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# Pre-Fire Intervention – Thinning and Prescribed Burning

NCSR Fire Ecology and Management Series

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Northwest Center for Sustainable Resources (NCSR)  
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## Fire Ecology and Management Series

This six-module series is designed to address both the general role of fire in ecosystems as well as specific wildfire management issues in forest ecosystems. The series includes the following modules:

- Ecological Role of Fire
- Historical Fire Regimes and their Application to Forest Management
- Anatomy of a Wildfire - the B&B Complex Fires
- Pre-Fire Intervention - Thinning and Prescribed Burning
- Post-Wildfire (Salvage) Logging – the Controversy
- An Evaluation of Media Coverage of Wildfire Issues

The *Ecological Role of Fire* introduces the role of wildfire to students in a broad range of disciplines. This introductory module forms the foundation for the next four modules in the series, each of which addresses a different aspect of wildfire management. *An Evaluation of Media Coverage of Wildfire Issues* is an adaptation of a previous NCSR module designed to provide students with the skills to objectively evaluate articles about wildfire-related issues. It can be used as a stand-alone module in a variety of natural resource offerings.

Please feel free to comment or provide input.

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NCSR curriculum modules are designed as comprehensive instructions for students and supporting materials for faculty. The student instructions are designed to facilitate adaptation in a variety of settings. In addition to the instructional materials for students, the modules contain separate supporting information in the "Notes to Instructors" section. The modules also contain other sections which contain additional supporting information such as a "Glossary" and "Suggested Resources."

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## Pre-Fire Intervention - Thinning and Prescribed Burning Module Description

This module is the fourth in the *Fire Ecology and Management Series*. The module is designed for courses that support natural resource disciplines such as *Forestry*, *Wildlife* and *Environmental Science*. Although the module can be taught independently, faculty should consider teaching it as part of the series. Specifically, the modules *The Ecological Role of Fire*, *Historical Fire Regimes and their Application to Forest Management*, and *Anatomy of a Wildfire* are designed to prepare students for this module. This lecture-based module examines forest thinning and prescribed burning as methods for reducing the probability of catastrophic fire and restoring forest ecosystems. A *PowerPoint* presentation describes the context in which these practices have been proposed as a solution and presents some of the evidence that evaluates their effectiveness.

# Pre-Fire Intervention - Thinning and Prescribed Burning

## Introduction

In this lecture-based module, issues associated with thinning and prescribed burning as management tools to reduce the probability of catastrophic fire are presented. The module is based on a series of *PowerPoint* slides paired with a textual outline of the major points. Detailed supplementary lecture notes for use by the instructor are included in the notes section for each slide. Citations of relevant print, video and web-based resources are also provided for the instructor as background, supplemental use in the classroom and for additional research. Several are appropriate to assign as student reading. Detailed notes on the content of relevant video materials that may be used to supplement the *PowerPoint* presentation are also provided.

The module is most appropriate for use in courses such as Fire Ecology, Wildfire Management, Forest Management, Environmental Science and Introduction to Natural Resources.

## Objectives

Upon completion of this module students should be able to:

1. Describe why thinning and prescribed fire might be required in managed forests
2. Describe forest types and conditions under which thinning and prescribed fire are appropriate management options
3. Describe the types of evidence used to evaluate the effectiveness of thinning and prescribed fire
4. Describe how federal legislation proposes to address fire management

## Procedure

The accompanying *PowerPoint* presentation should be delivered to students at an appropriate time in the course. Additional text or titles may be added to the *PowerPoint* slides to match your particular instructional style. Alternatively, the presentation could be made available to students on-line, where they could review the material on their own. Some background on fire behavior, fire history and fire effects is assumed (see NCSR modules, *Ecological Role of Fire* and *Anatomy of a Wildfire*).

The list of recommended videos should also be considered to supplement the *PowerPoint* presentation. The *Biscuit Fire Recovery* video (cited in “Resources” section of this module) in particular, provides excellent background for the topics addressed in this module.

## Assessment

Student learning of the material in this module is probably best assessed with essay or short answer questions on an exam. Consider the following:

1. Distinguish between a ponderosa pine forest in a “natural condition” and one that has experienced 100 years of fire suppression.
2. What are the expected short-term and long-term outcomes of using thinning and prescribed fire as management tools?
3. How do we know that thinning and prescribed burning are effective? Cite supporting information from specific studies.
4. What factors should be taken into account before the decision is made to implement thinning or a prescribed fire?
5. What is the “wildland-urban interface” and what particular challenges does it present in wildfire management?
6. How do the *National Fire Plan* and the *Healthy Forests Restoration Act* propose to address wildfire management in federal forests?

The material also lends itself to class discussion centered around some of the issues raised in the presentation.

## General Lecture Outline

- I. Introduction
- II. What stand conditions result in the need for thinning?
  - Stand density
  - Ladder fuels
  - History of fire exclusion
- III. Considerations related to thinning
  - Wildland-urban interface (WUI)
  - Concerns
  - Expected outcomes
  - Recommendations
- IV. How do we know thinning is effective?
  - Evidence from Biscuit Fire – Oregon
  - Pollet and Omi study
  - Evidence from Hayman Fire – Colorado
  - Evidence from Angora Fire – California
- V. Prescribed fire
  - Types of prescribed fire
  - Concerns
  - Expected outcomes
  - Recommendations
- VI. National Fire Plan and Healthy Forests Restoration Act
  - Purpose
  - Benefits
  - Concerns
  - Areas of agreement

See notes on *PowerPoint* slides for detailed lecture notes for *Pre-Fire Intervention - Thinning and Prescribed Burning* presentation.



*PowerPoint* Slides with Instructor's Notes

# Pre-Fire Intervention - Thinning and Prescribed Burning

*"In recent times, we have gone from 'keepers of the flame' to 'custodians of the combustion chamber'."*

Stephen J. Pyne 2005

This project supported in part by the National Science Foundation. Opinions expressed are those of the authors and not necessarily those of the Foundation.



It has become clear in recent years that as a result of past forest management practices, perhaps in combination with global climate change, many of America's forests have become more prone to catastrophic wildfire. As Stephen Pyne, a prominent fire ecologist at Arizona State University, has suggested, "we have gone from 'keepers of the flame' to 'custodians of the combustion chamber'." Thinning of over-stocked forests has been proposed as a useful tool that provides logs for the timber economy while reducing the probability of catastrophic wildfire. This practice is often implemented as a prelude to the re-introduction of prescribed fires, which attempts to restore the natural role of fire in ecosystems. This presentation examines the practices of thinning and prescribed fire and issues surrounding them. Case studies from throughout the western United States are used to illustrate our current thinking on thinning and prescribed fire as management tools that are implemented prior to a wildfire.

## Fire exclusion has dominated wildfire policy



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Beginning with the fire season of 1910, the U.S. Forest Service and Bureau of Land Management implemented an aggressive *fire exclusion policy* that attempted to eliminate all wildfire from forests. One particularly large fire, dubbed the “Big Blowup”, burned 3 million acres in Idaho and Montana and took the lives of 78 people. Twenty-five years later, the Forest Service implemented its “10 A.M. Policy”, which stated that any fire was to be fully contained by 10 A.M. the next day. (For more detail on the history of fire policy in the U.S., see Arno and Allison-Bunnell, 2002 CHAPTER 2)

For nearly a century, wildfire management has emphasized strategies for fighting fire. To some degree, this emphasis remains. Over \$3 billion was appropriated for fighting fire on lands administered by U.S. land management agencies (mostly U.S. Forest Service and Bureau of Land Management) in 2007 (GAO-07-655). When corrected for inflation, this represents an increase from \$1.3 billion to \$3.1 billion over 10 years (1998-2007). The majority of Forest Service fire suppression costs are related to protecting property on the wildland-urban interface.



USDA Forest Service, Tahoe National Forest

As our understanding of the role of fire in ecosystems grows, we are learning that other interventions beyond fire suppression may enhance values for humans while improving ecosystem function. Various forms of fuels reduction such as thinning, removal of surface fuels and snags, mowing and pruning, as well as prescribed fire are among the interventions that have been proposed to reduce the probability of stand-replacement fires. Thinning has particular appeal as the sale of logs from thinning operations has the potential to provide a revenue stream that may be used to fund other types of restoration work. All fuel treatments have temporary effects on fire behavior due to the accumulation of vegetation associated with ecological succession. Therefore, repeated measures such as prescribed burning are required to maintain the desired condition.

