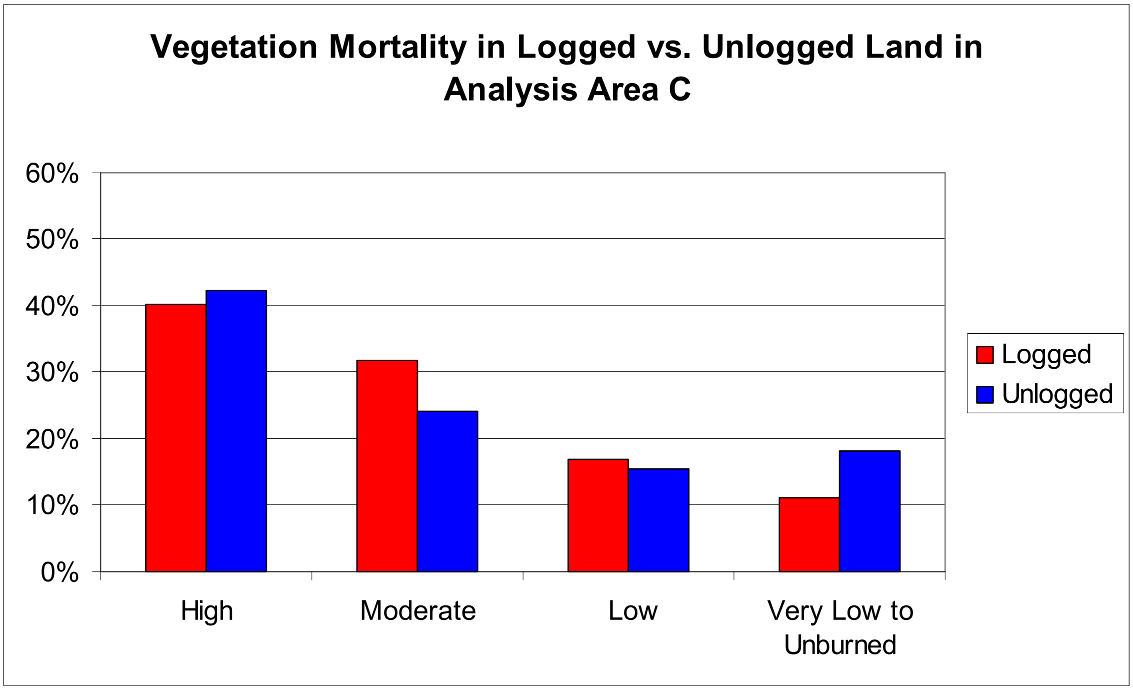
Our analysis of vegetation mortality in logged and unlogged areas in Area A of the Biscuit Fire Complex revealed that logged areas burned more severely than unlogged areas. In the logged areas more land was burned with high vegetation mortality than in the unlogged areas (11% more). In unlogged areas, more land was unburned or burned with very low vegetation mortality than on logged land (10% more than logged land).



Vegetation mortality in logged and unlogged areas in Area B of the Biscuit Fire Complex similar results were found. Logged areas had a much greater proportion (26% higher) of land burned with high vegetation mortality, and the unlogged areas had a greater proportion of low vegetation mortality (9% higher) and of unburned land (14% higher).



