Federal Land Policy: Programs to Reduce Wildfire Risk and Improve Forest Ecosystem Health Must Overcome Barriers to Active Resource Management

Prepared for the
Idaho Federal Lands Task Force Working Group,
Idaho State Board of Land Commissioners

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Contribution no. 913, Idaho Forest, Wildlife and Range Experiment Station
University of Idaho

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OUTLINE Page

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Abstract

Forest and rangeland conditions on federal lands in the western states have been altered by past land-use practices, including fire suppression activities. Vegetation patterns are different than those at the time of settlement by Euro-Americans. Ecological, economic, and social values are at high risk of catastrophic wildfire on 20 million acres of federal lands in Idaho and Montana, and at least 19 million acres in other states. As a consequence of excluding fire from its ecological role, forests have too many trees. This invites insect and disease outbreaks, dead trees and, unless removed, excessive amounts of flammable materials to fuel unnaturally hot fires. Restoring historic ecological conditions through active forest management, using a combination of logging and prescribed fire, would provide a range of ecological, economic, and social benefits. Why, then, is there less active management today than a decade ago? Federal land policies have changed in response to public distrust of active management, creating a number of barriers. Among them are inadequate funding and inaction from gridlock. Reducing wildfire risk and improving forest health will require changes in public policy. The funding barrier can be overcome. Studies in eastern Oregon, Colorado, and Montana show that logging can attain ecological restoration goals and pay for needed treatments through timber sales. Inaction from gridlock is more problematic. Experiments in alternative governance, such as those being proposed in Idaho, could encourage collaboration between federal managers and local publics, move decisions closer to the land, and create the flexibility managers need to undertake ecological restoration projects that meet the goals of environmental laws without overly complicated planning and regulatory requirements.

Introduction

On August 20, 1910, dozens of wildfires burning across northern Idaho and western Montana blew up, leaving patterns of destruction across 3 million acres of land, including 85 dead. Fire scientists and managers warn that fires of this scale are still possible (Mutch 1994), and journalists cannot resist comparing the 2000 fire season with 1910 (see Barker 2000, Geranios 2000a). There is a significant difference, however. In 1910, weather conditions dried the forests, ignited the fires, and spread them naturally. This fire event triggered a national program to suppress wildfire that began earnestly in the 1930s. An unintended consequence of excluding fire from its ecological role in western forests is unnatural accumulations of fuel. Professor Leon Neuenschwander, fire ecologist at the University of Idaho, said fires now burn hotter with more destructive potential than ever before (Geranios 2000b). This is cause for national concern:

> August 14, 2000, *Newsweek* – **Disasters: The West's Deadly Fields of Wildfire.** "The big picture was awesome: 60 to 70 major wildfires burning across nearly 750,000 acres in 11 western states, 20,000 firefighters working to contain those fires at a cost of $8 million [to $18 million] a day, scores of new fires ignited by lightning every night and all of it adding up to the hottest, most destructive summer season in 50 years. ... Property losses across the region were incalculable, although only [eleven] deaths have been attributed to the fire epidemic [as of August 24]. ... In hard-hit Idaho, outmanned civilian firefighters got emergency help from a battalion of Army troops. ... The fires of Idaho's disastrous summer could burn until the first snow." (Morganthau 2000)

Scientists do not dispute the need to reduce the risk of fire (Kloor 2000). The problem is well understood. Fire needs heat, oxygen, and fuel to burn; fire behavior is influenced by weather, topography, and fuel characteristics (Barney et al. 1984). Of these factors, only fuel can be controlled. The solution to the forest fire fuel problem is well known: active or intensive forest management to reduce fuel accumulations (see, for example, O'Laughlin et al. 1993, Baumgartner and Everett 1994, Sampson and Adams 1994, Johnson et al. 1995, AF&PA/NASF 1997). Furthermore, the solution has been recognized for decades:

> "More than a billion acres of forest and rangeland in the United States are managed under some form of organized fire protection. On much of this land, there is a buildup of flammable fuels that under critical burning conditions can feed disastrous forest fires. The continuing trend toward intensive forestry will, in the long run, contribute to the reduction of this wildfire potential. ... But many foresters have convinced the public, and even themselves, that mechanization and armies of trained forest firefighters are sufficient to handle any threat from fire in our forests. Unfortunately, it is not. ... Examples only emphasize the futility of setting mechanized man against the destructive forces of wildfire where fuels have accumulated." (Wilson and Dell 1971)

On the federal lands that dominate western landscapes, the "continuing trend toward intensive forestry" mentioned above has ended. As the fuel buildup continues, advice from forest scientists continues to be ignored.

In May this year a prescribed fire escaped from Bandelier National Monument and threatened the town of Los Alamos, New Mexico, charring 48,000 acres, destroying 200 homes, and causing an estimated $1 billion in damage (Associated Press 2000). Following that, additional voices were added

to the chorus of scientists urging active management of federal lands to reduce fuels, including Professor Wallace Covington, forest ecologist at Northern Arizona University, an advocate for restoring historic forest conditions:

> "We cannot bury our heads in the sand any longer. Los Alamos, Flagstaff, Storm King – western forest landscapes and human communities have been ravaged by preventable catastrophic fires. ... We caused them by allowing our forests to become so overstocked with trees that they exceeded the carrying capacity of the land. ... Time has run out. Knowing what we know now, we must act, and we must act now. To do otherwise would be an abdication of our responsibility to future generations." (Covington 2000)

This paper reviews recent articles, reports, and other sources of information supporting the theme that active management is necessary to restore desirable ecological conditions in western forests, especially on federal lands. Instead of attempting to paraphrase the ideas of others, direct quotations are used extensively.

The Federal Lands Problem: Gridlock

Federal agencies are responsible for administering one-fourth of the land in the United States; west of the 100th meridian, half of all the land is federal (USDI-BLM 1998). Professor Steven Pyne, forest fire historian at Arizona State University, said, "I don't see many people who like the forests as they exist today. They are not the forests that people want" (Associated Press 2000).

In an effort to restore forest health and biological diversity, federal agencies would like to see a return to ecological conditions that existed at the time of Euro-American settlement (Kloor 2000). This goal is somewhat problematic:

> "Implicit in this choice of time period as a goal for restoration are many complex cultural assumptions concerning the relationship of Euro-Americans to the land. We are attempting to turn back the clock of ecological history to an era that precedes the impact of the western world view on native ecosystems." (Kimmerer 2000)

Professor Donald Arganbright of Northern Arizona University noted that restoration projects are taking place throughout the U.S. on almost every known ecosystem – prairies, lakes, tropical coral reefs, and forests (Arganbright 2000). Federal agencies have designed programs to undertake ecological restoration throughout the country. For example, in the northern Rocky Mountains restoration efforts are guided by the Interior Columbia Basin Ecosystem Management Project (ICBEMP). A program of active management has been proposed, based on a broad-scale ecosystem assessment conducted across almost the entire state of Idaho, most of western Montana, and the portions of Oregon and Washington east of the Cascade Range (see ICBEMP 2000). A decision on the proposed program is currently pending, seven years after President Clinton ordered the ICBEMP.

Federal agencies face a number of problems implementing ecological restoration programs. Mike Dombeck, Chief of the U.S. Forest Service, said,

> "Many of the problems we face in our national forests defy simple administrative solutions. One serious problem is the health of our forest ecosystems. Some 54 million acres of national forestland

are exposed to a moderate to severe risk of unnaturally occurring catastrophic fire. And 24 million acres are at risk of excessive mortality over the next 15 years due to insect and disease outbreaks.

"Our forest ecosystems most in trouble once had low-intensity fires every few years. Decades of fire suppression allowed dense stands of small-diameter trees to fill the spaces between larger, older trees. When fire now occurs, it often ladders into the canopy, destroying the entire forest for generations to come. ...

