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Improving Fire Resiliency of Pacific Northwest Forests

BY STEPHEN A. FITZGERALD

"What makes a big fire? A big fire requires big dollops of all the things that make any fire. It needs a lot of fuel."
— Stephen J. Pyne
Year of the Fires: The Story
of the Great Fires of 1910.

Although the wildfire season hasn't officially begun here in the Northwest, already fires this spring have erupted in Oregon, Florida, North Dakota, Minnesota, Colorado and California. The Picnic Rock Fire in Colorado in March alone blackened approximately 9,000 acres, consumed two structures, forced the evacuation of people in several subdivisions and cost $2.5 million to extinguish. In southern California, wildfires have resumed where they left off last fall. Over 25,000 acres have burned since April, consuming 41 structures and forcing the evacuation of residents from hundreds of homes.

With this early wake-up call, I began thinking about what this year's fire season portends for us here in the Pacific Northwest. I wish I had a crystal ball.

Although winter moisture and snow pack levels are normal to above normal, spring moisture has been far below normal. If this springtime trend continues, fuels will cure more rapidly and earlier, becoming ripe for burning, particularly if the weather also turns warm and dry. On the other hand, a moist, cool spring would delay this and without significant lightning events or human fire starts, the fire season could be quite tame. Because of the myriad factors involved, no one really knows what kind of fire season we will have until we are actually into it.

However, I don't want to dwell on the unknown or speculate about this year's upcoming fire season. Rather, I want to discuss what can be done to improve the long-term fire resiliency of forests in the Pacific Northwest. I define fire resiliency as forests that are better able to withstand a wildfire and come through it relatively intact or rebound from its effects.

Fire ecology

Historically, not all wildfires were created equal or, I should say, burned with the same frequency, intensity or extent. The historic fire pattern varied according to seasonal weather as well as longer-term climate patterns (e.g., The Little Ice Age), forest type, elevation, aspect and topographic location.

For example, fires in some forest types burned more frequently (e.g., 2 to 40 years), but the intensity was such that small trees or species with thin bark were killed quite regularly and any accumulated fuel on the forest floor was consumed (see Table 1). This is readily seen in examining fire scar patterns on surviving trees (Figure 1). These fires may have burned large areas (maybe even larger than some of our fires today) and burned for weeks or months, but they were generally

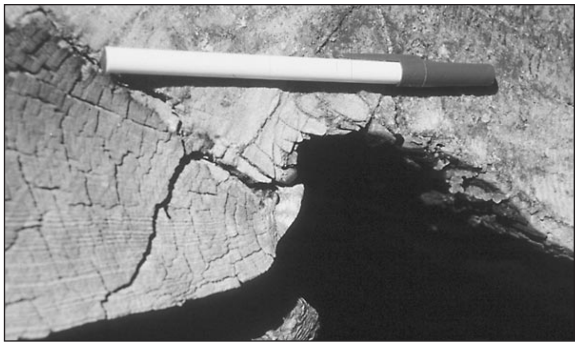

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Figure 1. A cross section of a fire scar.

Table 1. Historic Fire Regimes and Severity.

Forest Type	Fire-Return Interval	Fire Severity
Oregon white oak, ponderosa pine and dry mixed conifer	2-40 years	low
Moist mixed-conifer	40-100 years	mixed
Hemlock-Douglas-fir, lodgepole pine and subalpine forest	100-450 years	high

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non-lethal to large trees because of their thick, fire-resistant bark, which maintained more open forest conditions of 12-35 large trees per acre (Munger 1917). This fire pattern would be typical of what occurred historically in ponderosa pine ecosystems across the West.

In contrast, some forests burned infrequently (e.g., every 100 to 450 years), but burned with much greater intensity. These fires are typical of what is referred to as "stand-replacement" fires and had long flame lengths that were lethal to most trees and other vegetation, and burned across tens of thousands of acres. Individual surviving trees, tree clumps and stands of trees provided the seed source to regenerate a new forest. However, conifer regeneration did not always occur following wildfire. Some areas regenerated to hardwoods or shrub fields following wildfire with few conifers present. This fire pattern is typical of wildfires in the western hemlock-Douglas-fir forests of southwestern Oregon and in western Oregon and Washington. Please note, however, that some underburning probably occurred in these forests between the larger fire events as well. This may be particularly true on the drier eastern flank of the coast range and on ridgetops where it is more likely to receive lightning. Other forest types, such as the moist mixed-conifer forests, burn with a mixed-severity fire regime, where a given fire may "crown out" and kill most of the trees in patches of varying size and then later drop to the forest floor and underburn another patch. Here the effects of fire on the survival of trees and vegetation and soil and forest floor are much more varied.

Also note that Native American burning strongly influenced the fire pattern in areas where they frequented. They lit fires (or allowed camp fires to burn) to stimulate the growth and development of vegetation for a variety of purposes, including maintaining more open forest conditions (for security and travel) and to stimulate the growth of medicinal plants and culturally important foods. There is still much to learn about the influences of Native American burning in Pacific Northwest forests.

Fire behavior

Fire behavior is influenced by three factors: weather, fuel and topography. This is often displayed as the fire behavior triangle (Figure 2). When we talk about fire behavior, what we really mean is how fast the fire moves (i.e., fire spread) and how hot it burns (i.e., intensity). For example, if the weather is warm and there is some wind, the fire will burn with more intensity and will spread faster. A fire burning on a slope will move faster uphill (com-

Figure 2. The Fire Behavior Triangle.

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Figure 3. Removing fuel ladders is key to creating fire-resistant forests.

pared to a fire backing down slope) because the flames are tilted toward the slope, which more effectively dries the vegetation (fuel) ahead of the flames. The structure of fuels, such as the loading (amount in tons) and the arrangement of fuels (vertical and horizontal distribution of burnable material) dramatically affects how wildfires burn (Graham 2004). Given a constant weather stream and topographic conditions, fires will burn with more intensity and with longer residence times under high fuel loading. Longer residence times can result in increased tree mortality and damage to soils. Also, if fuels are present in mid-story (e.g., a fuel ladder), fires can then climb into the canopy and spread tree-to-tree, which has more lethal consequences (Figure 3).

As managers we have no control over the weather or topography. The only factor we have any influence over is the amount and arrangement of forest fuels. This is the fundamental basis for all treatments to modify fire intensity, severity and other effects of wildfire.

In reality, fuel, weather and topography interact in a much more complicated fashion than what can be discussed here. However, I'll leave you with the concept that the fire behavior triangle familiar to us all is more three dimensional, with sides that change depending on which of these three variables—weather, topography, fuel—has the most pronounced effect on a fire's behavior at any point in time.

Some forests are in trouble

In the last decade or so, we have witnessed an increasing number of fires that have been labeled as "uncharacteristic" or wildfires that burn outside their normal range for intensity. This is particularly true in forest types that historically burned frequently with low intensity, but now burn with high intensity and become stand-replacement fires. The primary reason for this is an increase in fuels and change in forest structure and composition.

A century of successful fire suppression has led to dramatic increases in stand density, development of ladder fuels and species shifts. In addition, past logging that removed large, fire-resistant trees, along with inadequate management of trees that have seeded in since, have left our forests extremely dense. Other factors, such as heavy grazing in the early part of the century, removed fine fuels, which changed the fire return interval and allowed woody vegetation to increase. Finally, land use and increases in homes and human infrastructure at the forest fringe requires the extinguishing of all fires because of the values at risk.

The change in fire regime in forests that historically subjected to frequent low-intensity fire—ponderosa pine and dry mixed conifer forests—has led to fundamental changes in forest structure and places them at increased risk to large, uncharacteristic wildfires. And the problem is not going away anytime soon.

Treatments to improve fire resiliency

Treatments to improve fire resiliency should prevent surface fires from torching and climbing into tree canopies. This can be accomplished by reducing surface, ladder and canopy fuels, in this order (Agee 2001).

Treatment efforts should first target forests that historically had frequent fire (e.g., low and mixed fire regimes), but are now over-dense (Agee 2001). This can be done with a variety of treatments or combinations of treatments such as thinning, pruning, prescribed fire and mowing of shrubs. Prescribed fire can reduce surface fuel and ladder fuels, as well as lift the overall crown due to scorching and killing of lower tree limbs. But prescribed fire may not be the first treatment of choice. Forests that are over-dense may require having fuels “stepped down” with some kind of mechanical treatment first. This helps reduce the risk of escapement and smoke when a prescribed fire is later used to step the fuels down even further.