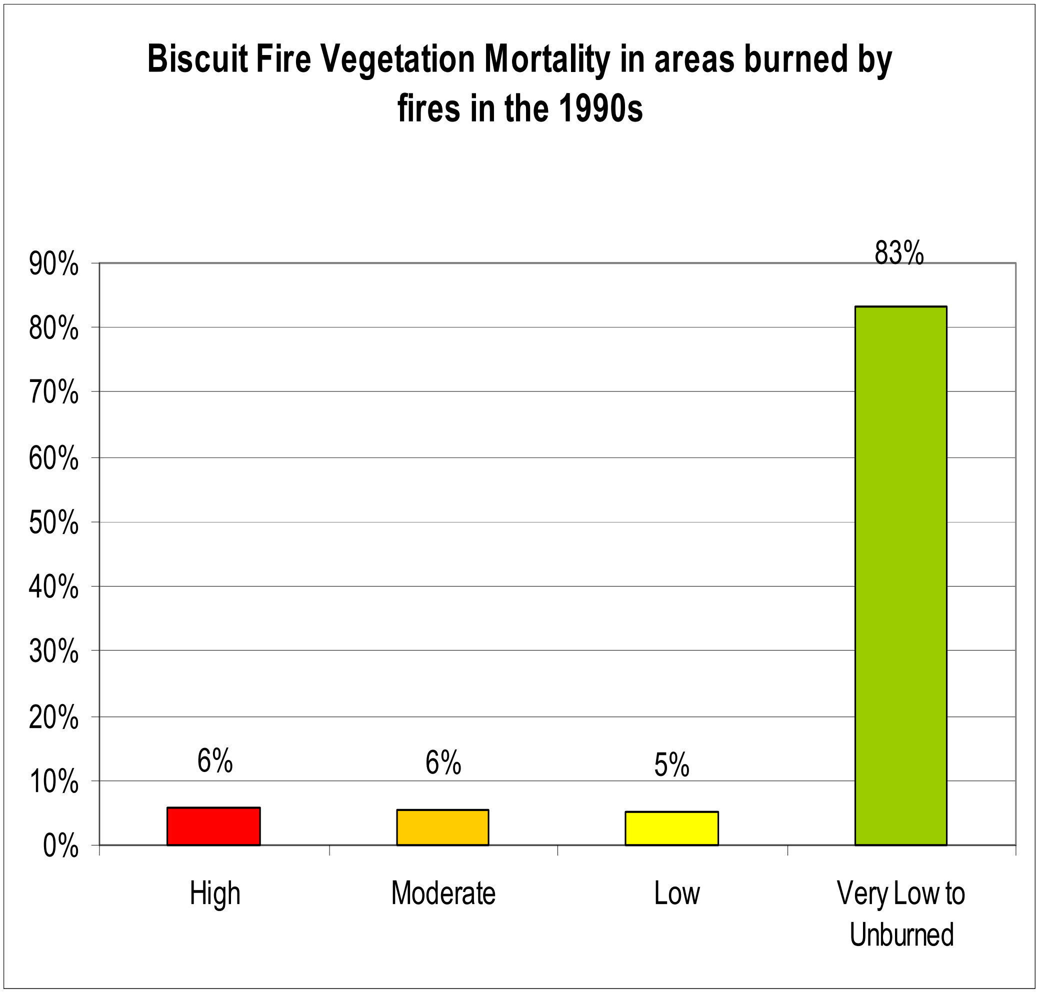
Our analysis of vegetation mortality in logged and unlogged areas in Area C of the Biscuit Fire Complex revealed that the proportion of land burned with high vegetation mortality was similar in logged and unlogged lands. There is a greater proportion of land burned with moderate vegetation mortality in logged areas. But the unlogged lands containing significantly more area that was unburned or had very low vegetation mortality.



As the Hayman Fire Case Study found, we found that vegetation mortality from the Biscuit Fire was very low in recently burned areas. Biscuit Fire vegetation mortality in areas that have burned in the fires during the past 10 years is distinctly different from the vegetation mortality in the fire area as a whole as the graph on the next page illustrates.

The Biscuit Fire Complex included 6,547 acres of land burned within the past 10 years by previous fires, but 83% of that land was in the very low to unburned severity category. Only 6% burned as high severity.

This result confirms what has been known by many fire managers for years. The best landscape-level treatment to reduce fire severity is either prescribed fire or wildfire-use (management of naturally occurring wildfires to accomplish fuel reduction).


Biscuit Fire Vegetation Mortality in areas burned by fires in the 1990s
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
6%
6%
5%
83%
High
Moderate
Low
Very Low to Unburned

Results of Fire Simulation Studies

Many fuel treatments significantly increased fireline intensity, flame length and heat per unit area over the control stand (Van Wagtendonk, 1996). Biomassing plus cut and scatter fuel treatments increased fire line intensity 118% (580 kW/m) over the control stand. Biomassing plus pile and burn fuel treatments increased fire line intensity 5% (25 kW/m) over the control stand. Similar results were found under 75th percentile weather conditions, with biomassing plus cut and scatter fuel treatments increased fire line intensity 145% (258 kW/m) over the uncut control stand.