We know how to begin to solve our forest health problems. Thinning, prescribed fire, and planting all play a role." (Dombeck 2000)

Wildfire risk should be diminishing and the health of federal lands should be improving, but they are not. Why? The means of attaining forest restoration goals through active management are logging and prescribed burning, and these methods are not universally accepted. Some people distrust federal land management agencies, programs, and projects featuring active management. Gridlock prevails and inaction results. Gridlock is neither desirable nor inevitable. The situation can be changed and the risks posed by wildfires are a compelling reason to do so.

Wildfire Risk

The U.S. General Accounting Office, using information from the U.S. Forest Service, reported to the U.S. Congress that 39 million acres of national forests are at high risk of catastrophic wildfire (US-GAO 1999). These lands are primarily in the interior West and Atlantic coastal states. Many of these forests are overcrowded, resulting in high mortality rates from bark beetle and other insect and disease outbreaks. High mortality rates result in excessive fuel buildups (USDA-FS 1999).

Professor Scott Stephens, fire scientist at the University of California, Berkeley, in testimony to Congress described the problem and its causes:

"Current forests in many fire-dependent ecosystems of the United States are denser and more spatially uniform, have many more small trees and fewer large trees, and have much greater quantities of fuels than did their presettlement counterparts. Causes include fire suppression, past livestock grazing and timber harvests, and possibly changes in the climate. The results include a general deterioration in forest ecosystem integrity and an increased probability of large, high-severity wildfires. Such conditions are prevalent nationally, especially in forests with historically short-interval, low to moderate-severity fire regimes." (Stephens 2000)

Analysis by the ICBEMP team of scientists revealed that the amount of federal forest lands at risk of catastrophic or lethal wildfire in Idaho and Montana has tripled in the past century, from 20 percent to 60 percent of the total area of federal forests (Quigley et al. 1996). This translates into 20 million acres of federal forests at risk in Idaho (10.4 million acres) and Montana (9.5 million acres). Federal scientists said,

"This [wildfire risk] poses a significant threat to ecological integrity, water quality, species recovery, and homes in rural areas." (Quigley and Cole 1997, p.13)

Professor Penny Morgan, fire ecologist at the University of Idaho, and her colleagues, including Professor Neuenschwander, provided written testimony to a congressional hearing on forest fires. They said,

> "Wildfires will continue to threaten people and their property throughout the West. More homes WILL be lost. The only question is WHEN? Unless we adjust the forest conditions to reduce the accumulated fuels, the risk to people and their property will continue. Further, intense fires can threaten ecosystem integrity, water quality, and long-term productivity of our forests. The problem is widespread, but differs greatly for the diverse and complex forest and non-forest ecosystems of the United States.
>
> "It is one of the great paradoxes of fire suppression that the more effective we are at fire suppression, the more fuels accumulate and the more intense the next fire will be. We MUST learn to live with this reality. We should seek to maintain and manage for the forest structures and species compositions that are resilient to future fires. In many, but not all cases, this requires active management – actively cutting small trees or burning accumulated fuels to alter forest structure. Active management can include prescribed burning, logging, or a combination." (Morgan et al. 2000, emphasis in original)

Forest Health

A forest, by definition, is an ecosystem with trees as the dominant vegetation (Helms 1998). "Forest health" is a term sometimes used to describe forest conditions. Forest health is a multidisciplinary concept focused on the *prevention* of undesirable forest conditions. Although the analogy with human health is imperfect, forest health is a useful communication device for focusing attention on the *restoration* of socially desired forest conditions. A healthy forest is *resilient*; i.e., it has the ability to respond quickly to natural and human-caused disturbances, including fire, insects, diseases, climate change, air pollution, and timber harvesting, and recover to some desired condition or state. A healthy forest is *sustainable*; i.e., it is capable of meeting people's present needs and aspirations without compromising the ability to meet those of the future (O'Laughlin 1996).

The U.S. General Accounting Office reported to Congress that

> "The most extensive and serious problem related to the health of national forests in the interior West is the overaccumulation of vegetation, which has caused an increasing number of large, intense, uncontrollable, and catastrophicallly destructive wildfires." (US-GAO 1999)

Professor Carl Fiedler, silviculturist at the University of Montana, has designed comprehensive restoration strategies for ponderosa pine ecosystems. Ponderosa pine is the most widespread forest type in the interior western states, covering some 40 million acres (Fiedler 2000). In testimony to Congress, Professor Fiedler asked and answered a key question about the health and sustainability of ponderosa pine ecosystems:

> "So what are the longer-term implications of current conditions in the ponderosa pine and pine/fir forests of the West? While the term ecosystem health means different things to different people, Aldo Leopold defined this term as the ability of a system to recover after disturbance. Based on this definition, many pine and pine/fir forests in the West are neither healthy or sustainable. The good news is that we have silvicultural treatments available to address the density, structural, and species

compositional problems that leave pine forests vulnerable to catastrophic fire. What is needed is timely, strategic-level implementation of comprehensive treatment prescriptions based on location, extent, and relative severity of hazardous conditions." (Fiedler 2000)

Professional foresters working in the Inland Empire region of eastern Washington and northern Idaho identified the problem there:

"Forest health has become a significant issue to both professional foresters and the general public. This is a controversial subject because forest health means different things to different people. Many natural events like fire, windthrow, and endemic insects and diseases are important factors in the forest ecosystem. The severity of wildfire, epidemic native insect populations and introduced diseases and insects along with very high tree densities, brought about by public reluctance to actively manage forests, have caused a serious decline in forest health. With the increase of homes in the wildland interface and the risk associated with a catastrophic wildfire, it is not possible or realistic to ignore the forest health issue facing the Inland Empire area. Reintroducing fire as the only means of improving forest health is not a viable option. Professional foresters must be allowed to utilize all appropriate management techniques, on public and private forests, to reduce fuel loading and improve our forests' resistance to insect and disease epidemics." (IESAF 1999)

Idaho's National Forests Are Unhealthy. Almost 40 percent of the state of Idaho is covered with forests; 73 percent of Idaho's forests are on federal land (Brown and Chojnacky 1996). After assessing a range of ecosystem components and processes, Forest Service scientists (Atkins et al. 1999) addressed the potential for large and severe forest fires in the state. They said,

"The ability of a forest to sustain itself ecologically and provide what society wants and needs is what defines a healthy forest. ... The starting point in evaluating forest health is measuring the change in forest conditions. ...

"It is clear our past land use practices have brought significant changes to Idaho's forests. If we assume that it is desirable to maintain native tree species and, at a minimum, representative areas with historic stand structures, we must conclude past actions have had a negative effect on achieving this objective. Several tree species, such as western white pine, aspen and ponderosa pine, are much reduced from what they were historically, especially in large size classes. ... While many of these changes are perfectly acceptable, even essential, others go well beyond what people are willing to accept, based on their values. ...

"Severe stand replacing fires over large areas may be incompatible with our current human settlement and uses of the forest. Such large severe fires threaten human lives, buildings, air quality, wildlife, wildlife habitat, timber, water quality and quantity, and recreational opportunities. ... Many forested areas now have high fuels, given the accumulation of trees and dead wood in the forests from decades of fire suppression, and are considered at risk of severe wildfire. ...