Thinning can improve fire resiliency. Thinning ***from below*** leaves the larger trees in the stand (Figure 4), which have thicker bark and have high crowns. This improves tree survival and because the crowns are higher, it makes it more difficult for surface flames to climb and torch tree crowns. Thinning also reduces the continuity of the canopy and the potential for crown-to-crown spread. Canopy fuels are quantified by measuring crown bulk density, which is defined as the pounds of foliage (and small branches and twigs) per cubic foot of crown volume. Fire behavior simulations and retrospective wildfire behavior studies show that the potential for crown fire is significantly reduced when crown bulk densities are at or below .006 pounds per cubic foot (Graham 1999, Agee 2000).

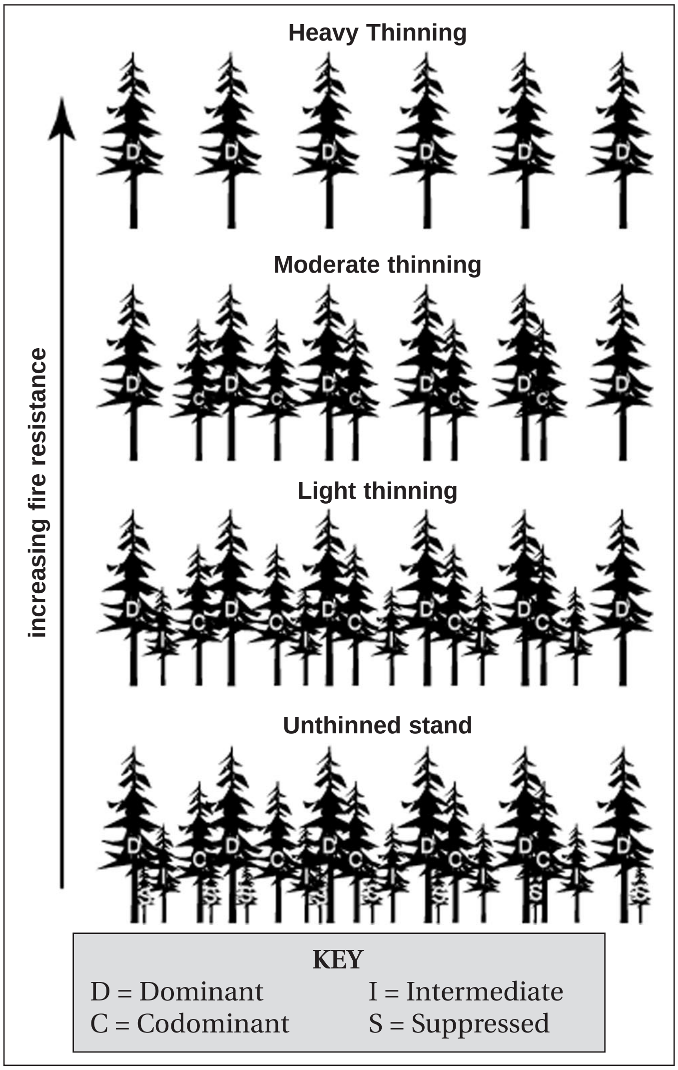

Figure 4. A forest’s resistance to fire can be improved by thinning.

Conclusions

Although some groups would still like to question the merits of thinning and fuel reduction techniques, there

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really is no debate. Existing fire behavior models and intensive retrospective analysis of wildfire behavior show fires can drop to the ground with dramatic changes to fire intensity and overall severity when fires enter large, treated areas. Even modifying a fire's effects from high severity to moderate severity (e.g., where trees are still killed, but retain their needles) provides huge benefits to fire resiliency and improves the ability of the burned forest to recover. For example, recent studies show that needles that later drop and cover the soil surface may reduce rainfall-induced erosion by 80 percent and water flow erosion by 20 percent (see February 2004 *The Forestry Source*).

More likely the debate should be over how we integrate treatments to improve fire resiliency ***at a landscape level*** with all other landscape issues and concerns, such as threatened and endangered species, cultural resources and watershed effects. However, in my opinion, there is no debate about what will happen when fire gets into some of these stands. It will be devastating. And delaying action will only cause a loss of future management options.

Finally, I will leave you with this thought. Many forests are in an unsustainable condition. Doing nothing will certainly spell doom for some of our dry-site forests that are currently over-dense, and these forests will continue to deteriorate and fuel uncharacteristic wildfires. This in turn will likely result in higher forest and watershed damage and the loss of critical wildlife habitat, timber and other resources. It also spurs controversial post-fire treatments, such as salvage logging. Moreover, we will spend millions of dollars to rehabilitate these burned-over watersheds and then will have to wait decades before the forest begins providing the kinds of benefits society expects. This does not appear to be a sustainable model to me. Does it to you? ◆

PHOTOS COURTESY OF STEPHEN A. FITZGERALD

(above) A crown fire.

(left) A mixed conifer old-growth stand that was thinned from below to improve fire resilience and tree vigor.

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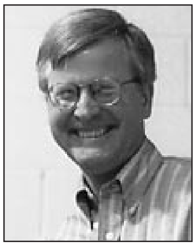
Mugging Which Burn Victim? The Salvage Controversy

BY PAUL W. ADAMS

A matter of proximity



The embers of the Biscuit Fire had barely cooled when I sat in on a meeting of the National SAF Policy Committee at the 2002 SAF Convention in North Carolina. SAF state policy chairs had been invited to join the discussion of important policy issues, and I welcomed the chance to mix with our national counterparts. When the talk turned to national position statements, I spoke up about the urgent need for a position on salvage harvesting on federal lands. Surprisingly, my appeal received only a lukewarm reaction and the discussion moved on.

But I soon recognized that very few at that meeting were from the West, and a lack of proximity to the salvage issue greatly affects perceptions of its nature and importance. The sound bite "salvage logging is like mugging a burn victim" provides another example. An anti-salvage activist came up with the phrase as a way to create a graphic negative image for an urban public ("mugging") that rarely sees the practice. Ironically, the people in timber-dependent communities in closest proximity to wildfires could just as easily say "stopping salvage is like mugging a burn victim."

Evolution of the issue

SAF members in the Northwest do not need to be reminded of the importance of the salvage issue. But some review here may be helpful in understanding its origins and context.

Part of the controversy stems from the "Salvage Rider" of 1995, a federal amendment that temporarily expedited salvage by limiting administrative appeals. Because the rider also included similar exemptions for some earlier old-growth sales that were stalled by appeals, it became a public rallying point for activists that actively worked to discredit it (e.g., "logging without laws"). Nearly a decade later, any proposal to legally expedite federal logging (salvage or otherwise) faces potential criticism of being "just another salvage rider."

Another source of controversy has been the 1995 "Beschta Report," whose 14 pages of thinly substantiated observations and opinions from several like-minded scientists has taken on a striking degree of public influence. For example, several successful administrative appeals and lawsuits of salvage projects have been based on inconsistencies with a 1995 USFS directive that required agency salvage plans to include specific consideration of the Beschta Report. The report remains very popular with activists opposed to salvage. For example, eight of the first 10 listings from an Internet search (Google) of "Beschta Report" are links to advocacy group websites.

More recently, plans for salvage harvest within the extensive Biscuit burn area have received wide attention and debate. Once again, scientists and activists have weighed in on the matter, including some who appear to be playing both roles. For example, the timing and focus of news articles that featured certain scientists who oppose salvage strongly suggest active efforts to gain the media spotlight. Likewise, a relatively neutral policy analysis that suggested some negative consequences of salvage delays ("Sessions Report") was vilified in guest editorials by some activists who pointedly used their own technical background to help discredit the analysis.

Although scientists and science have been part of the Biscuit and other recent salvage issues, the controversy fundamentally has very little to do with science. A scientist who expresses a strong preference for "natural recovery processes" is making a

PHOTO COURTESY OF PAUL W. ADAMS

This July 2003 photo shows a log truck with timber salvaged from the July 2002 Timbered Rock Fire area northeast of Medford and Shady Cove, Ore. While private lands in this area have been actively salvaged, the recently released BLM salvage plans were quickly threatened with appeals.

subjective judgment, that is, one based on personal values. There is no science that says a natural forest is inherently "better" than a managed forest (particularly if the latter is managed for values similar to the natural forest) or vice versa, unless the criteria for judgment are entirely unambiguous and agreed upon. And even then, this remains a judgment by human beings with highly personal philosophical or faith-based views of what criteria are most important.