Van Wagtendonk also found in his fire simulation studies that prescribed burning was by far the most effective fuel treatment in terms of reducing fireline intensity, flame length and heat per unit area.

Summary of Efficacy of Stand and Fuel Treatments

- Prescribed burning is the most effective fuel treatment, reducing flame length, heat per unit area and fire spread rates.

- Mechanical thinning and commercial logging are not as effective and often no more effective than non-treatment.

- Often untreated stands fair as well or better in wildfires as stands that have been thinned or logged.

A Landscape-Level Strategic Fire Plan for South Fork Mill Creek

Goals

- The goal of this fire plan is to dramatically reduce the risk of a large-scale fire event that causes serious damage to drinking water.

- Our target is one significant fire event per 1,000 years that might cause serious damage to drinking water.

- Create Fire Safety Zones to Enhance Fire Fighter Safety

Primary Elements of Fire Plan

- Create Perimeter Fire Safety Zone Around Watershed (use all tools: commercial and non-commercial thinning, prescribed fire, mechanical treatments, and annual maintenance)
- Create Interior Fire Safety Zones along strategic interior roads within watershed
- Coarse woody debris reduction at strategic sites (with appropriate screens and limitations)
- Fuel reduction using prescribed fire tools at sites ready for prescribed fire
- Thinning at strategic sites. Thin the stands with the highest tree densities (top 10% of the watershed). Thinning of stands within the watershed where tree densities are greater than 500 trees per acre (with appropriate screens and limitations)
- Maintain effectiveness of Perimeter Fire Safety Zone through annual maintenance and monitoring
- Maintain fire-safe structures in watershed
- Aggressive fire suppression throughout watershed and adjacent areas
- Gradual transition to a more fire-adapted landscape

Creation of Perimeter Fire Safety Zone Around Watershed

The creation of a perimeter defense zone and fire safety zone where fire fighters can safely operate will enhance protection of the watershed from fires that spread from outside the watershed. This perimeter defense will be centered on the roads which bound the watershed – usually following the watershed boundary on the ridge line.

The first zone will be 50 feet from the road centerline on both sides of the road. It includes the road bed and road right-of-way, and it will be treated to eliminate nearly all fuels that can support a surface or crown fire.

The next zone is 100 feet out into the forest from the fuel elimination zone. In this zone, the forest canopy will be dramatically reduced so that there is a complete barrier to the spread of crown fire. Commercial thinning, mechanical treatments and prescribed fire will be used to reduce canopy and dramatically reduce surface fuels.

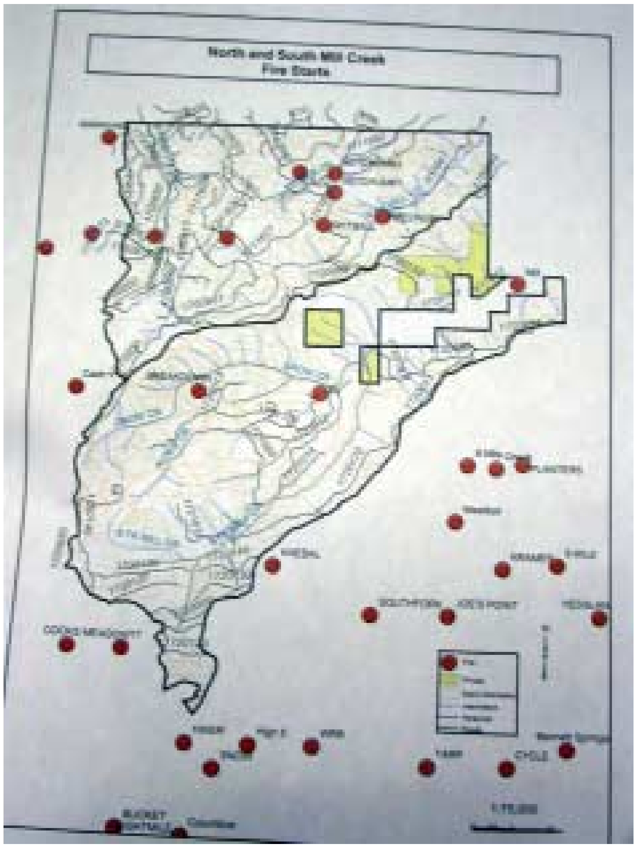
The exterior fuel reduction zone is 200 feet out into the forest from the severe fuel reduction zone. The goal of this zone is to bring any crown fire down to the ground and to dramatically reduce the intensity of any surface fire. Thinning will not be as severe as in the 100-foot middle zone, but canopy cover reductions will often be more than 50-70% of the current canopy cover.