"Unless fire-susceptible conditions change, we can expect similar large forest fires to occur." (Atkins et al. 1999)

Forest Service scientists have identified the conditions in Idaho's national forests as unhealthy (Harvey et al. 1994). When is a forest healthy or unhealthy? The Random House dictionary defines health using the concepts of *vigor* and *vitality*, and they can be applied to assessing the condition of forests. One dictionary definition of *vigor* is "growth ... as a plant." Coupling that concept with forest

inventory data, Idaho's national forests appear to be as vigorous as other forests in the state, with 13% less growth per acre in 1980, but 3% more in 1987. One dictionary definition of *vitality* is "power to live." Idaho's national forests have less vitality than other Idaho forests because they have a higher mortality rate, with 38% more mortality per acre in 1980 and 56% more in 1987. Mortality in Idaho's national forests (expressed as a percentage of growth) was 60% higher than other Idaho forests in 1980 and 55% higher in 1987. In Idaho, one can therefore conclude that national forests are not as healthy as other forests (O'Laughlin 1996).

Restoring Healthy Forests. A pervasive forest restoration problem is reducing overly dense stands (Long and Smith 2000). In Idaho, public and private resource managers agree that the major difference between national forests and private ownerships in the state is that national forests have higher densities of trees (O'Laughlin et al. 1993, Blatner et al. 1994, Morelan et al. 1994). That is, Idaho's national forests have more growing stock volume per acre than other forest ownerships. Inventory data show that in 1980, Idaho's national forests had 33% more volume per acre than other forests in the state, and in 1987, 35% more. As per the analysis above, denser stands also have higher mortality rates (O'Laughlin 1996).

Many western forests are too dense, with more trees than the site can support (Covington 2000). In many Idaho forests, trees well-suited to a site, such as ponderosa pine, western white pine, and western larch, have been replaced by ill-suited species, especially grand fir and Douglas-fir, that are more susceptible to insects, diseases, and fire (O'Laughlin et al. 1993, Atkins et al. 1999).

In the context of reducing wildfire risk, there is considerable evidence that forest conditions in Idaho are not as healthy as they could be. A University of Idaho report provided the evidence and concluded that active management can reduce the risks posed by the current conditions on national forests:

> "If forest health is a statement about trees at risk of mortality from insects, diseases, and wildfire, then much of Idaho's forest land is either unhealthy or on the verge of poor health, especially in the national forests that represent two-thirds of the state's timberlands. ... In forests throughout the state, environmental, ecological, economic, and social values are at risk. The situation can be changed by using forest management practices favoring pines instead of firs and reducing competition between trees by thinning, while protecting other forest values. Two obstacles to this are public policy and public trust." (O'Laughlin et al. 1993, p.1)

Active Management: Benefits and Risks

The team of federal scientists working on the Interior Columbia Basin Ecosystem Management Project (ICBEMP) concluded that

> "Active management appears to have the greatest chance of producing the mix of goods and services that people want from ecosystems, as well as maintaining or enhancing the long-term ecological integrity of the Basin." (Quigley et al. 1996, p.185; Quigley et al. 1998, p.38)

What is active management? Silviculture is applied forest ecology and a basic tool of active forest management. Professor David M. Smith of Yale University once said forestry is anything done *in* the

woods; silviculture is anything done *to* them (Beaufait et al. 1984). The recommended application of different silvicultural techniques and tools is described by a silvicultural prescription. Silvicultural treatments produce a variety of benefits for society. Treatments may benefit the forest ecosystem, but also pose some ecological risks.

Ecological Benefits. An active management program can produce ecological benefits by changing undesirable forest conditions. Desirable changes include reducing fuel accumulations and threats from high-intensity wildfires. Professor Fiedler testified to Congress that

> "Broadscale implementation of comprehensive restoration cutting treatments is a compelling need for several reasons: [1] the ecological function and long-term sustainability of huge acreages of pine forest are at risk, [2] the landscape-scale, catastrophic fires that have charred pine forests in recent years are harbingers of things to come, [3] proactive hazard-reduction treatments can limit severe damage from wildfire, which has substantial value in terms of wildland resources and amenities retained, and fire-fighting costs avoided, and [4] the fuels buildup in the interior West is not going away." (Fiedler 2000)

Changing the conditions in dense stands is a particularly "striking and pervasive" problem (Long and Smith 2000). Dense stands alter the fuel regime by adding quantities of fuel and providing vertical continuity (i.e., "ladder fuels"), thereby increasing the destructive potential of wildfires (Covington and Moore 1994). Overly dense forests, and those with species ill-suited to sites and prone to insect and disease attacks, can be modified by restoring ecologically sustainable conditions through silvicultural prescriptions that include removing excessive fuels. Options for doing so are analyzed in a section below.

Social and Economic Benefits. Restoration projects exist within a social context, and must therefore produce environmental conditions that are not just ecologically sound, but also economically feasible and socially acceptable (Hull and Gobster 2000). Professor Robin Wall Kimmerer of the College of Environmental Science and Forestry, Syracuse, New York, placed ecological restoration in the broader context of social and cultural acceptability:

> "A balance is sought between economic return and maintenance and protection of traditional cultural values. Restoring the relationship to the land is given equal weight with restoring the function of the ecosystem. ... As we strive to heal not only the land but also our relationship to it, restoration can be the means by which we regain our roles as members of the community. In this way, we can start to develop the intimacy with our land that nurtures a deeper spiritual connection, transforming our forests from natural resources to our home." (Kimmerer 2000).

Economic considerations are part of the social and cultural context of ecological restoration. Reducing the costs of fighting fires, in dollars and human lives, is a compelling reason to undertake active management to restore ecological conditions that reduce excess flammable fuels. In the ICBEMP assessment of the condition of federal lands in the interior Columbia River basin, Forest Service scientists observed that

> "Fire suppression costs, firefighter fatalities per year, and the proportion of high intensity fires have doubled between the periods of 1910 to 1970 and 1970 to 1995." (Quigley et al. 1996, p.61)

Professor Fiedler, in testimony to Congress, identified other social and economic benefits from forest restoration:

> "The ecological benefits that derive from comprehensively treating high-hazard western forests are varied and many. Equally important byproducts of the comprehensive restoration treatments we recommend are employment of woods workers in rural communities, production of substantial volumes of timber products to help offset increasing domestic dependence on imported wood, and generation of revenues to help pay for other restoration treatments, such as tree planting and prescribed burning." (Fiedler 2000)

Risks. Active management poses risks that must be weighed against the risks of high-intensity wildfires. Active management involves trading off largely manageable ecological risks from silvicultural activities with ecological risks of catastrophic wildfire. According to federal scientists, inaction or passive management will allow some forest health problems to worsen (Atkins et al. 1999, citing Quigley et al. 1998).

Professor Stephens testified to Congress that

> "There is no risk strategy when it comes to fuels management and doing nothing is not acceptable in my view. It will take 2-3 decades of active management using diverse tools and methods to begin to solve the national fuels problem." (Stephens 2000)

Members of the Society of American Foresters working in the interior Columbia River basin addressed the topic of wildfire risk, concluding that

> "Absent management activity the risk or fire hazard potential will increase. Silviculture can to some extent reduce the risks from wildfire (see Graham 1994, Oliver et al. 1994), but it does pose some risk to non-timber resources and ecological processes and functions. Trading a small and manageable amount of silvicultural risk today – minimizing adverse impacts through adaptive application of best management practices – for the certain risk that a high-intensity wildfire will produce its undesirable ecological results in the future may not be prudent. ... Silvicultural risks are relatively small and manageable compared to the risks high-intensity wildfires in fuel-clogged forests pose to timber and non-timber resources and ecological processes and functions. ... Trying to protect aquatic habitat by not allowing management of the adjacent terrestrial areas where fuel has built up does not make ecological sense." (O'Laughlin et al. 1998)

Professors James Long and Frederick Smith, silviculturists at Utah State and Colorado State Universities, respectively, developed silvicultural guidelines for managing northern goshawk (*Accipiter gentilis*) habitat in southwestern ponderosa pine forests. They recognized the risks posed by active management and concluded that