The SAF perspective

A key part of SAF's values and mission is to serve and benefit society. Thus, it is not surprising that most SAF members take a rather broad view of salvage harvest on public lands. That is, they see many "burn victims" following a major event like a wildfire, including the countless (and often silent) citizens who depend on their forests for the environmental values, products, and employment that collectively contribute to local and global sustainability. As a result, most SAF members reject the narrow views that would greatly restrict professional foresters from using their unique knowledge and experience to actively restore and promptly recover these diverse values and benefits.

The Oregon SAF Policy Committee decided to draft a state position on salvage harvest after it saw that its national counterpart was less likely to do so. In early summer 2003 the position was adopted by the OSAF Executive Committee and then further endorsed (99 percent approval) through a member referendum later that year. The core position says:

"The Oregon SAF supports the well planned, timely, and careful use of salvage harvesting after uncontrollable events have killed or damaged large numbers of trees in a forest. Potential benefits can include mitigating economic losses, recovering useful wood products, reducing fire, insect, decay, and safety hazards, and creating desired environmental conditions for successful reforestation. Application of scientific principles by professional foresters and other resource experts can ensure that economically viable salvage harvesting will be conducted with proper consideration of environmental and social concerns."

The full statement can be viewed at www.forestry.org/or/position/salvage.html. ◆

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National Fire Plan: Will Supply/Demand Work?

BY STEPHEN P. MEALEY

This past March, I participated in a partnership conference: *Creating Fire Resilient Landscapes,* in Medford, Ore. During a related field trip, a respected federal agency manager shared the following scenario: *"My agency offers good fuels reduction projects as timber sales…there are no bidders…industry-based fuels reduction treatment infrastructure disappears…agency funded treatments at an effective level are financially infeasible…there is no practical solution to creating effective fire-resilient landscapes."* Another respected speaker from the same agency commented: *"New technology to manufacture and utilize small diameter trees exists. However, without an assured supply, no financial institution will make that kind of investment…Progress in the removal and utilization of small diameter trees will depend on market forces, economics, positive incentives, and most of all, an assured supply."*

If an effective market-based response is necessary to effectively implement the National Fire Plan, a logical question is: What are the prospects for supply and demand working? This assessment will examine some barriers to supply and demand and some possible solutions.

Background

Roughly 190 million acres of federal forest and rangeland in the lower 48 states are at high risk of large-scale insect and disease epidemics and uncharacteristic wildfire because of deteriorating ecosystem health and drought. Almost 400 million acres across all ownerships are at risk. In 2000, the secretaries of Agriculture and Interior prepared a report: *Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000,* known as the National Fire Plan (NFP). As a complement to the NFP, the President introduced the *Healthy Forests Initiative* (HFI) in 2002 to reduce barriers to the timely removal of hazardous fuels. On November 21, 2003, Congress passed HR 1904, the Healthy Forests Restoration Act (HFRA) of 2003 and President Bush signed it into law in December 2003. The law represents a strong bi-partisan commitment to many of the features of the NFP and HFI and seeks to reduce the threat of uncharacteristic wildfire to communities and restore the health of the nation's forests and rangelands.

HFRA focuses on lands: (1) near the wildland/urban interface; (2) in high-risk municipal watersheds; (3) where insect and disease problems are especially critical; and (4) important to threatened and endangered species listed under the Endangered Species Act (ESA) that have been determined to be at risk from uncharacteristic fire.

HFRA seeks to:

1. Strengthen public participation in developing projects;
2. Reduce complexity of environmental analysis;
3. Provide a more effective appeals process; and
4. Improve judicial review.

Associated federal agency "administrative steps" taken to speed up fuels treatments include:

1. Expedited NEPA processes;
2. Improvements in administrative appeals rules;
3. Consideration of both short- and long-term risks in ESA consultation;
4. ESA regulations that streamline consultation; and
5. Council on Environmental Quality (CEQ) guidance to improve environmental analysis for fuels reduction treatments.

Since 2000, federal agencies have completed fuel reduction treatments on 8.3 million acres. Agencies intend to treat an additional 3.7 million acres in 2004. By the end of 2004, slightly more than six percent of the total acres at risk will have been treated. At a little more than $1,000/acre, costs would approach $20 billion to treat the remaining "at risk" acres in the next 10 years. Less than $500 million was proposed by the President for HFRA in his 2005 budget. Clearly, market-based partnerships will be needed to complete necessary fuel reductions in a meaningful period.

Barriers to supply

Most of the measures in the HFRA and the administrative steps to reduce barriers to the timely removal of hazardous fuels (and provide an assured supply) were responses to the June 13, 2002, USFS Congressional Hearing Report (USFS Predicament Report) that identified the sources of its policy gridlock problem. The President's HFI was also a response, in part, to the report. Prominent in both the HFI and the Predicament Report was the recognition that federal regulatory agencies (most prominently EPA, USFWS and NOAA-Fisheries) and management agencies (USFS and BLM) frequently differ when viewing risk. *"Problems arise when the regulatory agencies require the USFS to focus on the short-term consequences of a proposed plan or project instead of the long-term health for the landscape in question"* (USFS Predicament Report). One of the four top priorities for HFI was *"Developing guidance for weighing the short-term risks against the long-term benefits of fuels treatment and restoration projects."*

In August 2003 the Pacific Southwest Region of the USFS released the results of its review of "Implementing the National Fire Plan under the Northwest Forest Plan." Among the findings:

1. Management treatments are needed in many Late Successional Reserves (LSRs), but have not been aggressively pursued.
2. Survey and Manage protocols have increased the costs and complexity of implementation (the requirement for Survey and Manage was eliminated March 23, 2004).
3. Watershed analysis has frequently been expensive and time consuming.
4. Consultation with regulatory agencies can be complex and expensive. *"There has been a strong tendency* (for the regulatory agencies) *to focus on short-term adverse environmental effects of a project, rather than recognize longer run environmental benefits that would justify such short-term effects."*

Jack Ward Thomas, who participated in the review, has commented previously on the situation observed in Point 4. *"Regulatory agencies…in dealing with T&E species sometimes disregard the dynamic nature of ecosystems and take a preservationist approach. That is, the agencies' cultural biases lean toward preservation or static management approaches. Agency constituencies have evolved that value the products of such a management approach—a landscape with lessening visible impacts of human actions and fish and wildlife species benefited. Consequently, regulatory agencies prefer, or are forced to concentrate on offsetting short-term risk through preservationist strategies while ignoring or down-playing the long-term risk associated with the inevitable dynamic change in the ecosystems in question that will emanate from succession or stochastic events."*

Recent (mid-February 2004) consultations by the EPA and USFWS, critical of the Preferred Alternative for the USFS Biscuit Fire Recovery Project DEIS, show that fundamental differences between the management and regulatory agencies over short- and long-term risks remain and must be resolved before effective landscape-level forest restoration projects are possible.

Fix the consultation handbook! Fix the recovery plans!

Late March 2004 I attended the 69th North American Wildlife and Natural Resources Conference in Spokane. While there I took the opportunity to visit with USFS and BLM line officers at the senior executive level. Informal polling made it clear that of all the barriers addressed in HFI and HFRA and elsewhere, including the March 3, 2004, HFI/HFRA Interim Field Guide, the "risk problem" remains a priority for "fixing." One main issue emerged: the USFWS/NOAA-Fisheries (March 1998) Final ESA Section 7 Consultation Handbook.

Another related issue was also apparent: T&E species recovery plans for habitat in fire-prone forests. It was clear that most believed that unless changes were made at a technical level, no amount of policy direction would have much affect in resolving interagency differences over short- and long-term risk.

Consultation Handbook. In part because of the January 7, 2004, ESA Joint Counterpart Regulations to streamline ESA consultation, the Forest Service and the BLM are now compelled to design projects to achieve "not likely to adversely affect" (NLAA) determinations to avoid formal consultation and expedite projects. The standards for NLAA in the handbook require, or have been interpreted in policy to require a "precautionary principle" driven intolerance for little or no short-term risk or effect in NLAA determinations. Any action causing “some adverse effects,” regardless of timeframe, is defined as “likely to adversely affect,” and requires formal Section 7 consultation. Under current definitions, “Level 1” team and other efforts to conclude NLAA and avoid formal consultation forces either the elimination of projects with short-term adverse effects from consideration, regardless of long-term benefits, or the modification of projects to eliminate risk. This latter modification often removes long-term beneficial actions. A solution would be to balance short-term and long-term adverse impacts with any short-term or long-term benefits to species and their habitat by reducing fire risk, in determining NLAA.