Scientists have described four principles for creating fire-resilient forests (Agee 2002b, Peterson et al 2005). These principles are listed below and will be used in development of plans for the fire safety zones described in this report.

Principle	Effect	Advantage	Concerns
Reduce surface fuel	Reduces potential flame length	Control easier, less torching	Surface disturbance less with fire than other techniques
Increase canopy base height	Requires longer flame length to begin torching	Less torching	Opens understory, may allow surface wind to increase
Decrease crown density	Makes tree-to-tree crown fire less probable	Reduces crown-fire potential	Surface wind may increase, surface fuel may be drier
Retain larger trees	Thicker bark and taller crowns	Increases survivability of trees	Removing smaller trees is economically less profitable

Source: Agee 2002b.

Why Construct a Perimeter Fire Safety Zone Around the South Fork Mill Creek Watershed?



The map of fire starts in South Fork Mill Creek Watershed vicinity at the left illustrates that most fire starts are either north or south of the South Fork Mill Creek Watershed. The potential for large-scale fire events moving into the watershed from outside is greater than from fires starting in the interior of the watershed.

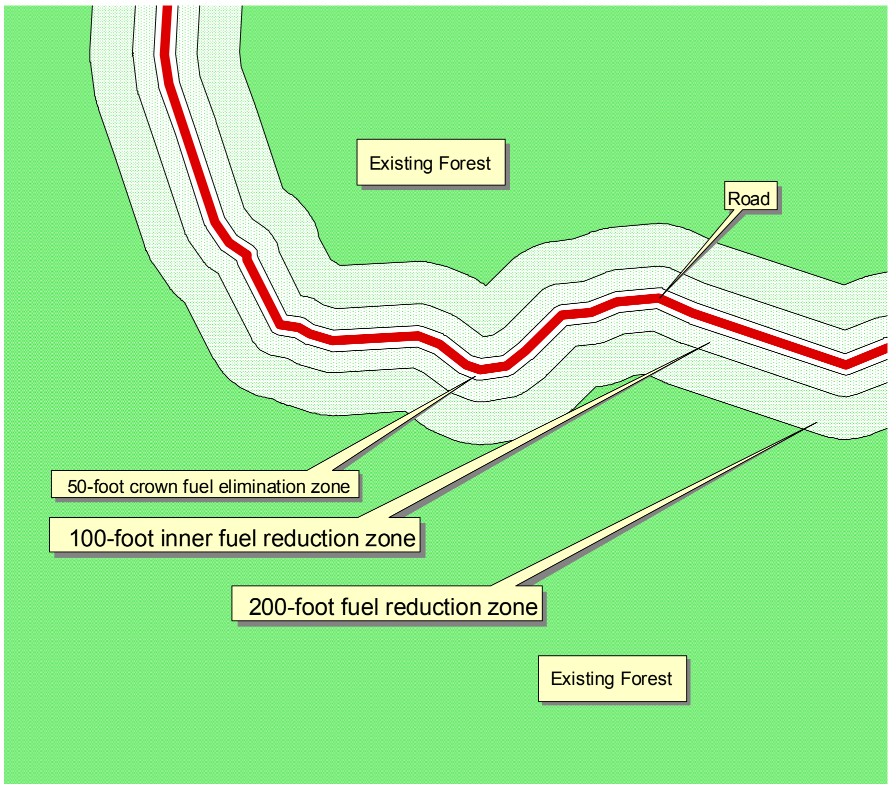
The main reasons for this are:

- Nearly 90% of all wildfires are human caused and occur on or adjacent to open roads.