> "Accepting some increased short-term risk may be the only practical way to achieve the desired future condition, including long-term reduction in the potential for catastrophic fires." (Long and Smith 2000)

Active Management Options

Forest Service scientists identified the tools available to change the conditions in Idaho's forests. Their recommendations are universal in application:

> "Landowners and managers have a number of tools available to alter these conditions [including] prescribed fire [and] timber harvests designed to accomplish similar results as prescribed fires. The use of harvests in combination with fire can be very effective in changing the pattern of vegetation across the landscape to more desirable conditions. ...
>
> To reverse the downward trend [in forest conditions] will require active management. It would include more actions that regenerate a new forest such as prescribed fire or logging." (Atkins et al. 1999)

Professional foresters working in the Inland Empire region of eastern Washington and northern Idaho have adopted a formal position statement that managers need the flexibility to use a full range of appropriate techniques and tools to cope with forest health problems:

> "The Inland Empire Society of American Foresters knows professional foresters have a vital role in the management of healthy forests and the recovery of unhealthy forests. A full range of management techniques must be available for use by professional foresters. Appropriate management techniques include, but are not necessarily limited to, salvage of dead and dying timber, thinning of dense forests, reforestation with species best suited for the site and the use of prescribed fire where appropriate. Because every forest site is different, professional foresters must be given the flexibility to make decisions that will provide the appropriate management for the forests of the Inland Empire." (IESAF 1999)

There is some debate among ecologists about how much controlled burning (i.e., prescribed fire) and logging is necessary to restore forests in the western states (Kloor 2000). Many university professors argue that logging is an essential part of ecological restoration (Fiedler 2000, Keegan 2000, Long and Smith 2000, Lynch et al. 2000, McKillop 2000, Morgan et al. 2000, Nelson 2000, Smith 2000, Stephens 2000).

The sum total of their message is straightforward. Ecological restoration in fire-dependent forests must include logging to remove trees that do not contribute to the desired future forest conditions and prescribed fire to reduce surface fuels and recycle nutrients. The key consideration in choosing a silvicultural option, observed Professor Stephens (2000), is determining desired future forest conditions.

The main point of this paper is the one offered to Congress by Professor Penny Morgan and her colleagues, as well as Professor Stephens:

> "We need an aggressive program of fuels management including BOTH prescribed fire and mechanical treatments." (Morgan et al. 2000, emphasis in original)
>
> "Mechanical fuel treatments followed by prescribed fire can be used to reduce fire hazard in many areas." (Stephens 2000)

Logging is the only feasible mechanical fuel treatment to reduce fire hazard. Consider the technical definitions of these terms. According to the Society of American Foresters *Dictionary of Forestry*, fuel

treatment is "any manipulation or ***removal*** of wildland fuels to reduce the likelihood of ignition or to lessen potential damage and resistance to control" (Helms 1998, emphasis added). The SAF *Forestry Handbook* describes a variety of techniques and tools for fuel management, including mechanical treatment and prescribed burning:

> "Mechanical treatment means manpower or equipment is used to ***remove*** or rearrange fuels. Rearrangement consists of piling fuels for future burning or crushing dead fuels so they decompose faster. Prescribed burning is an economical method of disposing of accumulated slash or undesirable species. It is done by burning piles of vegetation or broadcast burning." (Beaufait et al. 1984, emphasis added).

There are only two ways to remove fuels: logging or burning. Logging is a synonym for timber harvesting, which is the "felling, skidding, on-site processing and loading of trees or logs onto trucks" (Helms 1998). A large part of the wildfire risk problem is excessive on-site accumulation of fuels, a condition which precludes burning as a fuel treatment option, leaving only logging. After excess fuels have been removed by logging, prescribed burning could be used to remove or reduce the remaining surface fuels and very small woody stems.

Federal agencies recently revised the ICBEMP draft environmental statement for the interior Columbia River basin region, proposing two "action alternatives" to the baseline current situation (see ICBEMP 2000). Each of the three alternatives proposed annual expenditures of somewhere between $142 million and $145 million for forest stand management activities. Members of the Society of American Foresters working in the region cautioned against shifting the management emphasis from thinning and harvesting to prescribed burning. In formal comments submitted to the ICBEMP they said,

> "The mix of three different [forest stand management] activities is considerably different, with the no-action S1 Alternative featuring heavier emphasis on thinning and harvesting, and the action alternatives replacing some of the thinning and harvesting with a $22 million increase in prescribed burning. The action alternatives may be too risky a strategy, given the unpredictable consequences of even the most carefully controlled burning conditions in stands with an abundance of small trees, which is typical of much of the ICBEMP area. There are also human health and aesthetic concerns about smoke from prescribed fires that may preclude the use of this tool where it would otherwise be appropriate." (IESAF 2000)

Although active forest management is generally recognized as necessary to change the undesirable forest conditions in the interior West, there is a lack of agreement about the appropriate silvicultural approach to active management. Given the variability of forest conditions, that is to be expected. Prescribed fire and logging are both necessary, and both are controversial. Some people who recognize the need for ecological restoration treatments are opposed to any logging on federal lands, and therefore prefer prescribed burning. Others who recognize the need for logging in combination with prescribed fire are suspicious about cutting anything but small trees. These controversies are addressed in the next two sub-sections.

Prescribed Fire: Too Little, Too Late. The conditions necessary to undertake prescribed burning limit the use of this effective tool to a fraction of the federal lands that need fuel treatments. Professor

Emeritus William McKillop of the University of California, Berkeley, identified the conditions necessary to use prescribed fire in forest restoration:

> "The proper management goal for our National Forests is to restore existing forest stands to the pre-European-settlement condition as quickly as feasible. ... The difficulties of using prescribed fire should not be downplayed. For example air quality restrictions and budgetary constraints are major barriers to its large-scale implementation. In addition, there are very limited periods and opportunities when all of the factors such as fuel loadings, fuel moisture, existence of defensible perimeters, and weather conditions, especially wind velocity, are at levels appropriate to burn. Furthermore, it must be realized that the dangers of fire escapement require fire crews to be on stand-by and have good access by road to the area being subject to prescribed burning." (McKillop 2000)

Professor Fiedler testified to Congress that because of the fuel buildup it is too late to rely on prescribed burning:

> "The opportunity to use prescribed fire as a means of either reducing hazard or restoring sustainable conditions in today's dense stands is largely past." (Fiedler 2000)

Logging Options: "Thinning-from-below" and "Comprehensive Treatment." Thinning forests can achieve a variety of objectives, including tree growth redistribution, tree species regulation, timber harvest, wildlife habitat improvement, and wildfire-hazard reduction (Graham et al. 1999). Two silvicultural options for wildfire-hazard reduction are "thinning-from-below" and a more "comprehensive treatment" approach to stand manipulation to promote restoration of desired conditions as quicky as possible.

"Thinning-from-below" removes only smaller trees. In situations where fuels are excessive, some ecologists favor "low thinning" that limits timber harvests to trees under a specified diameter limit. For example, in the southwestern states Morgan et al. (2000) argue for not cutting trees over 16 inches in diameter. They noted that the Chief of the Forest Service has proposed fuel treatments throughout the West that would preserve all trees over 12 inches in diameter. In a letter to President Clinton, Fred Ebel, President of the Society of American Foresters, objected to the Forest Service silvicultural prescription:

> "This recommendation is not based on science, and will not help alleviate the problem. In New Mexico alone, if every tree under twelve inches in diameter were cut, the forest would still be overstocked. ... We must let professionals on the ground make these determinations and use science and experience to get this job done." (Ebel 2000)

The "low thinning" option has some drawbacks on high-productivity sites. In Idaho, less desirable trees such as grand fir and Douglas-fir can attain 20 inch diameters within 50 years (L. Neuenschwander, personal communication). More than 90 percent of the 3+ million acres of high productivity sites in the 8-state Intermountain Region are in Idaho; more than half these lands are in the national forests (Powell et al. 1993, Brown and Chojnacky 1996). These Idaho forests are among the nation's most productive timberlands (Wilson and Van Hooser 1991), capable of producing more than 120 cubic feet of wood per acre per year.