Recovery Plans. The HFRA provides for fuels treatment projects in T&E species habitat where such habitat has been determined in a recovery plan, listing or critical habitat determination to be at risk from uncharacteristic fire. The problem is that recovery plans and listing or critical habitat determinations that recognize wildfire as a threat for T&E species habitat in fire-prone areas are generally lacking. With this problem, HFRA effectively blocks projects for listed species potentially at risk from uncharacteristic fire until recovery plans are changed or amended. These would include the evaluation and balancing of “the long-term benefits of fuels treatment projects, including the benefits of restoring natural fire regimes and native vegetation, as well as the long-term risks of catastrophic wildfire, against any short- or long-term adverse effects,” as directed by USFWS/NOAA-Fisheries, December 10, 2002. Published techniques for the required evaluation and balancing (“relative risk assessments”) are also lacking. Short-term solutions are to revise recovery plans and formalize techniques for relative risk assessments. A longer-term solution is to add a requirement in the ESA for relative risk assessments.

Barriers to demand

Barriers to demand are the barriers to supply. At the March conference in Medford, a representative of the biomass industry said: *“In northern California and southern Oregon alone, biomass fuel is being consumed by power plants around the clock, 365 days a year, at a rate of one chip truckload of biomass fuel every one to two minutes. The infrastructure to support this kind of activity is awesome.”* A conference participant from the forest products industry said: *“Promise me a three- to five-year supply, and I’ll take all the 8-14 inch stuff they can provide.”* Bottom line: With an assured supply of fiber, industry has, can and very likely will respond. This response would likely be aided by biomass tax credits of up to $20/ton as recently discussed by some members of Congress.

Prospects for supply/demand working

There are some good signs that markets can help make the NFP work:

1. *Evergreen* magazine in November 2003 featured *Great Minds, Great Ideas:* The USFS Forest Products Laboratory at Madison, Wisconsin, and their hopeful answers to questions about small wood processing, utilization and marketing.
2. The Clearwater Stewardship Project near Seeley Lake, Montana, is a model for successful forest restoration partnerships and includes the USFS, a family-owned milling business, a supportive community and supportive conservation groups. The Applegate Partnership based near Jacksonville, Ore., is a similar success model.
3. Savannah Pacific is proposing a new sawmill near the Coconino National Forest in response to the Arizona forest’s expectation it can supply 20 million board feet of small timber annually from thinning to reduce fire risks.
4. Gary Roloff, Boise Cascade wildlife ecologist, and others have submitted for peer review and publication a paper describing a successful “relative risk assessment” involving spotted owls and water quality in fire-prone forests of southwest Oregon.
5. Recent technical workshops I have attended related to effectively implementing the National Fire Plan have been filled with enthusiastic federal/state/private professionals who seem completely dedicated to success.

Finally, the American people have spoken. Debate on HR 1904 in both the House and Senate was enlightened and passionate. It was clear a long-term, bipartisan commitment was made to restore the nation’s forests and protect its communities. In that context, barriers and associated problems discussed here appear short term and amenable to effective resolution. ◆

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Bringing Back the Forest after Fire

BY MIKE CLOUGHESY

The Oregon Forest Resources Institute (OFRI), created by the Oregon Legislature to improve understanding of forestry and forest resources and to encourage sound forest management, began an intense forest fire education program two years ago. Until recently this work has focused on the causes, risks and effects of uncharacteristically intense wildfires and on treatment options for making forests more fire resilient.

Now a new OFRI report, *Forest Fire Risk and Restoration,* takes the discussion forward another step, investigating what can be done to enhance the recovery of forest ecosystems that have been damaged by fire and for reducing the risk of fires recurring. It also looks at the consequences of each restoration option versus taking no option at all.

Scientists and forest managers generally agree on the urgent need for some combination of thinning, brush removal and prescribed burning to treat forests that have not yet burned. But restoring forests where fire *has* occurred raises a spectrum of issues, many of them even more urgent than the pre-fire treatment of overstocked forests.

"After a fire, the management challenge is to figure out where to assist nature in forest recovery, how to do that, and where to let nature take its course," says Hal Salwasser, dean of the Oregon State University College of Forestry, a contributor to the report. "This is no easy choice, for every option has the potential for desirable and undesirable consequences," Salwasser said.

Delays in replanting conifers after a fire can quickly make the cost prohibitive if underbrush establishes itself first. Steve Hobbs, associate dean for research at the College of Forestry at OSU, says even when timely replanting occurs, a key factor limiting success, particularly in dryer regions, is water. "Shrub, hardwood and herbaceous vegetation species," he said, "are all well adapted to extract water from the soil and thrive. After timber harvest or fire, residual species germinate or re-sprout rapidly and quickly dominate the site."

Hobbs and other scientists see the prescriptive solution as quickly planting conifer seedlings before competing vegetation can get firmly established. While shrubs and hardwoods should be on some sites as part of the diverse habitat historically associated with fire disturbance, control of competing vegetation is critical until the conifers are large enough to dominate the site.

There is no doubt among forest scientists that reforestation is most likely to succeed if competing vegetation is effectively controlled. There also is general agreement that herbicides are the most effective and efficient tool. But herbicide use is limited on Forest Services lands, despite its approval for use in the forest by the U.S. Environmental Protection Agency. On private and other non-federal lands, however, the practice is common and has led to excellent success.

Another reason for the sense of urgency is the potential to finance reforestation costs through the harvest of merchantable trees that are dead or dying as a result of fire. However, according to John Sessions, professor of forest engineering at the Oregon State University College of Forestry, trees start to decompose rapidly after a fire if not harvested and will lose approximately 20 percent of their value in the first year and every year thereafter.

Also, unless some of this dead and dying timber is removed, young conifer forests are more at risk of reburning with lethal consequences and loss of the overall investment in dollars and human effort.

OSU's Dean Salwasser concludes the report by observing: "Oregon's citizens want forest managers to take action…but distrust is a major issue and it cuts both ways. Therefore, collaboration is needed among land managers, scientists and affected communities to build functional solutions for resilient forests that can also restore trust and create learning opportunities so we can improve our land stewardship over time.

"Although the task is enormous, it is doable with good science. If we don't, our quality of life is diminished and we will be giving our children and grandchildren even worse problems than we now face."

For an on-the-ground look at some of the issues covered in the report, OFRI is partnering with the Capital Chapter of Oregon SAF and other organizations to offer free one-day tours of Oregon's 2003 B & B Complex fire near Sisters on July 8 and 9. To order a copy of the report or to register for one of the tours, visit OFRI's website at www.oregonforests.org. ◆

Mike Cloughesy is forestry director of the Oregon Forest Resources Institute in Portland, Ore. He can be reached at 503-229-6718 x23 or cloughesy@ofri.com.

Taking Mapping to the Fire: GIS Supports Fire Suppression

BY EMMOR NILE

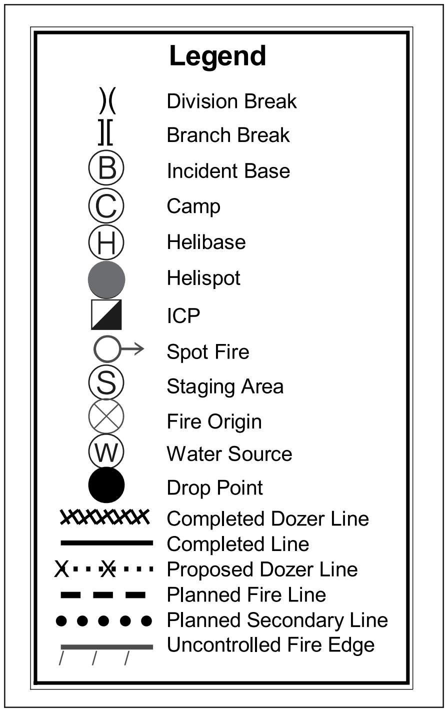
Firefighter safety is always a top priority whenever forces attack a fire, and adequate maps are a key component of safety. Producing quality maps for the fire crews in a timely fashion can be a challenge. For decades, the Oregon Department of Forestry (ODF) has made fire-mapping support a priority for their districts and project fires. Since 1999 the maps used on all ODF project fires have been produced at the incident using Geographic Information Systems (GIS).