## Predicted Fire Behavior in Treated vs. Untreated Areas



USDA Forest Service

However, we have only incomplete knowledge of how fire-dominated systems operate. An adaptive approach is required that views interventions and manipulations such as thinning and prescribed fire as “experiments.” Central questions remain such as:

In what forest types and under what conditions can thinning be used to reduce fire severity?

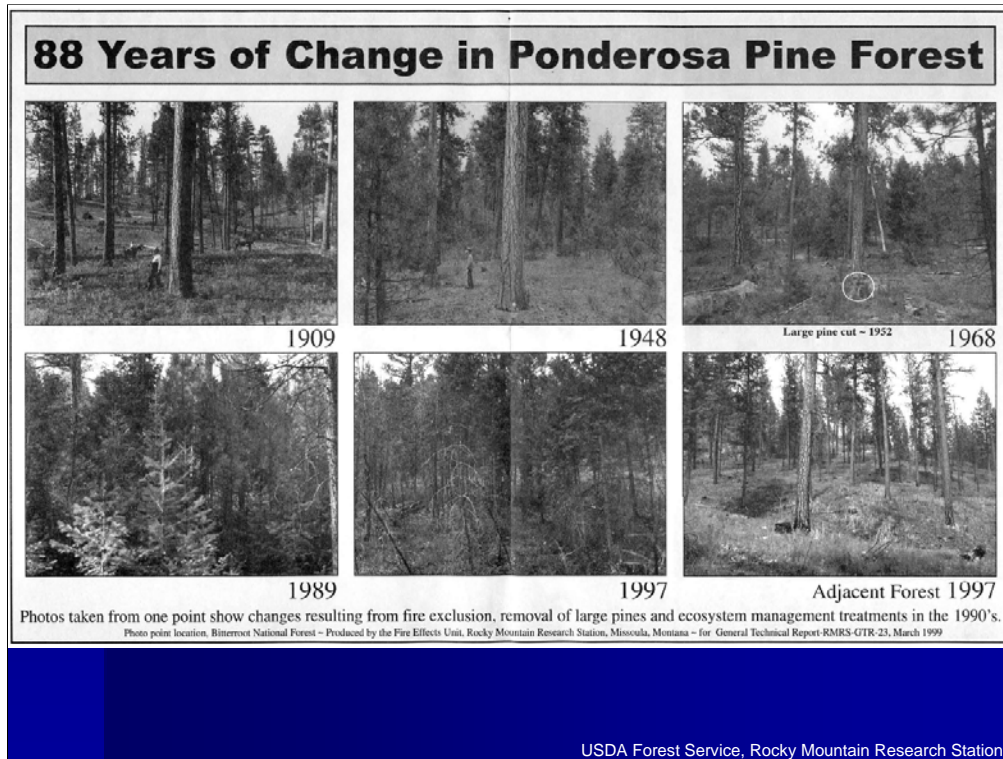
Under what conditions should prescribed fire be used as a tool and what are the expected outcomes?

When should woody material in forests be viewed as “excess fuel” rather than “biological legacy” (i.e., snags, logs, living trees, etc. that remain after a disturbance), which we have learned contribute to the habitat diversity and recovery rates of disturbed sites?

There is a lot we just don’t know.

Now, we will take a look at some of the recent research on this topic in the western United States.





It is widely recognized that a history of fire exclusion and other management interventions has resulted in alterations in natural fire regimes. In some forest types this has resulted in overly dense stands that are more prone to catastrophic fires. See NCSR module *Historical Fire Regimes and their Application to Forest Management* for details.

This series of photographs appeared on a widely distributed Forest Service poster designed to illustrate the impacts of fire exclusion on ponderosa pine ecosystems in the West. It is based on a report that describes ecological changes associated with forest management and fire suppression since the early 1900s in a ponderosa pine forest. These changes are documented in a series of repeat photographs taken at 13 photo-points from 1909 to 1997. The poster is designed to convey the conventional wisdom that stands in this forest type contain excessive fuels and thus, are more prone to uncharacteristic, stand replacement fires. The series illustrates the progressive accumulation of small trees, snags, dead branches and other “fuels”. The final photo illustrates an example of an “ecosystem management treatment”, which is intended to be comparable to the historical condition shown in the 1909 photo.

**“..the baseline reference condition of forest stand conditions that evolved from regularly occurring, low intensity surface burning.”** USDA Forest Service 2000



USDA Forest Service: Rocky Mountain Research Station

Although it is widely agreed that many western forests were historically more open than they are today and that they were dominated by large fire-resistant trees, the choice of the 1909 photograph as a baseline has been the subject of some controversy. In the poster it was included to illustrate the historical condition of ponderosa pine forest on the Bitterroot National Forest in Montana. The photograph was captioned as indicated here (USDA Forest Service 2000).

USDA Forest Service. 2000. Protecting people and sustaining resources in fire-adapted ecosystems: A cohesive strategy. The Forest Service management response to the General Accounting Office Report GAO/RCED-99-65. April 13, 2000

**"Northwesterly view showing cleanup operations on the Lick Creek timber sale."**

USDA Forest Service 1983



USDA Forest Service: Rocky Mountain Research Station

In reality, the photo portrays a site that was recently partially logged to open up the canopy as evidenced by the brush piles and stumps scattered through the photo. The caption on the original photograph in an earlier publication (USDA Forest Service 1983) shown here, clearly indicates that the photo was taken after a partial harvest (the Lick Creek timber sale).

USDA Forest Service. 1983. Fire and vegetative trends in the northern Rockies: Interpretations from 1871-1982 photographs. Gen. Tech. Rep. INT-158 by G.E. Gruell. Intermountain Forest and Range Experiment Station. Ogden, Utah. December 1983



## Historical conditions immediately before partial timber harvest



USDA Forest Service: Rocky Mountain Research Station

A Forest Service photo of the same site prior to logging that shows a lack of underbrush but also a significantly higher density of large trees. This photograph was not included on the poster, leading to claims by critics that the Forest Service was misrepresenting historical conditions in an effort to promote further logging of Ponderosa pine forests.

### SOURCE:

USDA Forest Service. 1995. Age-class structure of an old growth ponderosa pine/Douglas-fir stand and its relationship to fire history. Gen. Tech. Rep. INT-RP-481 by S.F. Arno, J.H. Scott and M.G. Hartwell. Intermountain Research Station. Ogden, Utah. April 1995



Despite the controversy, there is abundant evidence that many western forests carry fuel loads (as illustrated here) that are uncharacteristically high due to decades of fire suppression. There is also ample anecdotal evidence that thinning reduces fire severity such that dominant trees have a lower probability of being killed by a wildfire. Thinning reduces the vertical connectivity between surface and aerial (crown) fuels.