"Comprehensive treatment" is a different approach. Some silviculturists argue that the thinning-from-below approach is not only the wrong prescription for some situations, but also creates misperceptions that forest restoration is "solely a problem of too many small trees, and that restoration treatments are expensive" (Fiedler 2000). Comprehensive treatment involves individually marking the trees that will remain on the site and removing all others. The key is selecting and marking the trees that will provide the desired future condition. In some instances this means removing large trees, especially if they are less desirable species, such as grand fir or Douglas-fir that commonly encroach on ponderosa pine sites. Comprehensive treatment would not only promote the attainment of desired ecological conditions more rapidly (Fiedler 2000), but also provide very substantial economic opportunities (Keegan 2000).

Comparing the two approaches, Professor Fiedler presented to Congress the following information from a study of a typical Montana ponderosa pine forest:

> "We compared the widely recommended thinning-from-below prescription aimed at removing the ladder fuel component in high-hazard forests, with a more comprehensive treatment regime aimed at addressing the full range of problems that threaten their sustainability. Rather than focus on the trees to be cut – as is the case with the thin-from-below prescription – the approach we recommend is to mark the trees to be left in the number, species, size, and juxtaposition that best approximate (or set the stage for) the desired sustainable stand of the future. All trees not designated for leave are cut.
>
> "These prescriptions were applied to an average forest condition in western Montana. The thin-from-below treatment produced a small volume of timber products and cost more to implement than the value of products removed, whereas the comprehensive treatment produced an average of about 4,000 board feet per acre." (Fiedler 2000)

National Forest Management: Inaction Prevails

Professor Robert Nelson teaches environmental policy at the University of Maryland and formerly spent almost two decades as a policy analyst with the U.S. Department of the Interior. He has written a book-length critique of the U.S. Forest Service, targeting fire management (see Nelson 2000a). In testimony to Congress, Professor Nelson argued that the Forest Service has a preference for prescribed burning that is inappropriate in light of the scale of the fuel buildup problem in the national forests, with more than 50 million acres of land needing treatment. He said,

> "The Forest Service in recent years has shown a preference for prescribed burning over mechanical treatment. ... The clear preference for prescribed burning has created several problems. There are some areas where prescribed fire cannot be used but there is still a reluctance to employ mechanical removal of excess fuels. ... Hence, the use of prescribed burning is often most feasible in the areas of the national forest system that are not the most severely affected by forest health problems and where the risks to lives and property is less. This problem is compounded by the Forest Service use of acreage outcomes that may be poorly correlated with the extent of actual risk reduction in order to evaluate unit and personnel performance. ... The net effect of the above factors has often resulted in inadequate actions being taken to reduce excess fuels. The obstacles to either prescribed burning or mechanical treatment have been greater on federal forested lands than state or private land.
>
> "Where prescribed fire can not be used effectively or safely, the resultant policy is essentially one of no action, as has occurred over considerable parts of the federal land system in the West. The

ultimate result is a continuing build-up of excess fuels, achieving the unhealthy and dangerous conditions found today on federal forested lands." (Nelson 2000b).

The Society of American Foresters (SAF) is concerned about the fuel buildup in federal forests. Speaking on behalf of the organization's 18,000 members, the SAF's executive vice-president wrote a letter to the editor of the *Washington Times*:

"We need to address severe forest health problems on over 40 million acres. We must increase funding for proper, well executed prescribed fires (Forest Service funding for fire programs has decreased by 40 percent since 1980). Finally, we must utilize all of the tools at our command, most specifically thinning and other harvesting regimes necessary to reduce fuel loads and dangerous fuel laddering. It is time that federal agencies invest in our future and cease ignoring the land management professionals who can help bring order out of this chaos." (Banzhaf 2000)

Inaction is unacceptable (Covington 2000, Nelson 2000b, Stephens 2000), yet that is the current situation. Consider, as Professor Nelson did, the magnitude of the management tasks related to the fuel treatment problem in the national forests:

"If a 15 year schedule were adopted to complete the process on the least healthy lands by mechanical treatments alone (perhaps followed by burning), it would require treating about 3 million acres per year with timber thinning and harvesting. During the decade of the 1980s, the average Forest Service acreage on which timber harvesting was taking place was less than 500,000 acres per year.

"Hence, mechanical removal of excess fuels for the most severely unhealthy lands alone could require annual thinning and harvesting on as much as six or more times the amount of acreage affected per year by harvesting activities in the 1980s. This is an upper limit and is not meant to be a projection but it serves to illustrate the potential magnitude of the issue.

"Even at more moderate levels of thinning combined with widespread use of prescribed burning, it is doubtful that the Forest Service is either administratively capable of implementing or likely to win public support for such a radical shift in management and policy in a short period. The agency is now widely distrusted in the West and among many outside groups with which it would have to interact." (Nelson 2000b)

Barriers to Active Management

Why, given the scale of the fuel buildup problem and the chorus of scientists calling for active management, has there been a downward trend in active management of federal lands during the 1990s? Evidence of the trend is a 70 percent reduction in timber sale volumes from federal lands, the result of policies driven by distrust of active management.

Substantial barriers to initiating active management are posed by current policies, including agency funding and institutional gridlock that breeds inaction. If an active management program to restore desirable ecological conditions in federal forests is to be undertaken, these barriers must be overcome.

The desire of federal land managers to reduce fuels through the use of prescribed fire, logging, or a combination of the two, faces numerous obstacles:

> "Removal of excess fuels is generally accomplished by the use of prescribed burning, thinning and harvesting of excess fuels, or some combination of the two. The Forest Service has encountered significant obstacles, however, to both. The ability to use prescribed burning is limited by a variety of formidable hurdles: [1] high cost, [2] risk to human lives and property, [3] expansion of the forest/urban "interface," [4] risk to forest health and ecological sustainability, [5] weather, [6] smoke, and [7] public perceptions. ... The second option is to cut unwanted trees and other undesired vegetation and to physically remove it. Here as well there are large obstacles: [1] high cost, [2] environmental impacts, [3] wilderness values, [4] visual unattractiveness, [5] legal hurdles, [6] supply uncertainty, and [7] public perceptions." (Nelson 2000b)

The public perception barrier to both prescribed fire and logging is closely related to the distrust of active resource management some people harbor. Professors from western land grant universities have written about this in the *Journal of Forestry*:

> "There are, of course, considerable challenges to successful implementation [of forest restoration programs and projects]. Not the least of these is that some national forest stakeholders are fundamentally opposed to harvesting on federal lands and will not agree that the means are acceptable, even if the ends are desirable." (Long and Smith 2000)
>
> "[People] who are concerned about harvesting, particularly on national forests, see forest restoration as simply a convenient and underhanded way to promote timber removal. This mindset is a major impediment to both small- and large-scale efforts to restore forests and to reduce fuel and thus limit fires in populated areas. We must somehow overcome this suspicion." (Arganbright 2000)

In addition to public perceptions that present obstacles against using silvicultural approaches, there are institutional barriers against restoring forests through active management that, according to Professor Covington, create obstructions that foster the tragic consequences of inaction:

> "Unfortunately, there are barriers to success. One is funding; this barrier, while not trivial, is relatively easy to overcome when the will exists. The other barrier is inaction caused by obstructionism and perfectionism. Some people prefer inaction and attempt to stall progress by using legal challenges and bureaucratic entanglement, and unrealistic demands for perfect knowledge. Ironically, in degraded forests this inaction becomes an action that leads to more degradation and increasingly severe crown fires that lead to loss of critical wildlife habitat, loss of homes, and, most importantly, loss of human lives. The consequences of obstructionism are tragic." (Covington 2000).