History

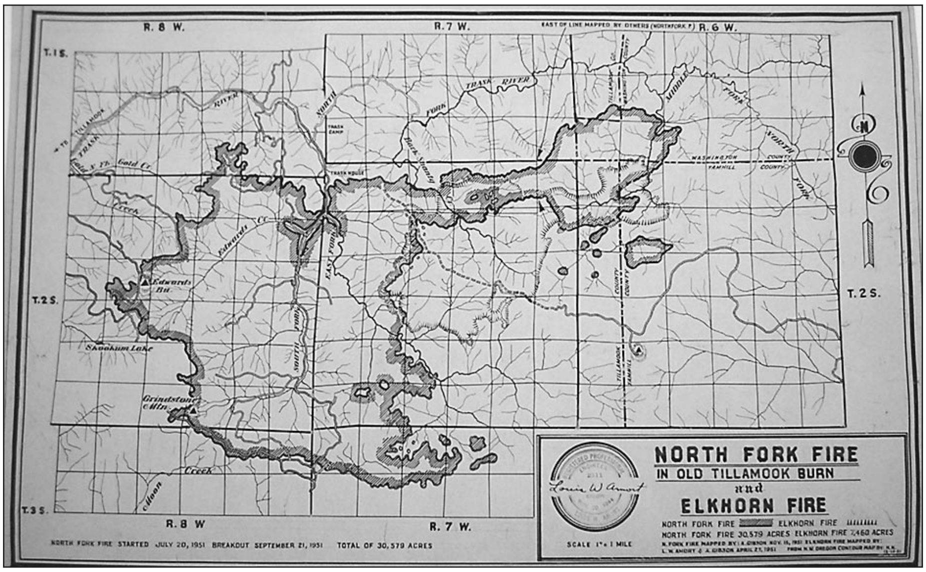
The best way to show where a fire burned is with a map. Since the formation of ODF nearly 100 years ago, maps have been made not only to help firefighters, but also to track where fires started and where they burned. In the 1940s, precise mapping of fire perimeters became a priority to help plan for rehabilitation efforts. Surveying crews would traverse contained fires and the ODF mapping unit would draft maps within a few months after the fire was out.

In the 1950s, ODF formalized a fire management structure known as *Large Fire Organization*. This organization was needed to help districts that had fires that grew beyond the capacity of local resources. The overhead staff was comprised of experienced personnel from across the agency to meet specific tasks required by the fire. It became apparent that up-to-date maps for briefings and line crews were best if produced in fire camp. To meet this need, ODF developed a mobile mapping unit contained in a converted travel trailer. The trailer contained all of the materials and supplies needed for two draftsmen to draw lines on a Mylar base and produce blue-line copies on an ammonia-based system. This unit was first dispatched in 1966 on the Oxbow fire, where it soon proved its worth and became an automatic dispatch to all project fires. The draftsmen developed procedures and standards that resulted in a large number of maps produced on each incident. Soon, it became known that if ODF was managing the fire, high-quality maps would be available.

After ODF adopted the Incident Command System (ICS) in the early 1980s, the cartographers and mapping unit were assigned to the Situation Unit under the Plans Section rather than the Chief Scout. ICS provided a consistency with other organizations and a standardized set of symbols for fire features shown on maps. Aside from some minor changes, the mapping unit continued to support an average of two or three project fires per year throughout the mid 1990s. By the end of the 1990s, cartography by hand had been



This legend shows the standardized set of symbols for fire features shown on maps.



An Oregon Department of Forestry map produced in 1951 of the North Fork Fire, Tillamook County.

PHOTO COURTESY OF MIKE SCHUFT, ODF

Oregon Department of Forestry and Warm Springs GIS trailers at the B&B Complex in September 2003.

phased out and replaced by GIS.

For incident support, the challenge facing the GIS staff was to develop a way to deliver the high-quality maps that the operations staff had grown to expect in a timely fashion. To meet this need, the ODF GIS staff collected data, software extensions and hardware that could function in a fire camp situation. Since 1999, all ODF project fires have been mapped using GIS.

Today

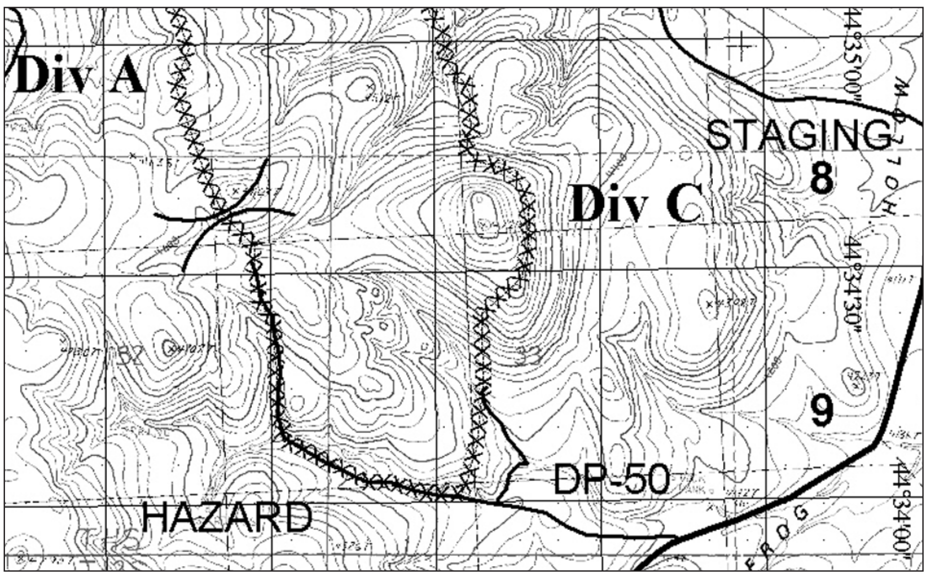
Today, the GIS unit on incidents produces the basic Incident Action Plan (IAP) map and several other products ranging from web and public information maps to aviation hazard maps for pilots. ICS provides a framework for interagency cooperation; it is not uncommon for a GIS unit on a fire to be staffed by GIS specialists from five or six organizations. Although the GIS specialist position is not an official ICS position, it is becoming recognized that GIS is an integral tool for managing incidents. Local agencies and landowners also realize that sharing GIS data in an emergency situation can help fire managers, and possibly, save lives.

Future

In the future, GIS and communications will be more integrated to allow for Automated Vehicle Location (AVL) and the transfer of GPS data via digital radio. Local agencies and landowners are continuing to develop and refine data layers, and the software tools currently available are much more powerful than versions available a few years ago. The biggest obstacle for GIS and ICS today is developing enough GIS technical specialists who are trained for incident support and have the GIS skills to meet the deadlines required by the job. ◆

Emmor Nile is GIS coordinator, Oregon Department of Forestry, in Salem, Ore. He can be reached at 503-945-7418 or enile@odf.state.or.us.

A division supervisor on the B&B Complex uses GIS maps.



An inset of the Incident Action Plan map produced on the Frog Hollow Fire, July 2003.

Studying the Value of Fuels Management for Wildlife Habitat in Interior Alaska

BY TOM PARAGI

Stand-replacement fire is the primary disturbance that drives vegetation dynamics in boreal forests, particularly in vast areas of black spruce and white spruce. Decisions on when and where to suppress wildland fire to protect human lives and resources has a major influence on dispersion and productivity of wildlife habitat in boreal forests, particularly on cold soils underlain by permafrost. Harvest of deciduous trees in interior Alaska is currently limited to primarily paper birch for local use as household fuel; harvest of aspen for revenue generation is not usually an option for habitat management.

There is an increasing need for fuel reduction near communities to break up continuous conifers and maintain broadleaf forest or shrub communities to slow the spread of intense crown fires. Prescribed fire and mechanical treatments are often used to supplant wildland fire near settlements to maintain deciduous vegetation. Fuel reductions can also maintain productive habitat for wildlife in areas accessible to the public and may provide biomass fuel for heating or power production. Society needs to understand how the operational details of fuels treatments (mechanical and prescribed fire) influence wildlife habitat so that land and fire managers and the public can examine tradeoffs in specific areas.

PHOTO COURTESY OF ADF&G

ADF&G Wildlife Biologist Tom Paragi kneels in dense aspen regeneration between parallel windrows of shearblading debris on the Delta Junction Bison Range, Alaska. On patches where moss was scraped off during the winter blading, warmer soils produced significantly higher aspen sprouting than on areas where debris was not windrowed.

PHOTO COURTESY OF ADF&G

ADF&G Wildlife Technician Al Keech stands in a feltleaf willow stand crushed 16 years earlier by a dozer in the Tok River floodplain, Alaska. Compared to surrounding habitats, this site consistently has the highest count of winter pellet groups deposited by moose. Note crushing debris on ground.

Dense regeneration of deciduous trees and shrubs provides cover and browse for snowshoe hares and moose, escape cover for ruffed grouse broods, foraging sites for songbirds that glean insects from foliage, and other habitat values.