- Exclusion of people from watershed and road closures within the watershed, dramatically lowers the chance of fire starts within the watershed.

Design Of Fire Safety Zones Using Thinning And Fuel Reduction Activities

The illustration below shows how a fire safety zone could be designed along an existing roadway. Roads follow the ridgelines around most of the watershed perimeter and could form the core of a perimeter fire safety zone.

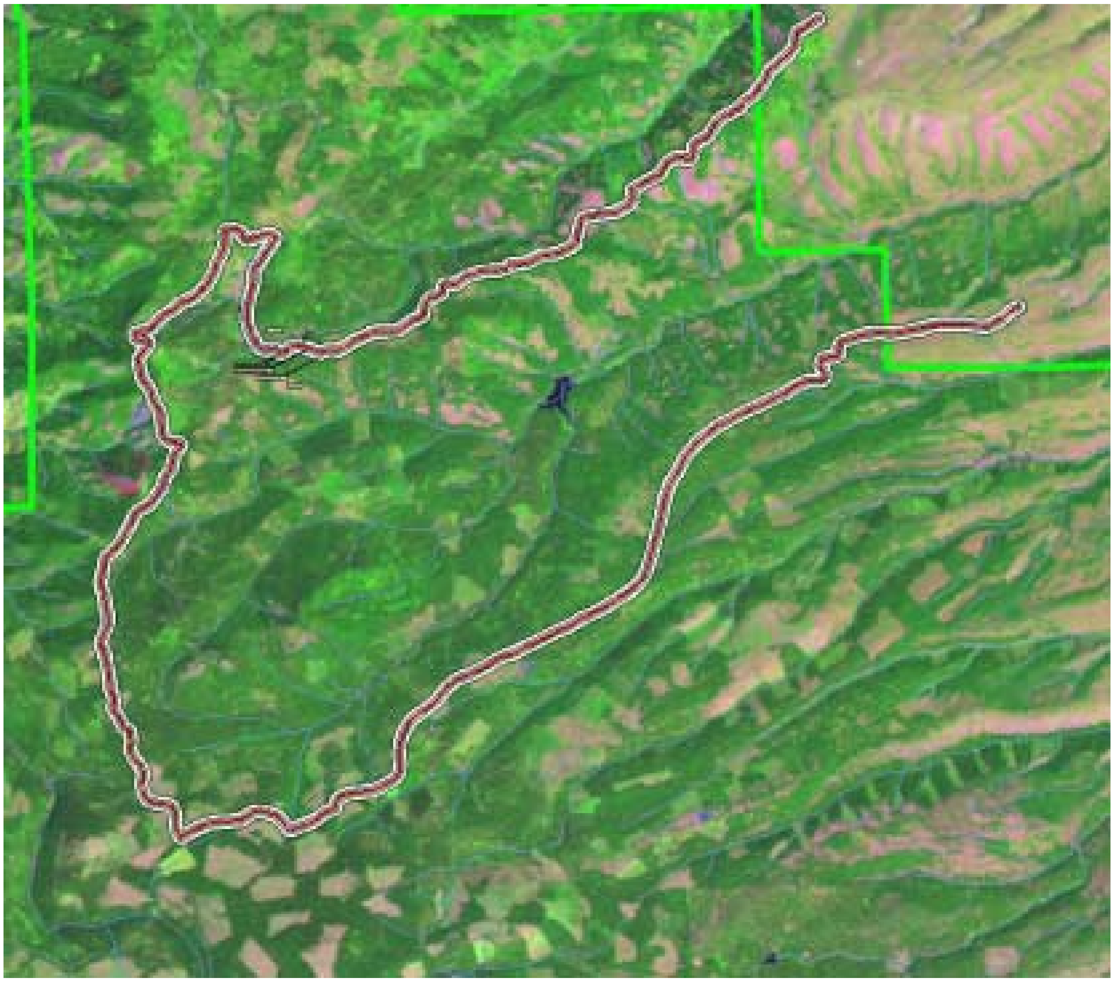


Very dense forest stands now exist along most roadways in South Fork Mill Creek Watershed Area as illustrated below. Often tree canopies nearly span the road from one side to the other. Wildfires can easily burn from one side of a road to the other in the current situation.