Institutional Gridlock. Professor Nelson, in testimony to Congress, emphasized three points that provide an overview of the current federal land management situation:

> "[1] Leading forestry experts have been warning since the early 1990s that very dangerous fire conditions were building up on the forests of the interior West. These conditions are putting lives and property at severe risk. [2] The response of the federal government has been inadequate in addressing the growing magnitude of the problem, as various investigations including reports by the General Accounting Office to the Congress have previously found [see, for example, US-GAO 1999]. [3] The failure to take effective federal policy action has reflected a wider state of gridlock within the federal land management agencies with respect to many aspects of federal policy making for the national forests and other public lands in the West." (Nelson 2000b)

Professor Nelson seemed to be especially concerned about gridlock. He noted that the Forest Service decision-making process is "broken" and identified some of the policies responsible for this situation:

> "Policy gridlock has been widely noted and discussed among students of public land management. Echoing the conclusions of many nongovernmental studies, the General Accounting Office informed the Congress in 1997 testimony that 'in summary, ... the Forest Service's decision-making process is broken' (US-GAO 1997). Land use planning and other new procedural steps required under the 1970s legislation have created wide policy making confusion and in some cases the de facto control over public land decisions outside the federal agencies themselves. Often relying on language of the 1970s legislation, the courts increasingly have overridden executive decisions. The cumbersome process of land use planning appeals and many other opportunities for delay and protest have often given new de facto veto powers to outside groups with enough legal and lobbying skill and money.
>
> "Rather than establishing accountability, the current management regime on the federal lands is one in which no one is responsible. ... The state of federal land gridlock also reflects a growing uncertainty about the mission of the federal lands. For many decades these lands were managed according to a 'multiple use' philosophy. The enactment of the Endangered Species Act of 1973 began to shift the focus to the ecological conditions of the forests for their own sake. Ecosystem management means shifting the focus of management decisions to the future forest conditions in themselves, rather than the human uses of the forests." (Nelson 2000b)

Jack Ward Thomas, Chief Emeritus of the Forest Service, is Boone and Crockett Professor of Wildlife Management at the University of Montana. In 1996 Dr. Thomas and Dr. Mike Dombeck, at that time Acting Director, Bureau of Land Management, wrote in the *Wildlife Society Bulletin* about ecosystem management in the interior Columbia River basin. They identified policies enforced by regulatory agencies as part of the federal lands gridlock problem:

> "The Endangered Species Act (ESA) and air- and water-quality laws establish goals and processes to manage endangered species and protect air and water resources. Meeting the mandates of these laws has been entrusted to regulatory agencies not the land management agencies. Often there is substantial disagreement among agencies about the potential of the ecosystem or specific resources to respond to alteration or disturbance. Disagreement can lead to 'grid lock'." (Thomas and Dombeck 1996)

Professor Nelson pointed out to Congress that coping with the western wildfire situation requires breaking federal lands gridlock by changing current policies:

> "While the Forest Service management system has been reduced to a state of gridlock and the congressional legislative process remains stalemated, the West has been burning. The West can no longer afford to wait until some elusive policy and value consensus emerges at the national level. It needs relief in the near term from the broad dangers of catastrophic wild fire. This will require significant shifts in policy and forest interventions beyond the scope of the recent experiences of the Forest Service and other federal land management agencies." (Nelson 2000b)

Can the barriers be overcome? There are many barriers to implementing a forest restoration program to reduce fire risk and restore forest health (see Nelson 2000b). Professor Covington (2000)

identified funding and inaction as two barriers. Both can be overcome. If the social will exists, anything is possible. Once the inaction fostered by gridlock has been overcome, funding will be relatively easy. Breaking gridlock is a more difficult problem, requiring not only creative approaches to change public policy, but mustering political strength. The next two sections specifically address the funding and inaction from gridlock barriers.

Overcoming the Funding Barrier

Funding is a barrier to reducing wildfire risk (Covington 2000, Nelson 2000b). There are basically only two ways to overcome this barrier. One is to draw upon the federal treasury through the congressional appropriations process. So far this has not been successful, considering that at least 40 million acres need fuel treatments. The other is to change the revenue/cost structure of federal land management. Professor McKillop, a forest economist, argued that

> "The only economically feasible way to restore forest ecosystems is to use a timber-harvesting program to reduce fuel loadings before using prescribed burning. Silvicultural techniques, such as group selection, which makes small openings in the forest, will recreate the mosaic of all age classes of trees without significant aesthetic or environmental effects." (McKillop 2000).

Anne Bartuska, Director of Forest Management for the Forest Service, sees a limited role for federal timber sales in forest restoration. She testified to Congress that

> "On many of these high-risk acres, high stand densities, principally caused by past timber management and decades of fire suppression, are a major contributor to heightened risk. It is essential to understand that this high stand density is due to an overgrowth of small diameter trees that are most often of no, or limited, economic value. Therefore, the commercial timber sale contract is of limited utility to address the problem. Nonetheless, in many instances, these stands will require thinning before other management tools, such as prescribed burning, can be applied to restore healthy, ecologically functioning forests." (Bartuska 2000)

Because of statements like the above, it is widely thought that a program to reduce hazardous fuels would be expensive (Fiedler 2000, Nelson 2000b). Congress therefore has been reluctant to fully fund the forest health initiatives recommended by the Forest Service. Ecological restoration projects that pay their own way through timber sales could help reduce the funding problem.

Forest Restoration Can Pay Its Own Way. Studies reviewed in this section have shown that carefully designed forest restoration projects can break even financially while meeting ecological goals. Implementing ecological restoration projects that pay their own way requires attention to two policy issues: [1] agreement on the desired future forest conditions, which in turn guide managers in determining the goals or objectives for restoration treatments, and [2] flexibility for managers to use the full range of silvicultural approaches, including logging some of the larger, more valuable trees, but only when that is consistent with attaining desired conditions and restoration objectives.

Professor Stephens, in testimony to Congress, noted the importance of a pragmatic and economical approach to ecological restoration, but also expressed some concerns about what he perceived as a lack of information:

> "Economics and practicability in light of current stand and landscape conditions are important considerations that are often involved in managers' decisions about which tools to use. However, to achieve goals for ecosystem integrity and sustainability, we also need much better information about the ecological consequences and tradeoffs of alternative management practices. For the most part, information necessary to answer such key questions is anecdotal or absent." (Stephens 2000)

Information gaps are being filled. Studies of ponderosa pine restoration in eastern Oregon (Johnson et al. 1995), Colorado (Lynch et al. 2000), and Montana (Fiedler 2000, Keegan 2000) address some of the questions noted above.