Silvicultural prescriptions for broadleaf regeneration are designed to increase soil warming so nutrients held in organic matter can become available, especially for vegetative propagation of aspen and willow. Canopy removal that simulates the effect of stand-replacement fire is often the first step. Conifer shading often allows moss to proliferate on the ground surface, further insulating the soil from summer warmth. Broadcast burning and mechanical scarification are options for moss removal, with the latter (light scraping of surface material) shown to significantly increase aspen sprouting in shearblading treatments.

Over the last decade, the Alaska Department of Fish and Game (ADF&G), Division of Wildlife Conservation, and the Alaska Department of Natural Resources, Division of Forestry, have been implementing post-logging treatments in white spruce, prescribed fire in aspen and mechanical treatments (shearblading or felling aspen, crushing willows) to rejuvenate deciduous forests or shrubs for habitat where broadleaf fiber harvest is not economically feasible. Empirical knowledge from these trials (including cost efficiency) is now being transferred to experiments implementing fuel breaks in dense black spruce with moss understory. Stand conversion of cold sites is desired to reduce risk of crown fire and provide a tactical option for suppression of wildland fires near communities (e.g., retardant drop zone). Trials with dozer shearblading and roller crushing are underway, alone and in combination with debris windrowing or broadcast burning of debris to reduce the shading effect on soil.

A key habitat question with these treatments is whether the immediate increase in woody debris much greater than with natural disturbances in boreal forests has a significant effect on wildlife populations.

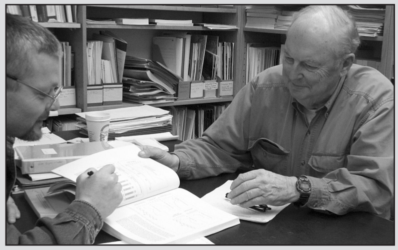
Moose are an important food source for many Alaskan hunters. These large ungulates can cross mechanical treatments with debris, but tend to use only the edges more often when debris becomes dense or greater than one meter high. Small mammals such as voles often proliferate on disturbed sites, perhaps more so where debris provides cover. Voles form the base of the vertebrate food chain in boreal forests and attract avian and mammalian carnivores. For example, winter track counts to date have indicated that weasels and martens focus more on felled aspen than burned aspen. As with all treatments, there are tradeoffs: Higher predator numbers may be desired by wildlife viewers or fur trappers, but would be detrimental to grouse chicks seeking cover in young forest. Studies of how prescribed fire and various mechanical treatments influence habitat suitability for wildlife are underway at several locations in the Interior (the initial progress report on this work can be found at www.wildlife.alaska.gov/pubs/techpubs/reports_wildlife.cfm#habitat).

Maintaining young broadleaf forests through fuels treatments can often benefit wildlife in addition to meeting objectives on fire risk. Forest managers do need to maintain some late-seral features such as larger trees, snags and cavity trees in a managed landscape to provide habitat for late-seral birds and mammals. Increasing abundance of some wildlife species can cause conflict with human values. Voles, hares and moose can damage forest regeneration and raid gardens on adjacent property. Moose pose a collision risk on highways, particularly during our dark winters when deep snow forces moose onto roads near urban areas. However, abundant wildlife is generally a positive feature of communities adjacent to wildlands and to some people a primary reason behind where they choose to live.

Although fuel treatments may be unsightly in the beginning, the benefits of reduced fire risk and enhanced habitat are reasons to take a longer-term perspective on what a managed forest can provide for the future. ◆

Tom Paragi is a wildlife biologist with the Alaska Department of Fish and Game in Fairbanks, where he works on habitat enhancement and restoration. An active member of the SAF Yukon River Chapter, he can be reached at 907-459-7327 or tom_paragi@fishgame.state.ak.us.

Buckman Receives Forest Service Award



Robert Buckman (right) mentors a student.

Robert Buckman, a retired Forest Service employee, has been awarded the USDA Forest Service's "New Century of Service" award. Buckman, also a retired Oregon State University professor, has been recognized by Chief Dale Bosworth for nearly 50 years of service and leadership. An SAF member since 1950, he was elected Fellow in 1989.

Buckman retired from the Forest Service in 1986. During his 38 years with the agency, he served in several positions, including deputy chief for research and station director of the Pacific Northwest Research Station. He retired from Oregon State University, where he was a professor with the College of Forestry, in 1995.

Although a retiree, Buckman, who serves as a volunteer at the Corvallis Forestry Sciences Laboratory, still mentors students and colleagues and lectures on international forestry, forest policy and Forest Service history.

Recently, he was a member of a team that reviewed the Biscuit Fire, Oregon's largest wildfire in recent memory that burned half a million acres in the southwest portion of the state in 2002. He currently is revisiting a study on red pine he began in the mid-1950s.

Buckman will be presented with the award, which is part of the agency's "New Century of Service" effort, at a ceremony in Arlington, Va., in June.

For more information on the "New Century of Service" award and effort, visit www.fs.fed.us/newcentury. ◆

The Future of Our Forests: A Good Time to Make a Difference

BY LINDA GOODMAN

"Thunder is good, thunder is impressive; but it is the lightning that does the work."

—Samuel Clemens
better known as Mark Twain

Confronting us today, thunder is the many diverse opinions surrounding active management on our national forests. Feelings are strong on all sides of these issues. In the middle of a monstrous storm is the forester or the lightning that is treating the land and is restoring deteriorating health of Oregon and Washington forests.

As land stewards we see the accumulation fuel from over 90 years of successful fire suppression efforts on private, state and federal lands. We ***now*** know that the gradual build-up of live and dead fuels has contributed to an increased risk of large-scale wildfires. About 50 percent of national forest acres in the Northwest have fuel conditions outside their historical natural condition. It is disturbing to me that public lands are experiencing uncharacteristically large, intense and erratic wildfires. These fires are expensive and dangerous.

With a western population explosion in recent years, we are seeing many more new homes adjacent to national forests and undeveloped private land. It's understandable as these are beautiful places.

Unfortunately, the places where communities and forests come together—the wildland and urban interface—present serious and complex fire management challenges. Over 450 communities adjacent to forested lands are at risk from severe wildfire in Oregon and Washington. Working in the interface areas is costly and complicated due to access issues, varying local authorities and laws, and people's attitudes. At the same time, the cost of an acre of hazardous fuels reduction in interface lands is significantly less than the cost of suppressing and restoring an acre of wildfire in the same place.

Thinning out trees with prescribed fire will help with the problems of fuel loading. The problem didn't happen overnight, and it's going to take a decade or longer to make a difference in reducing the fuel loads on public lands.

PHOTOS COURTESY OF TOM IRACI, USDA FOREST SERVICE

(above) A very crowded and insect-infested stand on the Deschutes National Forest.

(below) Thinning has now opened the stand.

We are also dealing with the challenge of smoke management from prescribed fires to treat fuels. All Forest Service burning is coordinated through the Oregon and Washington smoke management plans. In addition, the Pacific Northwest Region and PNW Research Station protect air quality by utilizing the BlueSky smoke modeling framework to predict smoke impacts from both wildfire and prescribed fire.

During the past four years, working with our partners under the National Fire Plan we are reducing and removing fuels in priority areas. We are also working with individuals, communities and agencies to develop community fire plans, to reduce the risk of wildfire, and to leverage funds for fire protection and prevention efforts.

We have new tools that let us streamline the documentation of analysis and get work done. The National Fire Plan gives federal, state and local entities more resources, and a 10-year comprehensive strategy refines the framework for getting there. In 2003 Congress invested about $1.57 billion in the National Fire Plan, about $173 million more than in 2002.

The Healthy Forest Initiative focuses on restoration, including treatment of hazardous fuels, and helps streamline work. The Healthy Forest Restoration Act, signed last year, helps the agency further streamline processes to get more work done on the ground. It is specifically designed to remove and reduce wildfire hazard materials on the nation's federal lands.

In the Pacific Northwest, hazardous fuel reduction is a top priority. This year we plan to treat 128,000 acres of fuels directly, 70 percent of which will be accomplished through prescribed fires. Of the 128,000 acres, 50 percent is in the wildland-urban interface.

Another 90,000 acres we will treat through vegetation manipulation like thinning and timber harvest. About 34 percent of this program will be accomplished in wildland-urban interface areas. We will demonstrate that fuel reduction projects reduce the severity and spread of wildfires.

"We all grumble about the weather but nothing is done about it," said Mark Twain.

We don't take this attitude about Oregon and Washington national forests. We have an historic opportunity to actively manage for the health and diversity of our forests and rangelands by reducing wildland fire risk. While it will take time to make a difference we are taking on the task of restoring fuel loads to historic norms, and protecting people, communities and the forests of the future from "uncharacteristic" wildfires.