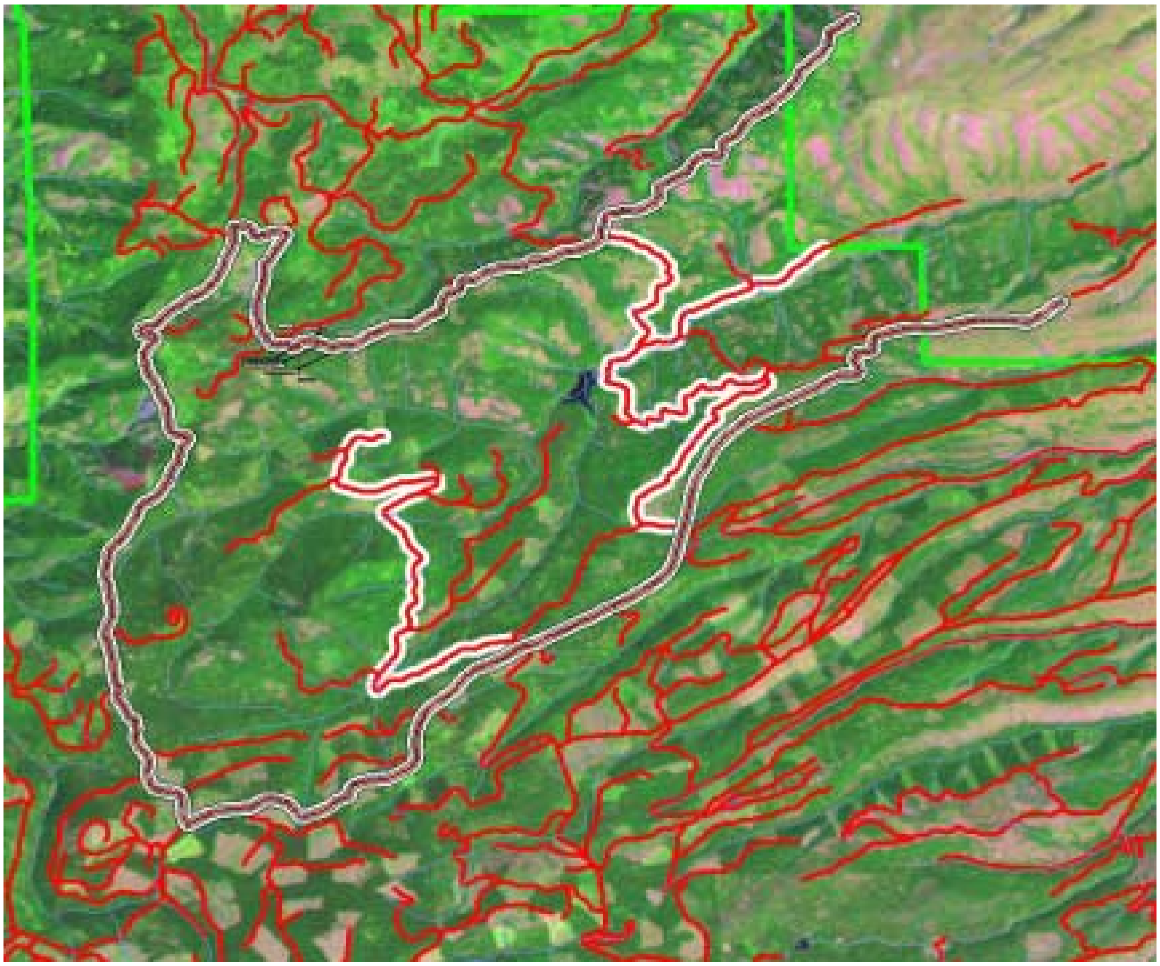
Dense stands and high fuel loading next to existing roads around the watershed perimeter.