## Current Situation: Many Acres of Overgrown Forest With Significant Wildfire Hazard



USDA Forest Service

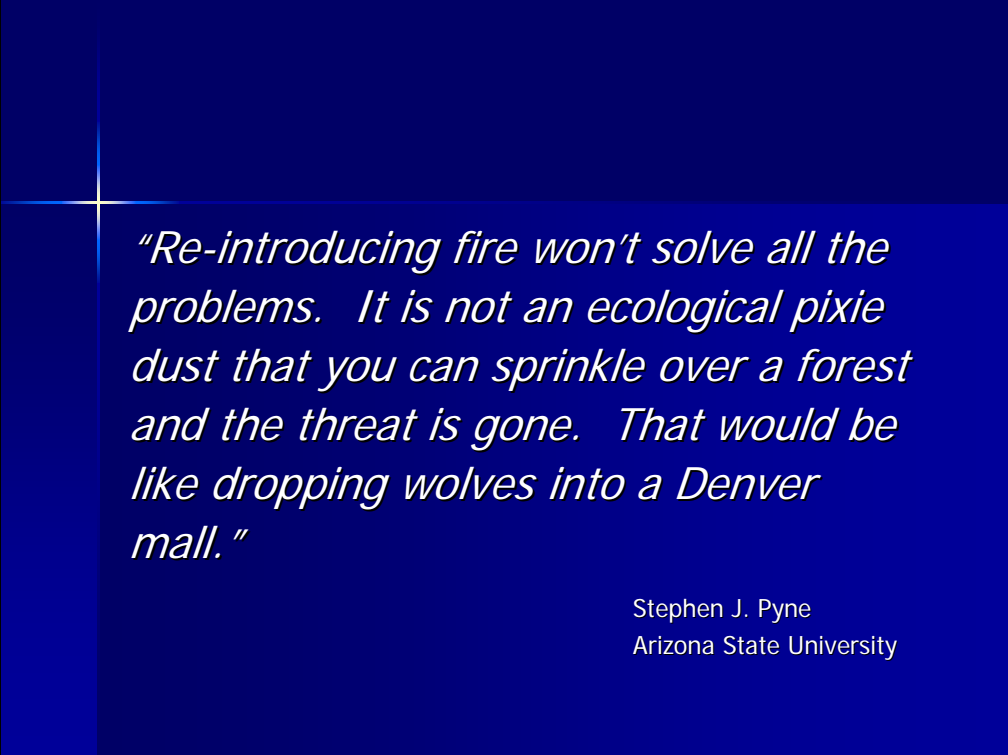
This photo illustrates the overgrown forest condition with an abundance of biomass and ladder fuels. Thinning that is conducted with the primary goal of fuels reduction emphasizes the removal of small diameter trees. Larger, more fire-resistant trees are generally left behind.

Although using thinning as a tool to restore forests to a more natural condition has broad appeal, the following objections are sometimes raised:

1. Thinning will lead to industrial-scale logging
2. Thinning introduces entry of exotic species
3. Thinning increases erosion and sediment in waterways

Careful planning such as the timing of the intervention and the type of equipment used can reduce these impacts. Also, these impacts must be weighed against the potential long-term benefits of thinning as well as the potential long-term costs of doing nothing. The Nature Conservancy, for example, has identified fire exclusion as a threat to biodiversity in 45% of the conservation plans in place for its protected areas.

For more detail on types of forest thinning and their expected outcomes, see chapter 12 of *Intensive Silviculture* in Hunter (1990).



*“Re-introducing fire won’t solve all the problems. It is not an ecological pixie dust that you can sprinkle over a forest and the threat is gone. That would be like dropping wolves into a Denver mall.”*

Stephen J. Pyne  
Arizona State University

Management efforts are often geared towards re-introducing fire into these systems to maintain more characteristic fuel loads and therefore, fires at a frequency and severity that lie within the range of historical variability. However, re-introducing fire into an environment that is overstocked and has abundant ladder fuels may be catastrophic. We cannot rely on natural fires alone to restore natural fire regimes. The resulting fires would be socially unacceptable as they would burn large amounts of valuable timber and threaten human lives and structures. This is especially an issue in areas with a complex mixture of public and private lands such as the Lake States and northern California.

Stephen Pyne of Arizona State University puts it this way (see quote). Before fire can be re-introduced, thinning is often required to reduce fuel loads.





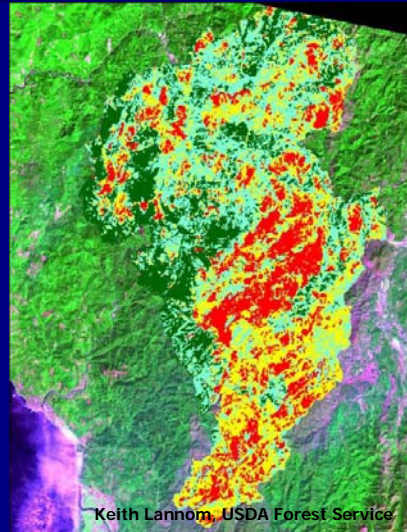
USDA Forest Service

Introducing fire before thinning may result in a stand replacing fire (Angora Fire, California)

## Biscuit Fire – SW Oregon 2002

### Post-fire assessment of three treatments:

- Thinned and under-burned
- Thinning only
- Untreated



Controlled studies that evaluate the effectiveness of thinning, however, are hard to come by. In general, these studies require adjacent treatments, an untreated area (control) and then the (usually unintentional) introduction of fire. The 2002 Biscuit Fire in southwest Oregon provided just such an opportunity. Test plots that had been treated three different ways prior to the 2002 fire were analyzed after the fire.

1. Thinned and under-burned plots - many live trees with live lower branches
2. Thinned only - resulted in few live trees
3. Untreated plots – few live trees remained

However, while thinning ladder fuels is supposed to reduce canopy fire, there was anecdotal evidence that hardwoods in the under-story may actually prevent fires from reaching the canopy due to the moisture content of their leaves. See *Oregon Field Guide 2004* video entitled, *Biscuit Fire Recovery*, for details. This study illustrates the complexity of the relationship between thinning, prescribed burning and wildfire. Generalizations that seem to apply for one forest type, may not apply in another.

The map shown here indicates the burn severity for the Biscuit Fire. Green areas were not burned, blue areas burned with low severity, yellow areas with moderate severity and red areas with high severity.

Source: Keith Lannom, Remote Sensing Applications Center, USDA Forest Service

## Effect of Thinning and Prescribed Burning on Fire Severity in Ponderosa Pine Forests

(Pollet and Omi 2002 )

Fire Name Location	Fire Severity Rating (1-5)		Crown Scorch (%)	
	Untreated	Treated	Untreated	Treated
Webb Fire Montana	3.2	2.6	67	26
Tyee Fire Washington	4.4	3.0	100	74
Cottonwood Fire California	4.0	2.7	78	26
Hochderffer Fire Arizona	4.4	2.1	99	29

Although forest managers have been using fuel treatments for decades to reduce wildfire risks, there are few scientific studies that evaluate the effectiveness of these treatments. Most of the evidence in support of the effectiveness of fuel reduction practices has been anecdotal in nature or based on computer modeling. This study conducted by Pollet and Omi was one of the first to systematically and quantitatively analyze the effectiveness of fuel reduction treatments. The study is based on field measurements of fire severity and crown scorch following wildfires in treated versus untreated ponderosa pine stands at four study sites in Montana, Washington, California and Arizona.

Ponderosa pine forests are the most widely distributed forest type in the western United States and are particularly prone to fire. Also, as indicated earlier, decades of fire suppression have resulted in densely packed stands with an abundance of shade-tolerant trees in the under-story and ladder fuels that connect surface fuels to crown fuels during a wildfire.

### Detail on treatments

Webb Fire - Prescribed fire, no thinning

Tyee Fire - Thinned (1970) and prescribed fire (1983)

Cottonwood Fire - Thinning (1989 and 1990)

Hochderffer Fire - Thinning (1970) and prescribed fire (1995)

### Fire severity is based on the following scale:

1 – unburned

2 – light surface burn, no crown scorch

3 – spotty, irregular crown scorch

4 – moderately intense burn with complete crown scorch

5 – severe, high intensity burn with crowns totally consumed

At all four sites, fire severity and crown scorch were significantly lower at the treated sites than the untreated sites. Results indicate that fuel treatments that remove small diameter trees may be beneficial for reducing crown fires in ponderosa pine forests.

Background Photo: USDA Forest Service: Gap Fire on Tahoe National Forest in older, overstocked forest. Stand-replacement fire results.

## Effects of Fuel Treatments on Fire Severity Hayman Fire, Colorado

Treatment	Area (acres)	Unburned (%)	Low (%)	Mod (%)	High (%)
None	22,546	4	18	8	70
Prescribed Fire	719	6	20	11	63
Thinning + treatment	395	0	19	7	74
Thinning + no treatment	625	3	12	9	76
Harvest + treatment	1622	5	14	10	71

Table is adapted from Graham, R.T. (tech. ed.). 2003. Hayman fire case study. USDA Forest Service, Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-114

This Forest Service document examines all aspects of the 2002 Hayman Fire, the largest fire (138,000 acres) ever recorded in the state of Colorado. Detailed examination of fire behavior, ecological effects, human impacts, post-fire rehabilitation and social and economic issues are included.

This table presents data from the post-fire analysis that evaluated the effects of various fuel treatments on fire severity. As the interval between “time of fuel treatment” and “time of wildfire” increases, the cause-effect relationship between the two decreases. Therefore, only recent (after 1990) modifications are included here.