Ponderosa Pine Restoration in Eastern Oregon. The Governor of Oregon assembled a study team led by Professor Norm Johnson of Oregon State University (Johnson et al. 1995) to develop a forest health strategy for eastern Oregon. Some of the key points in the strategy (Kitzhaber 1997) were as follows:

- "Ecosystem health may be improved through active management in overstocked stands which have suffered from fire exclusion and highgrading of large trees. Thinning of small diameter green trees is an important component of active management for forest health and will help make sales economically viable.
- "Active management includes cutting trees, riparian area planting, reforestation, prescribed fire, road obliteration, stream rehabilitation, and protection of sensitive areas.
- "Timber salvage may be an important component of ecosystem health restoration and fuel reduction strategies to the extent that it promotes ecosystem health goals.
- "Where the costs of ecosystem health restoration efforts are not paid for by timber sale proceeds, funds should be made available to finance these activities on a priority basis." (Kitzhaber 1997)

The rationale for this strategy came from the study team's report, authored by a diverse group of university professors (Johnson et al. 1995). Key findings from their report, including some policy analysis, were:

- "Resource treatments, including thinning and fuel reduction, could reduce the risk of loss from insects and fire on large areas of these forests.
- "Salvage and restoration treatments have the potential to pay for themselves and provide funds for other ecosystem restoration projects.
- "Commercial timber operations offer an opportunity to reduce stand densities, reduce fire danger from live and dead timber, reduce the intensity of insect outbreaks, and create the funds for overall restoration. Sales can be planned to allow use of timber sale revenues to treat a broad range of restoration problems. So far, federal forest managers in the Blue Mountains have had little success in securing appropriated funds for such treatments; little in the current budget environment suggests that appropriated funds will be available for forest ecosystem restoration.
- "A program of restoring desired forest conditions (e.g., increased amounts of large trees, reduced likelihood of stand replacing fires and epidemic insect attacks) has relatively little ecological risk

within the context of the Forest Plans, watershed analysis, East-side Screens, PACFISH, and an active monitoring/oversight program.

- "Under the current layers of regulations, review, appeal, and litigation, it could be difficult for active management, especially commercial timber operations, to play a significant role in ecosystem restoration of east-side forests. The current process of designing and implementing projects, especially projects involving commercial timber harvest, has so many overlapping layers that it is difficult for the Forest Service to be responsive to emerging environmental needs or to be economically efficient. Each 'layer'has a laudable purpose, but in combination, they can stifle forest management activities on the National Forest. In addition, the cost of assessments to meet the analysis requirements (Forest Plans, watershed analysis, EIA, ESA, etc.) of each layer is becoming prohibitive. At a minimum it takes 10-12 months from initiation of project planning to awarding of the project; in many cases it takes years. Thus, the ability of the Forest Service to respond to increased levels of dead and dying timber, and to reduce densities of live trees, can be severely restricted.
- "Environmental laws, such as National Environmental Policy Act, Endangered Species Act, and National Forest Management Act, have successfully created a new approach to management that increases the likelihood of maintaining and restoring sustainable ecosystems. That achievement should not be overlooked. It is time, though, to place a concentrated focus on determining how to better integrate and streamline the implementation of these laws." (Johnson et al. 1995)

Ponderosa Pine Restoration in Colorado. Professor Dennis Lynch, a forest products technologist, and his colleagues in biology and environmental studies deduced from their work that

> "Forest restoration projects can achieve ecological objectives and pay for themselves in southwest Colorado even with low-value material, but careful planning and execution are required. We want to emphasize that the ecological prescription always controlled the harvesting actions. In other words, we did not deliberately take sawtimber to subsidize products other than logs to make a [management] unit profitable. Rather, we accepted for harvest whatever material was left after ecological objectives had been met. ... We conclude that the general approach to ponderosa pine restoration, emphasizing thinning and burning, is ecologically and financially sound, but the details will make or break any individual project." (Lynch et al. 2000).

Ponderosa Pine Restoration in Montana. Professor Charles Keegan, forest economist at the University of Montana, in testimony to Congress, compared the economics of thinning-from-below to comprehensive treatment in Montana's ponderosa pine forests:

> "The comprehensive restoration treatment is clearly superior in terms of ecological effects (see Fiedler 2000). In addition, its financial aspects, as well as its potential to positively impact employment and wages in rural communities in the Inland Northwest, are much superior to the often prescribed thin-from-below approach.
>
> "Besides moving the stand more rapidly to an ecologically desirable and sustainable condition, the comprehensive restoration approach generates positive revenues from timber products ranging from a few hundred dollars to over $1000/acre, depending on stand conditions, terrain and logging systems, and market conditions. Our analysis indicates that the thin-from-below prescription fails to fully accomplish key ecological goals and also commonly requires a subsidy of hundreds of dollars per acre. The difference in value between the comprehensive treatment and the thin-from-below

approach, which at best offers a partial and temporary ecological solution, is generally over $1000 per acre.

"This broad-scale implementation of treatments designed to restore and sustain desired forest conditions has large potential to sustain, and even increase, employment, especially in rural areas where per capita incomes are nearly 30 percent below those of urban areas. ... Jobs in forest management and timber harvesting and processing are among the highest paying components of the economy in much of the rural West." (Keegan 2000)

Timber Sales and Restoration of National Forests. The above studies demonstrated that timber sales can create favorable economics without sacrificing ecological goals. All of these studies were done in areas where national forests are predominant. Chief Dombeck has said that

"Most [timber] harvest in our national forests is no longer an end in itself. More and more, we are using [timber] harvest as a means to achieve ecosystem health." (Dombeck 2000)

Professor Keegan, in testimony to Congress, addressed the importance of the Forest Service timber sale program as a means to attain ecological restoration goals:

"The federal timber sale program is an enormous opportunity to dramatically increase forest ecosystem health on federal lands; and, at the same time, sustain and even increase high paying jobs in rural communities throughout the West." (Keegan 2000)

Professor Emeritus David W. Smith of Virginia Polytechnic and State University testified to Congress that a timber sale program is an essential part of national forest stewardship. He said,

"The Cerro Grande fire that struck 235 homes in Los Alamos demonstrated the importance of the timber program as a stewardship tool. ... Stewardship activities like thinning forests through the timber sale program can alter conditions and reduce fire hazard, preventing or greatly reducing tragedies like the Los Alamos fire. ... Stewardship of our national forests requires silvicultural treatments like thinning, which should be a major emphasis in the Forest Service's future timber sale program. ...

"We have a serious problem on our hands. The good news is we know how to fix it. Professor Norm Johnson, chair of the Committee of Scientists, stated that 'In the past the forest industry needed the national forests; now the national forests need the industry to achieve ecological objectives.' With an investment from Congress and the will to do the right thing on the ground, we can solve this problem through a combination of prescribed burning, timber harvesting and other management techniques. ... There are many examples that can be cited – we know that we can treat these forests and reduce the risk.

"The bottom line is active forest management, with clearly defined objectives and a set of silvicultural procedures that have been formulated based on specific stand and site conditions, can be a very effective and efficient means of perpetuating our forests and ensuring their ecological integrity. Forest management when applied using our very best science-based knowledge and professional experience will certainly maximize uses and enhance values for society, and be ecologically and biologically sound. A strong and viable timber sale program is essential on U.S. Forest Service lands and now is the time to change this need into reality." (Smith 2000)

Overcoming the Inaction Barrier

Another barrier to reducing wildfire risk is inaction (Covington 2000). Four years ago, federal scientists working on the ICBEMP recommended active management of federal lands as the way to meet people's needs and to restore ecological integrity (Quigley et al. 1996). Why, then, is there less active management on federal lands now then there was four years ago? Obstructionism is one problem (Covington 2000). This is manifested through public policies based on the distrust some segments of the public have in federal forest managers. Decision gridlock on federal lands in Idaho and elsewhere is the result (O'Laughlin et al. 1998a).

Professor Nelson, in testimony to Congress, offered the following recommendations for breaking gridlock: [1] make a clear commitment, [2] reform land-use planning, [3] employ mechanical removal of excess fuels and other vegetation, [4] decentralize planning and management decision making, and [5] reduce financial burdens (Nelson 2000b).