The map below illustrates an overview of Fire Safety and Perimeter Defense Zone for the South Fork Mill Creek Watershed constructed around existing perimeter roads.



Interior Fire Safety Zones

Interior fire safety zones could also be developed at strategic locations along existing interior roads within the watershed. They will have the same configuration as the perimeter defense zone. The map below illustrates potential Interior Fire Safety Zones.



Coarse woody debris reduction at strategic sites

Our proposal incorporates CWD reduction at strategic sites along roads and other strategically selected areas – usually where past activity fuels are very dense. But we need to emphasize the importance of maintaining large, down logs for erosion control and wildlife habitat in most locations.

Large logs do not contribute to initial fire behavior and often are not consumed by wildfires. Except in unusual circumstances we recommend leaving large logs on the site.

Prioritize CWD Treatments

- CWD often is very patchy and hard to generalize on a larger stand-level or landscape level.
- CWD should be treated within certain guidelines and limitations.
- CWD should be treated at strategic locations, not across the entire landscape.

The example on right contains relatively little CWD. The example on left is close to the area on left and has more CWD.

Fuel reduction using prescribed fire tools at sites ready for prescribed fire

There are many sites in the watershed where prescribed fire could be used effectively today with minimal risk. One such site is illustrated above. The key to use of prescribed fire in the watershed is planning and experience. Careful attention to prescriptions is always necessary when using prescribed fire. Experienced crews are essential to the use of prescribed fire.

The Forest Service needs to begin using prescribed fire much more to treat fuels in this part of the Mt. Hood National Forest. The experience in use of prescribe fire is present within Region 6 and many more areas could safely be treated with prescribed fire than are currently being considered.

Thinning at strategic sites

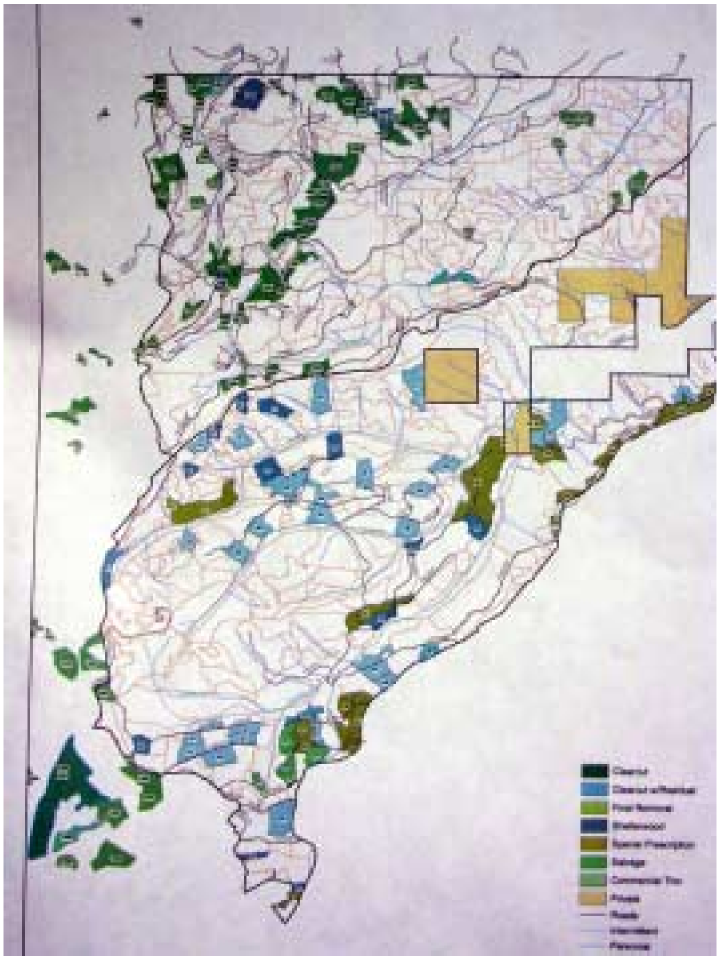
Our proposal incorporates thinning at strategic sites – usually along existing roads and in areas where past activities have resulted in very high stand densities. The purpose of such thinning should be to reduce crown densities and increase canopy base height to prevent torching and crown-fire initiation and crown fire spread. In our proposal this thinning would only occur in very limited, strategic locations and would follow strict prescriptions. Thinning would always be followed by repeated use of prescribe fire to maintain low levels of surface fuels.