Explanation of treatments:

“None” - forest unmodified, no fuel treatment

“Prescribed Fire” – area subjected to prescribed burn after 1990

“Thinning + treatment” – mechanical removal of under-story trees, minimal removal of over-story (pre-commercial thinning), surface fuels (slash) piled and burned

“Thinning + no treatment” – as above, except no treatment of surface fuels

“Harvest + treatment” – commercial thinning, surface fuels (slash) piled and burned

Explanation of fire severity classes (based on satellite imagery):

“Unburned” – minimal or no canopy scorch

“Low” – patch foliage scorch

“Moderate” – foliage completely scorched

“High” – foliage consumed

Main points:

1. For this fire, fuel treatments did not have a significant impact on fire severity. Note similar values for “high” fire severity across all treatments and compared to “no treatment”. In part, this is due to the extreme conditions (winds and low fuel moisture) that were present on June 9 when the fire expanded rapidly and overran most fuel treatments.
2. The relationship between the size of the fuel treatment and the size of the fire on the landscape is important. Large areas are more effective. In large fires under extreme conditions like this one, smaller fuel treatment areas are easily breached by fire spotting created by blowing embers.



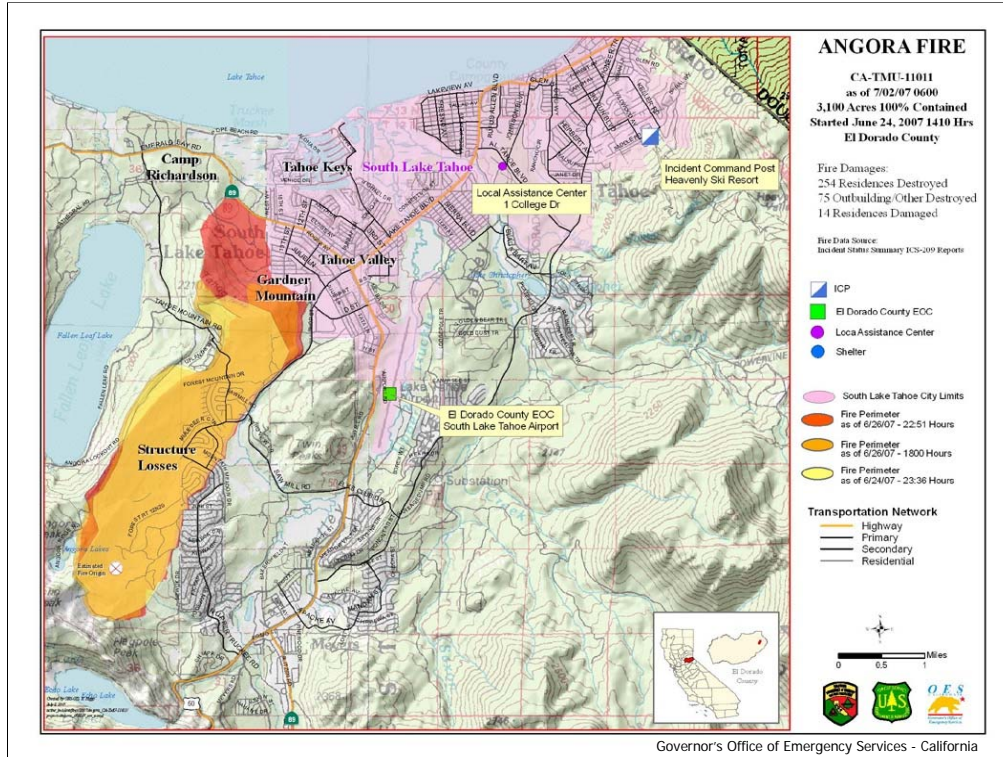
## Wildfire Management in the Wildland-Urban Interface (WUI)



USDA Forest Service: Tahoe National Forest

Recent population increases have resulted in expansion of residential areas into rural areas previously occupied only by natural or managed forests. These areas, now known as the wildland-urban interface (WUI), present particular challenges for landscape level wildfire management where human structures lie adjacent to or are nestled within fire-prone forests.

This photo was taken in the WUI during the 2007 Angora Fire in northern California.



The 2007 Angora Fire was located in the Lake Tahoe Basin about 150 miles northeast of San Francisco on the California-Nevada border. With Forest Service lands adjacent to a densely populated, high value urban area, the fire represents an opportunity to study fire behavior and management in the wildland-urban interface. The fire progression and impacted area (orange and yellow) are shown here. Note the close proximity of the fire to South Lake Tahoe city limits (in pink).

Angora Fire Map – Source: Governor’s Office of Emergency Services – California



After ignition on June 24, 2007, the Angora Fire grew to over 3000 acres under windy conditions. By the time the fires were extinguished, over 250 structures, including many high value homes, had burned.

Angora Fire – smoke above Lake Tahoe



The incentive for reducing wildfire at the wildland-urban interface (WUI) is very high due to the risk that fire places on human life and valuable property. The presence of high value human structures in fire-prone forests increases the demands on forest managers to reduce the probability of catastrophic fires. Forest thinning around communities to reduce the impacts of fire is probably less controversial than generalized (non-WUI) thinning and is likely to receive widespread public support. Additionally, in fire prone areas homeowners are encouraged to create a defensible space around their homes by clearing brush and other combustibles away from the home. Failure to do so has dire consequences as illustrated in this photograph of a home destroyed in the Angora Fire.





Creation of a “defensible space” around homes by removing shrubs and thinning trees in the WUI can make a big difference in outcome.



State of California Emergency Services

Additional information on community-based efforts to protect people, property and natural resources from the risk of wildland fire is available through the Firewise Communities Program ([www.firewise.org](http://www.firewise.org))

## Angora Fire – Fuel Treatments

### Untreated Stands (1366 acres)

Dense, multistoried stands with abundant ladder fuels

### Treated Stands (480 acres)

Less dense stands with fewer small trees, dominated by large Jeffery pines

The area impacted by the Angora Fire is characterized by mixed conifer stands with moderate to heavy levels of dead wood and mixed brush in the under-story. Prior to the fire, large areas had received fuel treatments (thinning), therefore it also provided an opportunity to evaluate the effectiveness of these fuel treatments on fire behavior, suppression and structure ignition.

Untreated stands (approximately 1366 acres) were mostly dense, multistoried stands with abundant ladder fuels. Treated stands (approximately 480 acres) were less dense with fewer small trees and were dominated by large Jeffery pines.



Fuel treatment prescriptions included commercial and/or pre-commercial mechanical thinning, followed by hand thinning, piling, and burning slash piles. The primary objective of these treatments was to reduce fire severity by changing fire behavior from crown fire to surface fire and reducing heat production.

Fuel treatment – thinning and slash piling similar to Angora fuel treatment at Camp Sherman in central Oregon

Source: SOS Forests

[www.sosforests.com/?p=665](http://www.sosforests.com/?p=665)



## Angora Fire – Fuel treatment effectiveness

### Treated areas

84% burned with surface fire,  
16% burned as crown fire



### Untreated areas

Most burned as crown fire,  
consuming 95-100% of tree  
crowns and surface vegetation



USDA Forest Service: Tahoe National Forest

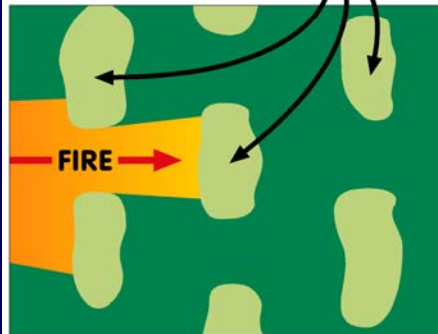
Post-fire analysis of fire behavior indicated that:

1. About 405 of 480 (84%) acres of fuel treated stands burned with surface fire intensity, while about 75 (16%) acres of fuel treated stands burned as crown fire.
2. Crown fires on treated stands occurred on steep slopes; therefore, fuel treatments need to be more intensive on slopes to achieve the same effect as flat topography.
3. Most of the untreated areas burned as crown fire, consuming 95-100% of tree crowns and surface vegetation.

Thus, it appears that for this fire, fuel treatments were largely successful in reaching the goal of changing fire behavior.