New Approaches for Managing Federal Lands. Professor Nelson (2000b) testified to Congress that it may not be possible to achieve sharp reductions in excess fuel hazards in the interior West without some "outside-the-box" thinking. He proposed to Congress emergency legislation for the forest fire problem that would include a set of procedures along the following lines: [1] state planning responsibility, [2] federal approval, [3] state implementation responsibility, [4] federal and state shared funding, [5] renewal and renegotiation at the end of the 15 year planning horizon (Nelson 2000b). Obviously, he said, many variations on these suggestions are possible. He continued,

> "Whether by this approach or some other, the inaction during the 1990s of the federal land management agencies – in the face of dire warnings of looming catastrophic wildfire in the West – shows that radical changes in the framework for federal land management are required. Federal land management today is not working over much of the West.
>
> "Unless the Congress acts decisively to adopt some form of brand new approach, the cities and the property owners of the West are likely to continue to face large and unacceptable forest fire risks. If it is both impossible and undesirable to eliminate these risks entirely (partly in the service of other forest values that may be in conflict with excess fuels reduction), it should be the people of the West – not federal forest administrators in Washington, D.C. – who make such life and death decisions." (Nelson 2000b)

Experiments in Alternative Governance. Perhaps it is time to try something different on the federal lands, as many public lands scholars have recommended (see, for example, O'Toole 1988, Wilkinson 1995, Nelson 1995, Fairfax 1996, Thomas 1997, Floyd et al. 1999, Nelson 2000a,b). Pilot project experiments using alternative forms of governance are one approach (see O'Laughlin et al. 1998a, Snow et al. 1998, Forest Options Group 1999).

The three pilot project models recommended in the report of the Idaho Federal Lands Task Force (1998), and the five specific pilot project proposals recommended in the report of the Idaho Federal Lands Task Force Working Group (2000), are a carefully considered approach to trying something different. These proposed experiments identify specific areas with resource management problems that could be improved by ecological restoration projects. These lands would remain under the control of federal agencies. Specific land management objectives would be developed through collaborative processes involving the public. A basic premise of the proposed experiments is that the goals of

environmental laws could be met while planning and regulatory requirements are streamlined to create the flexibility managers need to design and implement ecological restoration projects.

Politics. Part of the gridlock problem is political. In a letter to President Clinton, the president of the Society of American Foresters urged the administration to develop a comprehensive strategy to restore fire-damaged areas in the West that would involve communities, firefighters, and other forestry experts (see Ebel 2000). Bill Banzhaf, executive vice-president of the SAF, said,

> "We simply want to see solutions to this problem and not have it turn into fodder for election-year politics. Forest scientists know that restoration of fire damaged forest must be accomplished quickly to prevent excessive soil movement and flooding. We are asking the administration to develop a plan to address these urgent issues. ... The administration needs to get beyond the policy gridlock to prevent an annual recurrence of this year's horrendous fire season." (SAF 2000)

Professors who testified to the U.S. Congress and are cited herein were selected by the committees before which they testified. The committees are controlled by Republican members of Congress. That is not to say the testimony was in any way partisan. However, it does raise the question of what the other party might have to say about the wildfire risk and forest ecosystem health issues analyzed in this paper. An Idaho journalist (Wickline 2000) provided a partial answer:

> "Idaho Democratic leaders say the party could lose more legislative seats because Republicans are blaming the Clinton administration for the decline of natural resource industries.
>
> "[The Democratic leaders] are asking President Clinton for federal support to clean up the damage from wildfires, rehabilitate the land and create long-term, forest-related jobs.
>
> "'These jobs might include thinning, managed cuts, streambed restoration and road rehabilitation,' House Democratic Leader Wendy Jaquet and Senate Democratic Leader Clint Stennett wrote to the president." (Wickline 2000)

The point is that restoring federal lands to a sustainable condition provides a wide range of ecological and social benefits. This natural resource issue ought not be one driven by partisan politics.

Conclusion: Time for Action

Scientists agree that the risk of high-intensity wildfires should be reduced and active management, including logging and prescribed fire, is necessary to treat excessive fuels that have accumulated in western fire-dependent forests. However, given the variability of western lands and forests, different management methods and treatments would be appropriate for different places:

> "There currently exists tremendous variability in forest structure within the federal lands of the United States. With such diverse current conditions it is simply not possible to come up with one methodology to restore and sustain all of these areas." (Stephens 2000)
>
> "No single thinning approach can be applied to reduce the risk of wildfires in the multiple forest types of the West. ... Silvicultural systems using density and species management, along with the judicial use of prescribed fire, are key to managing western forests." (Graham et al. 1999)

> "We must be careful not to jump to the conclusion that the same kinds of treatments are needed everywhere. There are no simple answers, so no single kind of management is called for everywhere. The ecological integrity of many forest, shrubland and grassland ecosystems is threatened by the combined effects of past fire exclusion, fire suppression, past intensive grazing, past logging practices, and ongoing climate change. Restoring ecological integrity will require thoughtful planning to ensure management that is ecologically appropriate and socially acceptable. Fire suppression, logging, prescribed fire, and other treatments have their place in managing forests and fuels, but they are not cure-alls for all circumstances. Federal land managers need all of these tools and more available to manage public lands." (Morgan et al. 2000)

The desired future condition of a particular forest is the key to ecological restoration (Stephens 2000). There has never been a consensus about how forests should be managed, nor should we ever expect there to be (Covington 2000). How a particular forest should be managed will vary according to which forest you are talking about, who you are talking to, and what they want from the forest.

Some environmentalists previously against timber harvesting in federal forests now accept the idea that some trees need to be cut. According to the Associated Press (2000), Rex Wahl, executive director of Forest Guardians, an activist group in Sante Fe, New Mexico, had long opposed the removal of any tree for profit or for managing nature. After he watched helplessly from his yard as the Los Alamos fire raged, Mr. Wahl suggested that old environmental dogmas must be abandoned, and he is now ready to cut trees to save the forest. He and others have some problems with the idea of cutting anything but small trees, but they recognize that fire cannot be used as a restoration tool without some thinning (Associated Press 2000).

Time is running out (Covington 2000). How much time is left? An estimate by Professor Covington and others is 10-25 years:

> "We anticipate an acceleration of historical changes in the Inland West including increased fuel accumulations, lengthened fire seasons, and intensified burning conditions, all contributing to larger and more catastrophic wildfires. A fairly narrow window of opportunity – perhaps 15-30 years – exists for land managers to implement ecosystem management treatments to restore more nearly natural and robust ecosystem structures and processes. ... The consequences of inaction far exceed those of action." (Covington et al. 1994)

Professor Melissa Savage, geographer at the University of California, Los Angeles, urged scientists and policy-makers to forge a consensus quickly, giving them perhaps a decade before it may be too late:

> "Scientists and policy-makers must act quickly to try to achieve a consensus on these issues before it's too late for ailing ecosystems. The next ten years will determine the future of the forests." (M. Savage, quoted in Kloor 2000).

There is widespread general agreement that it is ecologically and socially desirable to reduce the risk of wildfires in the West. The ends and means for doing are disputed, with three issues needing attention. First, what is the restoration goal? There is some debate about the goal of pre-Euro-American settlement conditions as the appropriate objective. Even if all ecologists agreed that this was appropriate, sustainable forest management requires that human dimensions be considered. Some

agreement on desired future conditions is a necessary first step in ecological restoration. Second, there is some disagreement about the appropriate means to attain desired future conditions. Logging is necessary in fire-dependent forests with excessive fuel accumulations, accompanied by judiciously applied prescribed burning. Third, there is some disagreement about the economic feasibility of restoring desirable ecological conditions. Studies in eastern Oregon, southwestern Colorado, and western Montana have shown that in ponderosa pine forests, ecological goals can be met and treatments can pay for themselves through the sale of timber from trees that do not contribute to desired future conditions.

The key question cannot be overemphasized. What is the desired future condition? Until that has been decided, inaction is guaranteed. Inaction promises more destructive wildfires. It is time for action.

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