It's a good time to make a difference for the future of our forests. ◆

PHOTOS COURTESY OF TOM IRACI, USDA FOREST SERVICE

(above) Prescribed fire thins out the area.

(below) Thinning and prescribed fire made a difference after the B&B fire burned through the stand.

Linda Goodman is the regional forester for the USDA Forest Service, Pacific Northwest Region, Portland, Ore. In this capacity, she is responsible for the management of over 25 million acres of national forestlands in the states of Oregon and Washington. She can be reached at 503-808-2200.

The Top Ten Environmental Benefits of Forestry

Editor's note: This article is provided by the SAF National Office for your educational outreach efforts.

1 Forestry is bringing back forests. Until the 1920s, forests were often logged and abandoned. Now, across the country an average of 1.7 billion seedlings are planted annually. That translates into six seedlings planted for every tree harvested. In addition, billions of additional seedlings are regenerated naturally.

2 Forestry helps water quality. Foresters carefully manage areas called watersheds (areas where we collect our drinking water) and riparian zones (land bordering rivers, streams and lakes). These are places where maintaining water quality is the primary concern for foresters. Forests actually help to clean water and get it ready for us to drink. The trees, the soil, and bacteria are all part of this process. Forest cover protects and nurtures the soils that are the key to water retention, filtering and quality.

3 Forestry offsets air pollution. Foresters nurture forests, which are sometimes called "the gills of the planet." One mature tree absorbs approximately 13 pounds of carbon dioxide a year. For every ton of wood a forest grows, it removes 1.47 tons of carbon dioxide and replaces it with 1.07 tons of oxygen.

4 Forestry helps reduce catastrophic wildfires. At the turn of the century, wildfires annually burned across 20 to 50 million acres of the country each year. Through education, prevention and control, the amount of wildfires has been reduced to about two to five million acres a year—a reduction of 90 percent. By marking and removing excess fuels, such as underbrush and some trees, foresters can modify forests in order to make them more resilient to fire.

5 Forestry helps wildlife. Foresters employ a variety of management techniques to benefit wildlife, including numerous endangered species. For example, thinning and harvesting create conditions that stimulate the growth of food sources for wildlife. Openings created by harvesting provide habitat for deer and a variety of songbirds. Thinning can be used to accelerate growth and development of older trees that are favored by owls and other species. In order to enhance salmon habitat, foresters also carry out strategic tree plantings and monitor forest health along streams to keep the water cool and reduce sediments.

6 Forestry provides great places to recreate. Foresters manage forests that provide recreational benefits to communities. Forests are important areas for such recreationists as birdwatchers, hikers, nature photographers, horseback riders, skiers, snowmobilers and campers. And because foresters put water values high on their list of priorities, the rivers and lakes in forested areas provide such recreational opportunities as fishing, canoeing and rafting.

7 Forestry benefits urban environments. Urban foresters manage forests and trees to benefit communities in many ways. Forests in urban areas reduce stormwater runoffs, improve air quality and reduce energy consumption. For example, three well-placed mature trees around a house can cut air-conditioning costs by 10-50 percent.

8 Forestry provides renewable and energy-efficient building products. Foresters manage some forests for timber and produce a renewable resource because trees can be replanted. Other building materials, such as steel, iron and copper, can be reused and recycled, but not replaced. Wood is a renewable resource which, in addition to being recyclable, can be produced anew for generations to come on sustainable managed forestlands. Recycling and processing wood products also requires much less energy than does the processing of many other non-renewable materials.

9 Forestry helps family forests stay intact. Foresters help family forestland owners, who own 54 percent of all the forests in the United States, understand the benefits of managing their forests in an environmentally friendly manner. Better management of private forests means that those forests will remain healthy and productive. Many endangered species spend at least part of their time on private land, more than 80 percent of our nation's total precipitation falls first on private lands and 70 percent of eastern watersheds run through private lands.

10 Forestry is good for soils. Foresters and natural resource managers are dependent on forest soils for growing and managing forests and, to a large extent, forest soils are dependent on resource professionals and managers. Foresters' success in growing forests and producing forest products is dependent on their ability to understand soil properties and to then match species with soils and to prescribe activities that not only promote forest growth, but also enhance and protect soil productivity and prevent soil erosion. ◆

New GPS Unit Uses Bluetooth

A new GPS unit called the SX Blue, collects GPS data with up to sub-meter accuracy and sends it to a Pocket PC with Bluetooth. The unit weighs less than a pound and can be carried on a belt or inside a cruiser's vest. By using a Bluetooth wireless connection, the user avoids the problems common with using GPS components connected with cables.

The SX Blue utilizes the WAAS correction signal and can provide a differentially corrected 3D GPS signal, even under dense canopy. It accomplishes this by using a proprietary technology that allows the unit to apply corrections for up to 45 minutes after losing the WAAS signal. For more information, Call Jon Aschenbach at Atterbury Consultants, Inc. at 503-646-5393. ◆

Calendar of Events

UNIVERSITY-SPONSORED EVENTS

Course	Dates	Sponsor	Location
IUFRO Foliage Meeting	June 13-19	OSU	Corvallis, OR
Forest Pruning and Thinning	July 24	WSU	Jefferson County
Balancing Ecosystem Values: Innovative Experiments for Sustainable Forestry	August 15-20	OSU	Portland, OR
Red Alder Management and Processing	August 28	WSU	Skagit/Whatcom County
Commercial Thinning Field Day	September TBA	WSU	Island County
The Basics of Accurate Forest Land Appraisal	October 4-8	OSU	Corvallis, OR
Ponderosa Pine: Management, Issues and Trends	October 18-21	OSU	Klamath Falls, OR
How to Dry Lumber for Quality and Profit	December 6-9	OSU	Corvallis, OR

OTHER EVENTS

Idaho/Washington Forest Owners Field Day, June 26, Nora Creek Farm, Idaho. Contact: Kirk David at 208-666-8626 or kdavid@idl.state.id.us.

Western Forestry and Conservation Nursery Association Annual Meeting, July 26-29, Medford, OR. Contact: WFCA.

Ecological Society of America, National Meeting, August 1-6, Portland, OR. Contact: Fred Hall at 503-285-8729 or Fred_C_hall@plantecolnw.com.

Family Forest Field Day, September 18, Bob and Lynette Falkner Tree Farm, Wash., National Tree Farmers of the Year. Contact: Steve Gibbs at steve.gibbs@wadnr.gov.

Productivity of Western Forests: A Forest Products Focus, September 20-23, Olympia, WA. Contact: WFCA.

Joint SAF/CIF Annual General Meeting and National Convention, October 2-6, Edmonton, Alberta. Contact: SAF National Office at 301-897-8720 or www.cif-saf-2004convention.org/natcon/.

Professional Timber Cruising, October 20-21, Beaverton, OR. Contact: Atterbury Consultants.

GPS for Mobile Professionals, October 27, Beaverton, OR. Contact: Atterbury Consultants.

Native Plants, December 14-17, Eugene, OR. Contact: WFCA.

Joint OSAF/WSSAF Leadership Conference, January 14-15, 2005, Hood River Inn, Hood River, OR. Contact: Sue Bowers at 541-895-5549 or sbowers@epud.net.

Inland Empire, Oregon and Washington State SAF Tri-state Annual Meeting, April 13-15, 2005, Lewiston, Idaho. Contact: Terry Shaw at 208-885-7452 or tshaw@uidaho.edu.

Contact Information

OSU: OSU College of Forestry Outreach Education Office, Peavy Hall 202, Corvallis, OR 97331-5707; 541-737-2329; http://outreach.cof.orst.edu/.

WSU: Department of Natural Resource Sciences, Cooperative Extension, Washington State University, P.O. Box 646410, Pullman, WA 99164-6410; 509-335-2963; http://ext.nrs.wsu.edu/.

WFCA: Western Forestry & Conservation Association, 4033 SW Canyon Rd., Portland, OR 97221; 503-226-4562; richard@westernforestry.org; www.westernforestry.org.

Atterbury: Atterbury Consultants, 3800 SW Cedar Hills Blvd., Suite 120, Beaverton, OR 97005; 503-646-5393; fax 503-644-1683; jaschenbach@atterbury.com; www.atterbury.com.

Send calendar items to the editor, *Western Forester,* 4033 SW Canyon Rd., Portland, OR 97221; fax 503-226-2515; rasor@safnwo.org. The deadline for the July/August 2004 issue is June 14.