## A New Strategy for Reducing Wildfire Effects

### Strategically Placed Area Treatments SPLATs



SPLATs reduce fire intensity and rate of spread, and increase the chance of stopping the fire

USDA Forest Service: Tahoe National Forest

The distribution of thinned areas on the landscape is an important consideration in the application of thinning. One unique approach involves the staggered placement of thinned areas (“fuel-breaks”) on the landscape in a manner that would reduce both fire intensity and increase the probability of stopping a wildfire. These “strategically placed area treatments” (SPLATs), illustrated here, reduce continuous areas of hazardous fuel loads and inhibit the movement of fire from the bottom of slopes to the top of a ridge. When fires encounter a SPLAT, they should drop down to the shrub layer and decrease in speed. Individual SPLATs may range in size from 50-1000 acres. Computer simulations of fire behavior (using software called FARSITE) have shown that with 30% of the area in SPLATs, fire risk can be decreased for the entire landscape. Thinning an entire landscape is very time consuming and usually prohibitively expensive, so the approach has some appeal to forest managers. There is some uncertainty concerning how effectively SPLATs reduce fire impacts under real world conditions and there are concerns regarding the potential impacts of SPLATs on wildlife, overall forest health and water resources. These questions are currently being investigated by researchers with the University of California at Berkeley (see <http://snamp.cnr.berkeley.edu>)

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## What conditions optimize the effectiveness of mechanical thinning?

1. Select forests that are too dense to re-introduce fire.
2. Emphasize those forest types that are characterized by high frequency, low severity fires.
3. Conduct thinning as one step in a broader ecological restoration.
4. Concentrate on those areas where risk is greatest.
5. Assure that markets are available for small diameter trees.

What conditions optimize the effectiveness of mechanical thinning? (modified from Pollet and Omi 2002)

1. Forests are too dense to re-introduce fire; prescribed fire would result in a stand-replacing crown fire and loss of both commercial and non-commercial value.
2. Emphasize those forest types that are characterized by high frequency, low severity fires, which are most likely to have missed several fire cycles and thus are more altered fire regime. Ponderosa pine forests with fire intervals of 15-20 years, for example, are more likely to have altered fire regime and would be good candidates as compared to Douglas-fir or lodge-pole pine forests with a return interval of perhaps several centuries and high severity and thus less likely to exist in an altered state.
3. Thinning is conducted as one step in a broader ecological restoration. Thinning may be followed up, for example, with prescribed burning in an effort to "re-introduce fire into the ecosystem" and to "put the fire regime back within the natural range of variability." Fire then assumes its original role in ecosystems.
4. Emphasize those areas where risk is greatest (WUI, critical watersheds, tree plantations, habitat for threatened and endangered species where warranted – e.g., wildfires may significantly alter forest structure for late successional species such as fishers or spotted owls).
5. Markets are available for small diameter trees (e.g., small saw logs, posts, poles, pulp and chips are all options for various diameters and conditions of wood, also co-generation plants that generate electricity from thinning byproducts).

## Prescribed Fire



State of Oregon – Governors office

*"Fire is the embodiment of uncertainty, and playing with it is just what Mama said."*

William deBuys 2004

Forest managers often attempt to reintroduce or allow fire into forested landscapes to maintain fuel loads, and therefore fires, at a frequency and severity that are more typical of historical conditions. The practice originated in the 1970's when some lightning-caused fires in national parks and wilderness areas were allowed to burn.

## Expected Outcomes of Prescribed Fire

1. Reduction in quantity and continuity of fuels
2. Reduction in surface fire intensity
3. Reduction in damage to tree crowns
4. Ecological effects (i.e., improved fertility, increased germination of fire-dependent species, increased biological diversity)

Expected outcomes of prescribed fire:

1. Reduction in quantity and continuity of surface fuels and ladder fuels
2. Results in decreased surface fire intensity and makes crown damage less likely
3. Typically little effect on crowns of largest trees
4. Other ecological effects (e.g., addition of soil nutrients, initiates germination of fire-dependent species, maintains biological diversity)

## Definitions

Prescribed fire – a fire that is intentionally set to meet management objectives

Prescribed natural fire – a lightning-caused fire that is allowed to burn to meet management objectives

Prescribed fire may be of two different types as defined here:

Prescribed fire – a planned, controlled fire ignited by land managers to accomplish specific natural resource improvement objectives.

Prescribed natural fire – a lightning-caused fire that is allowed to burn to meet management objectives; these are often high elevation fires away from human structures.



However, reintroducing fire into an environment that is overstocked and has abundant ladder fuels may be catastrophic. Therefore, we cannot rely on natural fires alone to restore natural fire regimes. The resulting fires would be socially unacceptable as they would burn large amounts of valuable timber and threaten human lives and structures. Fire as a tool in wildfire management must be used with caution.

The Cerro Grande Fire originating north of Santa Fe, New Mexico in May and June 2000 illustrates what can happen when things go bad. This fire originated as a prescribed burn in the Bandelier National Monument. High winds pushed the fire past its intended boundaries resulting in a 48,000 acre fire that destroyed 200 homes and cost over \$1 billion in property damage including portions of the Los Alamos Nuclear Laboratory.

Photo - Cerro Grande Fire – crown fire from NASA Earth Observatory





This Landsat 7 satellite image captures the ongoing Cerro Grande Fire near the town of Los Alamos, New Mexico and the Los Alamos National Laboratory (seen to the east of the smoke plume). The image was taken on 9 May 2000, 427 miles above the Earth's surface.

The fire probably damaged public opinion of prescribed burning despite a remarkably good track record. Of over 31,000 federal prescribed burns from 1996-2001, only 0.5% escaped their prescribed boundaries and most of these were minor.

Image - Cerro Grande Fire – crown fire from NASA Earth Observatory



## Prescribed Burning



USDA Forest Service: Tahoe National Forest

In addition to the risk of prescribed fires burning outside of their intended boundaries, there are other challenges. Funding for prescribed burning (and for thinning) dwarfs in comparison to allocations for fire suppression. Thus, the number of acres that would benefit from prescribed burning greatly exceeds the available budgets that would be required to accomplish that task. In many areas the “window of opportunity” for safe prescribed burning is very short. Appropriate weather conditions, fuel moistures and available personnel must all coincide to be successful. Also, prescribed fires may generate significant amounts of smoke and, at least temporarily, a decrease in esthetics. To gain public support for these practices, the public must be informed of the long-term benefits achieved by these short-term costs.

## Plantation Thinning and Prescribed Burning



USDA Forest Service: Tahoe National Forest

This pair of slides illustrates the effects of combining thinning (of a pine plantation in this case) and prescribed burning to reduce fuel loads.

USDA Forest Service, Tahoe National Forest, California

## What conditions optimize the effectiveness of prescribed burning?

1. Forests have moderate to low tree densities and ladder fuels
2. Prescribed burning is conducted in the context of a broader ecological restoration
3. Slopes are too steep for mechanical thinning
4. Adequate funding and knowledgeable personnel are available
5. Air quality concerns are addressed
6. Appropriate timing

What conditions optimize the effectiveness of prescribed burning?

1. Forests have moderate to low tree densities and ladder fuels, thus reducing the probability of a stand-replacing crown fire
2. Prescribed burning is conducted as one step in a broader ecological restoration that reduces fire risk while restoring the ecological role of fire in ecosystems.
3. Slopes are too steep for mechanical thinning
4. Adequate funding and knowledgeable personnel are available
5. Air quality concerns are mitigated with careful planning and public education
6. Timing of prescribed burn must be carefully selected for optimum weather conditions, impact on vegetation, moisture levels, etc.

## The Effects of Vegetation Management



USDA Forest Service: Tahoe National Forest

A before and after comparison on the Tahoe National Forest in northern California illustrating the effects of thinning on fire impact. The photo on the left is after thinning and the same area after the Cottonwood and Treasure Fires.

## The National Fire Plan

Developed to effectively respond to severe wildland fires and their impacts to communities:

- Increased firefighting capacity
- Rehabilitation
- Hazardous fuels reduction
- Community assistance

After particularly active fire seasons in the late 1990s and early 2000s public pressure grew to pass federal legislation that would address the increasing severity of wildfires. The National Fire Plan (NFP) was developed in 2000 to effectively respond to severe wildfires and their impacts to communities. The NFP ensures adequate firefighting capacity as well as hazardous fuels reduction, rehabilitation of burned areas and community assistance to affected areas. Hazardous fuels reduction includes implementing practices such as prescribed fire, mechanical thinning, herbicides and grazing.