Some example areas where thinning may be appropriate are illustrated below.

Dense stands, like that illustrated above, along perimeter roads and strategic interior roads are candidates for thinning as part of the construction of a perimeter fire safety zone.

Dense, overcrowded young stands, like those illustrated above, are also candidates for thinning. These areas are currently very flammable and are the greatest fire hazards in the watershed. Numerous examples of this situation exist in areas of prior stand treatments within the watershed.

The map below illustrates the some of the areas where dense young stands exist that have developed after prior stand treatments. These area are typically tree plantations that have grown back densely after clearcutting or dense young stands that have developed in partially cut or thinned stands.



There are many areas that have been logged or thinned in the past and have grown back into dense stands. Often there is still a lot of untreated activity slash that was left in these stands. Most of these need follow-up work to reduce fire risk from a build up of fuels that has occurred in the years following the treatment or to deal with activity fuels that were not properly disposed of immediately after the treatment.

The following photos show examples of existing areas that need follow-up work to reduce activity fuels.

Untreated activity slash and ladder fuels developing in a partial cut

One-shot approaches often don't work.

An effective fire plan must incorporate annual monitoring and maintenance. Repeated fuel treatments are the key to the maintenance of a fire safety zone such as that proposed in this report. Often repeated prescribed burns (such as the Turkey prescribe burns in the Hayman Fire area described earlier in this report) have much more beneficial effect in reducing wildfire threats than one activity alone. We recommend a long-term, strategic plan that incorporates multiple activities carried out over time.

Maintain effectiveness of Perimeter Fire Safety Zone through annual maintenance and monitoring

Often treatment longevity (Graham et al 2004) is not long and regular treatments are necessary to maintain a fire safety zone. In short periods after treatment, fuel changes can produce dramatic differences in fire behavior. Fuel accumulation after prescribed fire reached 67% of pretreatment loading levels in 7 years (Van Wagtendonk and Sydoriak 1987). Van Wagtendonk and Sydoriak (1987) also concluded that prescribed burning would be required every 11 years to maintain fuel loads below their preburn condition. In drier conditions, fuel treatments can last longer (Biswell et al 1973, Graham et al 2004), but still need to be repeated at regular intervals to maintain effectiveness.

After thinning there is usually a rapid growth of understory shrubs, herbs, grasses and small trees that soon create dense subcanopies. This can result in a situation that supports severe surface fires. If left untreated the shrubs and young trees developing after a thinning can also develop into ladder fuels.

Annual monitoring and maintenance of the Perimeter Fire Safety Zone is strongly recommended to maintain effectiveness.

Maintain fire-safe structures in watershed

Structures within the watershed should be brought up to current minimum "FireSafe" standards. These standards include:

- No shake roofs
- Remove fuels and tree canopies near structures
- Create fuel free zones and fuel depletion zones around structures
- Annual maintenance to prevent fuel buildup on roofs and near buildings

Aggressive fire suppression throughout the watershed and adjacent areas

Since this watershed is critical for the City of the Dalles water supply, high priority should be given to aggressive fire suppression efforts of all fire starts within this watershed and adjacent others. This alone will dramatically reduce the chance of high intensity wildfire events that could cause damage to the watershed.

Other Considerations for a Fire Plan for the Watershed

Surface Fire vs. Crown fire, Erosion, Sediment and Water Quality.

It is important to distinguish between the effects of surface fire and crown fire as these two fire types relate to conditions with this watershed. Crown fires often do not cause extensive removal of soil organic matter or litter horizons on the soil surface. However, intense surface fires can remove nearly all the surface soil organic matter as illustrated below. Prevention of surface fires should be a high priority in the South Fork Mill Creek Watershed.

Figure 33—In addition to burning the vegetation of the area, the Hayman Fire in many places burned organic materials in and on the soil

Sediment produced from the Hayman Fire after severe surface fire.

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