## The Healthy Forests Restoration Act

Promotes forest thinning as a way to reduce the probability of catastrophic wildfire

### Benefits:

- Restores overstocked young stands to more appropriate densities
- Reduces "fuels" in young stands
- Reduces fire probability in areas of human structures
- Allows timber sales on public lands
- Boosts local economies

The Healthy Forests Restoration Act (HFRA) was signed into law by President Bush three years later, in 2003. It promotes forest thinning as a way to reduce the probability of catastrophic wildfire on federal lands.

### Benefits:

- Restores overstocked young stands to more appropriate densities
- Reduces "fuels" in young stands
- Reduces fire probability in areas of human structures
- Timber sales on public lands (which have been significantly curtailed in recent years due to changes in management objectives)
- Boosts local economies by providing employment and forest products.



# The Healthy Forests Restoration Act

## Concerns:

- Will mature and old growth forests be "off-limits"?
- Is it economically feasible?
- Will thinning be emphasized near human structures?
- Does thinning reduce the probability of catastrophic fire?

## Areas of Agreement:

- Both economic and non-economic values of overstocked young stands will likely increase in response to thinning.
- Thinning near human structures should be emphasized.
- Old growth resources on public lands should be protected.

## Concerns:

- Some environmental groups are concerned that the HFRA will be used as an excuse to harvest mature and old growth forests.
- Is it economically worthwhile for timber companies to bid on thinning sales since most trees will be smaller than those ordinarily harvested?
- Will thinning be emphasized near human structures rather than the broad landscape?
- Does thinning by itself reduce the probability of catastrophic fire?

The broad areas of agreement appear to be the following:

- Both economic and non-economic values of overstocked young stands will likely increase in response to thinning.
- Thinning near human structures should be emphasized.
- Old growth resources on public lands should be protected primarily for their non-economic values such as watershed protection and wildlife habitat.

From 2001 to 2007 over 24 million acres of federal lands have been treated by federal land management agencies under the National Fire Plan and the Healthy Forests Restoration Act. Treatment includes both mechanical thinning and/or prescribed burning. Both the NFP and the HFRA have provided land managers with the tools to achieve long-term objectives of reducing fuels and restoring fire-adapted ecosystems.

# Summary



USDA Forest Service

Thinning and prescribed fire are useful tools in the reduction of wildfire impacts.

Effectiveness varies with forest type and conditions.

Role in ecological restoration requires additional research.

The public education campaign initiated by the Forest Service in 1950, imploring the American public to prevent forest fires, was a huge success. The perception of wildfire as something that is inherently “bad” has been engrained in the American psyche. Despite this effort and the wildfire management policies emphasizing fire suppression, wildfires continue to scorch forests, burn homes, exhaust land management agency budgets and occasionally, take human life. Under the guiding ideals of ecosystem management, there is a new recognition that disturbances like wildfire are natural events that contribute to the overall health of the forest. A change in the perceived role of fire is required. However, before fire can reasonably be re-introduced into many forest ecosystems, fuels must be reduced to avoid catastrophic, stand-replacement fires. Pre-fire interventions, such as thinning and prescribed burning, are useful tools that can be used to achieve this goal. Further research is required to determine the effectiveness of these practices, their impact on other forest values and their role in overall ecosystem restoration.

Conclusions – Thinning and prescribed fire are effective tools to reduce the probability of stand replacement fire. Their effectiveness varies with forest type and forest conditions. Evaluation must be done on a site by site basis – there is no “one size fits all” prescription. Pre-fire interventions are probably most appropriate in forests with short fire return intervals.

# Photo Credits

- Chronicle: Lance Iverson
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- NASA Earth Observatory
- SOS Forests [www.sosforests.com](http://www.sosforests.com)
- State of California Emergency Service [www.hazardmitigation.oes.ca.gov](http://www.hazardmitigation.oes.ca.gov)
- Steve Wilhelm [www.flickr.com](http://www.flickr.com)
- USDA Forest Service
  - Tahoe National Forest
  - Rocky Mountain Research Station
  - Keith Lannom

## Resources

### Print and Web-based Resources:

Arno, S.F. and S. Allison-Bunnell. 2002. *Flames in our forest - disaster or renewal.* Island Press. Washington, D.C. 227 pp.

Arno, S.F. and C.E. Fiedler. 2005. *Mimicking nature's fire: Restoring fire-prone forests in the West.* Island Press. Washington, D.C. 242 pp.

Agee, J.K. 1993. *Fire ecology of Pacific Northwest forests.* Island Press. Washington, D.C. 493 pp.

Agee, J.K. 2002. The fallacy of passive management. *Conservation Biology in Practice.* 3(1):18-25.

*This article addresses forest policy concerning fire and argues that "doing nothing is a choice of action" and an option that may not produce desirable outcomes.*

Carr, M. 2005. *Wildland Waters* USDA Forest Service. Summer 2005 FS-828. 22 pp.

*This special issue on fire provides an excellent general introduction to the fire issue. Most aspects are briefly addressed including fire regimes, fuels management, restoration, fire responses, salvage logging, and rehabilitation. Links to additional resources are provided.*

deBuys, W. 2004. Burned. *Conservation in Practice* 5(4):12-19.

*This is an interesting article intended for general audiences that presents fire management issues from a conservation viewpoint.*

Firewise Communities [www.firewise.org](http://www.firewise.org)

*This multi-agency program is designed to engage homeowners and community leaders in the effort to protect people, property and natural resources from the risks of wildland fire. Links to educational resources are available.*

Graham, R.T. (tech. ed.). 2003. *Hayman fire case study.* USDA Forest Service, Rocky Mountain Research Station. Gen. Tech. Rep. RMRS-GTR-114

*This comprehensive Forest Service document examines all aspects of the 2002 Hayman Fire, the largest fire ever recorded in the state of Colorado. Detailed examination of fire behavior, ecological effects, human impacts, post-fire rehabilitation and social and economic issues are included. The case study involved more than 60 scientists and forest professionals from across the United States. Part 3: The Effects of Fuel Treatments on Fire Severity is particularly relevant to the topics covered in this module.*

Hunter, M.L. 1990. Wildlife, forests and forestry. Prentice Hall, Inc. Englewood Cliffs, NJ. 370 pp.

*This text is one of few that effectively combines the disciplines of wildlife management and forest management. Chapter 12, Intensive Silviculture is particularly relevant to this module.*

Noss, R.F., J.F. Franklin, et al. 2006. Managing fire-prone forests in the western United States. *Front. Ecol. Environ* 4(9):481-487.

*This is an excellent review of the literature on the ecology and management of fire-prone forests in the western United States. The article and the references cited within should provide faculty with a comprehensive understanding of this complex issue. It has also been posted on-line by the Ecological Society of America at [www.frontiersinecology.org](http://www.frontiersinecology.org).*

Nowacki, G.J. and M.O. Abrams. 2008. The demise of fire and “mesophication” of forests of the eastern United States. *BioScience* 58(2): 123-138.

*Fire issues are not restricted to the western U.S. Instructors from east of the Mississippi River will find this article of interest.*

Pollet, J. and P.N. Omi. 2002. Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests. *International Journal of Wildland Fire* 11(1):1-10.

*Although forest managers have been using fuel treatments for decades to reduce wildfire risks, there are few scientific studies that evaluate the effectiveness of these treatments. Most of the evidence in support of the effectiveness of fuel reduction practices has been anecdotal in nature, based on informal observation or derived from computer models. This study conducted by Pollet and Omi was one of the first to systematically and quantitatively analyze the effectiveness of fuel reduction treatments. Their work is based on field measurements of fire severity and crown scorch following wildfires in treated versus untreated ponderosa pine stands at four study sites in Montana, Washington, California and Arizona. At all four sites, fire severity and crown scorch were significantly lower at the treated sites than the untreated sites. Results indicate that fuel treatments that remove small diameter trees may be beneficial for reducing crown fires in ponderosa pine forests. See module for details.*

Pyne, S.J. 2005. Tending fire. Island Press. Washington, D.C. 240 pp.

*This book by a prominent wildfire researcher provides an in-depth evaluation of both fire suppression and “let burn” policies.*

Smith, H.Y. and S.F. Arno (eds.). 1999. Eighty-eight years of change in a managed ponderosa pine forest. Gen. Tech. Rep. RMRS-GTR-23. Ogden, Utah. USDA Forest Service Rocky Mountain Research Station. 55 pp.

*This Forest Service publication describes ecological changes associated with forest management and fire suppression since the early 1900s in a ponderosa pine forest. Changes are documented in a series of repeat photographs taken at 13 photopoints from 1909 to 1997. The authors discuss the effects of past management practices and recent ecosystem-based management treatments.*

*Selected photos included in this document were used to produce a 1996 USDA Forest Service poster designed to illustrate the impacts of fire exclusion on ponderosa pine ecosystems. In this poster, a 1909 photograph is used to illustrate the historical condition of a ponderosa pine forest on the Bitterroot National Forest in Montana. The photo was later found to represent a cleanup operation after a timber sale. See module for more details.*

USDA Forest Service – Angora Fire Assessment  
Pacific Southwest Region

An Assessment of Fuel Treatment Effects on Fire Behavior, Suppression Effectiveness, and Structure Ignition on the Angora Fire

[www.fs.fed.us/r5/angorafuelassessment](http://www.fs.fed.us/r5/angorafuelassessment)

*This document is a comprehensive post-fire analysis of the Angora Fire in northern California in the summer 2007.*

USDA Forest Service – Healthy Forests Initiative

[www.fs.fed.us/projects/hfi/](http://www.fs.fed.us/projects/hfi/)

USDA Forest Service and USDI Bureau of Land Management – The National Fire Plan: Managing the Impacts of Wildfire on Communities and the Environment.

[www.fireplan.gov](http://www.fireplan.gov)

USDA Forest Service and USDI Bureau of Land Management – Healthy Forests and Rangelands

[www.forestsandrangelands.gov/](http://www.forestsandrangelands.gov/)

*This U.S. Department of Agriculture/U.S. Department of the Interior portal allows access to the most up-to-date information on both the Healthy Forests Restoration Act and the National Fire Plan.*

USDA Forest Service. 1983. Fire and vegetative trends in the northern Rockies: Interpretations from 1871-1982 photographs. Gen. Tech. Rep. INT-158 by G.E. Gruell. Intermountain Forest and Range Experiment Station. Ogden, Utah. December 1983



USDA Forest Service. 1995. Age-class structure of an old growth ponderosa pine / Douglas-fir stand and its relationship to fire history. Gen. Tech. Rep. INT-RP-481 by S.F. Arno, J.H. Scott and M.G. Hartwell. Intermountain Research Station. Ogden, Utah. April 1995

USDA Forest Service. 2000. Protecting people and sustaining resources in fire-adapted ecosystems: A cohesive strategy. The Forest Service management response to the General Accounting Office Report GAO/RCED-99-65. April 13, 2000

## Video Resources:

*Biscuit Fire Recovery*. 2004. Oregon Field Guide. Episode #1507. Oregon Public Broadcasting, Portland, Oregon. 30 min.

*This special production by Oregon Field Guide examines wildland fire issues related to the 2002 Biscuit Fire in southwest Oregon and northern California. Several perspectives are presented including those of the USDA Forest Service, the timber industry, fire ecologists and environmental groups. Although the details may differ, most of the issues associated with the Biscuit Fire also pertain to wildfires across the west. See detailed notes below.*

*Fighting Fire with Fire*. 2005. The Nature of Things, Canadian Broadcasting Company. Distributed by:

Bullfrog Films  
P.O. Box 149, Olney, PA 19547  
800-543-3764  
[www.bullfrogfilms.com](http://www.bullfrogfilms.com)

*This 45-minute production narrated by David Suzuki provides an excellent introduction to our current thinking on fire management. Although the emphasis is on fire issues in Banff National Park and Yellowstone National Park, the concepts discussed may be broadly applied across the West. The influence of past fire fighting policy, the current condition of western forests, thinning and prescribed fire, the ecological role of fire, and the implications of global climate change are all examined.*

*Fire Wars*. 2002. NOVA/PBS. WGBH-TV. Boston, Massachusetts. Program #2908. 60 min.

[www.pbs.org/wgbh/nova/fire](http://www.pbs.org/wgbh/nova/fire)

*This NOVA production follows a wildland fire fighting crew during the summer of 2000, one of the most active wildfire seasons on record. Video quality is excellent and topics addressed by this module are discussed. Website has additional resources including a glossary of fire terms and a simple wildfire simulator.*

*The Greatest Good – A Forest Service Centennial Film*. 2007. USDA Forest Service.

[www.fs.fed.us/greatestgood/](http://www.fs.fed.us/greatestgood/)

*This 3-DVD set documents the history of the Forest Service including the evolution of national wildfire policies.*

*The Oregon Story: Rethinking the forests.* 2005. Oregon Public Broadcasting, Portland, Oregon. 60 min.

Oregon Public Broadcasting  
714 SW Macadam Avenue  
Portland, OR 97219-3009  
[www.opb.org/programs/oregonstory](http://www.opb.org/programs/oregonstory)

*This video production, designed for a general audience, addresses forest-related issues in Oregon. The history of the logging industry, management of public vs. private forests, old growth forest and spotted owl issues, the Oregon Forest Practices Act and fire-related issues are all discussed. The final portion of the video addresses forest thinning as a tool to reduce the probability of catastrophic wildfire. See detailed notes below.*

*Prescribed Natural Fire.* 1998. Oregon Field Guide. Episode #904. Oregon Public Broadcasting, Portland, Oregon. 15 min.

*Prescribed Natural Fire - Update.* 2001. Oregon Field Guide. Episode #1209. Oregon Public Broadcasting, Portland, Oregon. 15 min.

*Chetco Fire - Update.* 2003. Oregon Field Guide. Episode #1408. Oregon Public Broadcasting, Portland, Oregon. 15 min.

*These three “Oregon Field Guide” episodes emphasize prescribed fire as a management tool. They may be ordered from the Oregon Public Broadcasting web site at [www.opb.org](http://www.opb.org). All are useful supplements to the PowerPoint presentation included with this module. See detailed notes below.*

## Notes on Videos

Detailed notes on some of the videos cited above follow. Instructors will find them to be useful as they assess their usefulness in presenting this topic. Numbers in left margin indicate approximate elapsed time in minutes.

*Prescribed Natural Fire*. 1998. Oregon Field Guide. Episode #904. Oregon Public Broadcasting, Portland, Oregon. 15 min.

0:00

Yellowstone fires are briefly described

Historical emphasis on fire suppression and "Smokey Bear" policy as compared to a "Let Burn" policy and justification

0:05

USDA Forest Service has a policy that allows some lightning caused fires in Wilderness Areas to burn if certain conditions are met. These are prescribed natural fires (PNFs).

Inspection of PNF is conducted one year later on Ochoco National Forest, Oregon

- natural processes are allowed to occur
- system is adapted to fire frequency of 20-25 years
- most of PNF burned understory only
- Ponderosa pine has a high tolerance for fire

0:10

PNF's are carefully monitored and are only allowed in Wilderness Areas

Northeast Oregon - Eagle Cap Wilderness

- concerns raised about PNF's in human inhabited area
- pre-burning surrounding area is tried so natural fire can be allowed to burn
- illustrates impacts of fire suppression
- 10-15 year record of fires recorded in fire scars ("cat faces")
- nutrient input into soil increases after fire

0:15 END

*Prescribed Natural Fire - Update*. 2001. Oregon Field Guide. Episode #1209. Oregon Public Broadcasting, Portland, Oregon. 15 min.

0:00

Video describes effects of a prescribed natural fire (PNF) in Central Oregon near Prineville that burned 5 years earlier. It is an update of the previous videotape.

Past practices of U.S. Forest Service described.

- First response was to put out fires. Fire suppression has been conducted in this area since 1910.
- Prior to fire suppression, fire frequency was approximately once every 15-25 years and fires were of low to moderate intensity.

0:05

Hash Rock Fire (18,000 acres) burned in 2000 as a high intensity fire as a result of high fuel build up, high tree density and abundant "ladder fuels" (branches and smaller trees that would have ordinarily been removed by previous fires).

In the past 10-20 years fire fighting has become less effective as we see more of these high intensity fires, which are difficult or impossible to control.

Part of the area burned by the Hash Rock fire was a PNF (the Mill Creek Wilderness fire) 5 years ago (1995). This sets the stage for a useful comparison of effects between an area that has had fire suppressed for decades with an area that has had a recent PNF (illustrated on a map):

- No PNF - high intensity, crown, stand replacement fire, woody debris burned completely
- PNF - low, ground fire, woody debris left behind for nutrient source and wildlife habitat

0:10

What are the ecological benefits of PNF's?

1. Wildlife habitat for insectivorous birds
2. Nutrient input
3. Reduced undergrowth
4. Improved grazing conditions for foraging wildlife (grasses have a high nitrogen content)

What concerns are raised concerning PNF's?

1. Environmentalists concerned about salvaging partially burned timber and impacts on streams
2. Hunters concerned about loss of prime hunting areas

U.S. Forest Service ecologist states that if we are to manage for all species ("ecosystem management"), then PNF's are a necessity because diversity is much higher after a PNF than if allowed to develop into an overstocked stand.

0:15 END

*Biscuit Fire Recovery*. 2004. Oregon Field Guide. Episode #1507. Oregon Public Broadcasting, Portland, Oregon. 30 min.

0:00

Setting = Southwest Oregon - Klamath-Siskiyou Mountains, Kalmiopsis Wilderness Area and Chetco River

- 13 July 2002 Lightning strikes start 5 fires during a record heat wave in southwest Oregon
- Fire was initially left to burn due to shortages of firefighting crews (deployed to other areas)
- By early August, the fire was burning out of control and named the Biscuit Fire after a convergence of several fires along the Oregon-California border
- Fire finally is put out by November rains
- Approximately 500,000 acres burned in a typical mosaic with some areas severely burned, some moderately burned, some lightly burned and some not burned at all

0:10

Several different viewpoints about the fire are expressed:

1. Owner of Rough n' Ready Lumber Mill, Cave Junction calls fire a "catastrophic event" caused by a build up of fuel due to logging restrictions
2. World Wildlife Fund representative describes the beneficial role of fire in ecosystems. Contends that this was not a catastrophic event but rather change is the rule and disturbance has been happening for centuries

Controversial questions remain:

Can logging be used to prevent fires?

What is the role of prescribed fire?

What should be done with the burned forest after the fire?

3. Research ecologist – "there is a lot we just don't know"

Oregon has previous experience with large fires – 1933 Tillamook Fire in northwest Oregon

40,000 acres burned in the first 10 days of the fire

Fire fighting efforts had minimal effect

300,000 acres ultimately burned, which at the time was seen as an "utter disaster"



0:15

Fire suppression (Smokey Bear) policy creates large fires and eliminates habitat for rare plants. Large fires are a “wake-up call”.

Natural Research Areas within the burn were studied before and after the fire

- Test plots burned and were analyzed post-fire
- Plants are adapted to fire and quickly regenerate
- A cambium test is demonstrated and used to determine which trees are still alive
- Not all areas burn to the same degree
- A central management question is “How do underburning and thinning affect fire behavior?”

At this site:

Thinned and underburned plots (2001) – many live trees remain with live lower branches

Thinned and not underburned plots (2001) – few live trees remain

0:20

For this site, burning of underbrush rather than thinning appears to be the most important intervention

Conventional wisdom suggests that reducing ladder fuels should reduce canopy fires, but there is anecdotal evidence here that hardwoods may prevent fires from reaching the canopy. This suggests that thinning must be evaluated on a site by site basis.

Post-fire questions are also controversial – “Should logging companies be allowed to salvage logs after a fire”

- Mill owner supports the idea and claims that “plenty of woods are protected now and we should fireproof our forests by thinning and salvaging logs.” Logging companies are not as interested in logging small trees and certainly not brush.
- The USDA Forest Service will determine how much salvage logging will occur (current plan is to salvage 518 million board feet from the Biscuit Fire). The balance must be achieved between salvage logging and the understanding that there is an important role for large dead trees, decaying wood and snags in forest regeneration.

0:25

One lesson learned from the reforestation efforts after the Tillamook Fire – resulting forests are essentially plantations that lack diversity.

USDA Forest Service – “This forest will burn again.”

Some forest species require fire to germinate. Knobcone pine for example requires fire to open serotinous cones.

0:30 END

*The Oregon Story: Rethinking the forests.* 2005. Oregon Public Broadcasting, Portland, Oregon. 60 min.

This video is divided into 12 chapters. The first 5 chapters address general forestry issues in the Pacific Northwest. The notes below cover only Chapters 6 through 12, which explore wildfire, thinning, prescribed fire and related issues.

0:00

Yellowstone Fire in 1988 is described by Steve Maley, USDA Forest Service, retired. Over 100,000 acres burned in less than 24 hours. Maley states that these “were not natural fires”.

0:05

The same conditions that resulted in the Yellowstone fires (over-stocked stands, ladder fuels, etc.) are common across the Pacific Northwest. Over one-third of drier forest types are at risk of catastrophic fire and 40% are ready to recruit into that condition.

0:10

Leslie Weldon, Deschutes National Forest Supervisor

““What is the public image of a healthy forest?”

- Usually, one with lots of trees – yet, overstocked forests generate fire hazards

Comparison is drawn between an overstocked forest and a forest that has been thinned and prescribed burned.

- The thinned, prescribed burned forest will allow large ponderosa pine to grow
  - Adaptations of ponderosa pine described

0:15

B&B Complex Fire on Deschutes National Forest in 2003 resulted from overstocked conditions. Burned nearly 91,000 acres.

- Claim is made that restrictions on logging impede thinning efforts.
- Steve Maley claims that “laws are designed to reduce short-term risks of logging, but do not recognize potential long-term gains.” The risk of inaction is the loss of natural resources. The whole idea of protection needs rethinking.
  - Spotted owl habitat, for example, is now being lost to wildfire.

0:20

Howard Johnson, Wallowa tree farmer (northeast Oregon)

- Describes management on tree farm – no clearcutting, removes defective trees and some larch, thinning and burning slash piles
- Some wildfire started by lightning
- Same property had been previously logged under improper conditions and most trees were removed
- Current efforts are to restore a more healthy forest by “taking out the worst and leaving the best trees.”

0:25

R-Y Timber Co. manages 20,000 acres near Wallowa Lake (northeast Oregon)

- Thinning decisions are designed to create space for growing trees, remove diseased trees and to maximize profit over the long-term
- Trying to create a multi-storied stand with four age classes (vertical diversity)
- Also maintaining high species diversity (Douglas-fir, white fir, ponderosa pine and western larch)
- Stand structure allows for frequent re-entry while retaining watershed and wildlife values over time
- “System will not persist if left alone” Several fire cycles have been missed due to fire suppression, therefore forest must be managed.

0:30

Jim Bowyer, Professor of Forestry and Forest Products, University of Minnesota

“What will be our strategy for obtaining forest products?”

The area of U.S. in forests has increased over the past several decades.

“Should we grow our own forest products or import from elsewhere where environmental regulations may not be as strict (Canada, Asia)?

0:35

On a 900 acre Wallowa tree farm, thinning of trees with dwarf mistletoe (parasitic plant) and other diseases is emphasized, leaving healthy trees and large snags behind.

Goal is to harvest 50 acres per year in this way

- Markets for thinned material must be identified (saw logs, posts, poles, pulp and chips are all options for various diameters and conditions of wood)
- Processing of logs is illustrated
- Restoration of overstocked stands requires removal of small diameter trees
- Markets must be developed for these materials; otherwise, we cannot afford to thin

0:40

Co-generation is another possible use for small diameter wood. Wood products are burned in boilers to generate steam which is then used to generate electricity (Co-gen plants)

- Public forests have lots of material to run co-gen plants like the one described
- Some think we should put more effort into thinning (prevention) rather than fire suppression to address wildfire issue
- Co-gen plants are still considered experimental

Summary of different viewpoints

0:45 END