Assessing Fire Risk with the Landscape Management System and FFE-FVS

BY KEVIN CEDER AND
JAMES McCARTER

Modeling and analysis of forest fire risks associated with present conditions and future management alternatives can now be done easily in the Landscape Management System (LMS) with the release of the LMS-FFE Add-On. The components of this add-on include:

- The Fire Scoping Tool
- All variants of the Fire and Fuels Extension (FFE) for the Forest Vegetation Simulator (FVS) growth model
- The LMS-FFE Configuration Tool
- LMS tables linked to FFE-FVS outputs
- The Fire Scoping Report spreadsheet
- Risk Mapper ESRI ArcView project file.

Together, these tools allow users to investigate and localize fire behavior predicted by FFE; define fire risk and characterize landscapes; relate fire risk and risk change to specific stand attributes; and map fire risk across a landscape. LMS provides a simple user interface and a consistent modeling platform to analyze fire risk in terms of other available outputs, including wildlife habitat, carbon and economics.

LMS is an evolving landscape-level forest analysis computer program developed at the University of Washington, College of Forest Resources that is freely available to the public. LMS integrates existing forestry computer programs, such as growth and yield models and stand and landscape visualization programs. A treatment simulation program, as well as tabular and graphical output programs, are also available in LMS. All functionality is accessed through a user-friendly graphical interface.

To run LMS, a tree list is needed with records summarized to a per-acre basis for each stand as along with site and topographic data. If available, spatial data, including a digital elevation model (DEM) and an ESRI shapefile of stand boundaries, are also useful. At a minimum, tree data must include species, diameter at breast height (DBH) and an expansion factor (how many trees a given record represents per acre). Height and crown ratio measurements are not required, but are preferred if available. Any missing height and crown ratio measures will be filled in by the growth model. Site and topographic data include site index or habitat code, slope, aspect, elevation and stand acreage. Stand age can be included, but it is not used by the growth models. FVS ready files can also be imported into LMS using the LMS Portfolio Builder.

FFE is a fire effects model developed by the USDA Forest Service for use with the FVS growth model. Variants of FFE-FVS are available for the majority of the fire-adapted ecosystems of the western United States, including the eastern Cascades, Inland Empire, Rocky Mountains, Sierras and Siskiyous. All FFE-FVS variants are installed by the LMS-FFE Add-On, which is available for free download along with the rest of the LMS program from the LMS website (http://lms.cfr.washington.edu).

Configuring LMS to run FFE-FVS is done using the LMS-FFE Configuration Tool (Figure 1). With this tool, features of FFE-FVS such as potential fire reports, fire simulations, and simulated fire visualization images can all be configured using a user-friendly dialogue box. When any of these features are enabled, default values for fire weather and fuel moistures from the selected variant of FFE-FVS are automatically entered. However, any of these values can be adjusted by the user to tailor behavior of FFE-FVS to better represent local conditions. Users can also enable LMS-FFE keyword files and fuel model files. Keyword files allow users to further control FFE to fit local conditions. Fuel model files allow the user to select an appropriate fuel model for each stand to fit site-specific fuel loading conditions, overriding the default selections made by FFE.

The LMS-FFE Add-On adds three new output tables to LMS: Potential Fire Report, Consumption and Physical Effects Report, and All Fuels Report. Unlike running FFE- FVS as a stand-alone program with individual

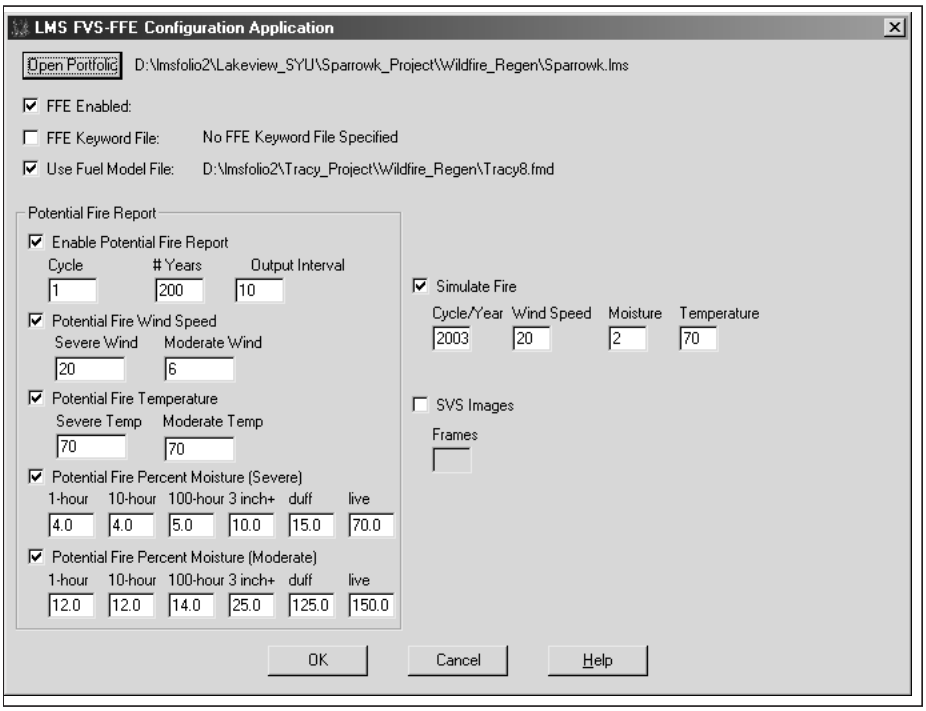


Figure 1. Landscape Management System FVS-FFE configuration tool.

output tables for each stand, LMS compiles the data from each stand in the simulation into individual tables containing data for all stands. With these tables users can answer questions regarding fire behavior, fuel loading, smoke emissions, mortality, and biomass consumption and associated carbon release from a potential fire.

Classification and summarization of landscape-level fire risk is done using the LMS Fire Scoping Tool (Figure 2). The Fire Scoping Tool installed by the LMS-FFE Add-On has an interface that allows the user to view distributions of FFE Potential Fire Report output variables, choose the fire weather severity, define fire risk class breaks, and create graphical and map outputs of fire risk for the entire LMS landscape portfolio.

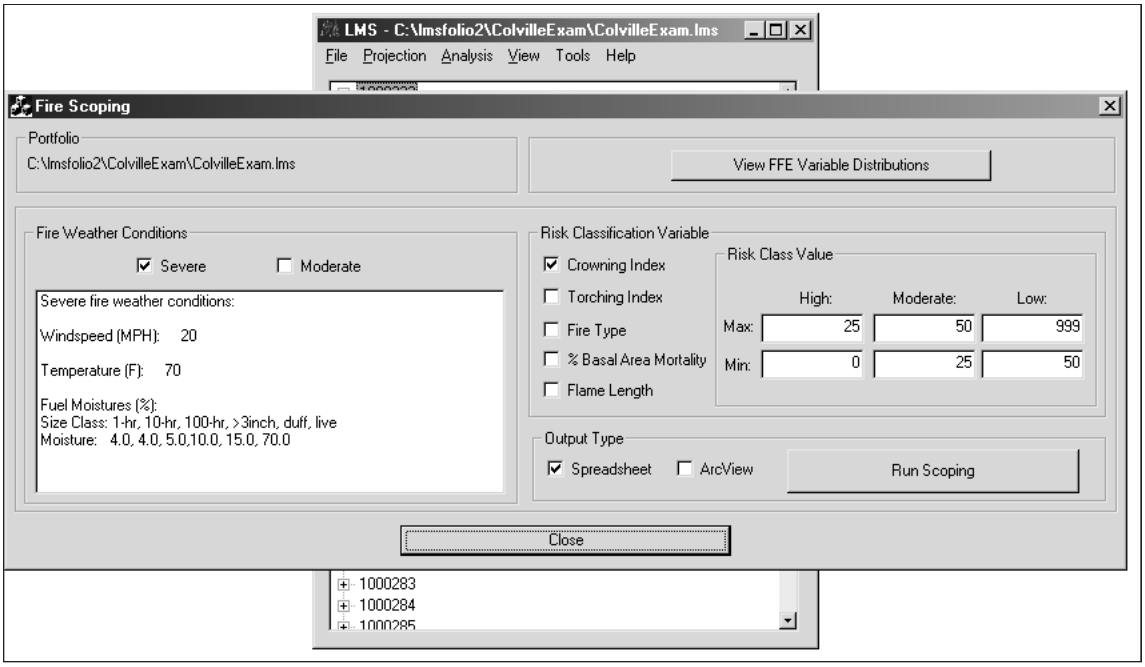


Figure 2. Fire Scoping interface launched from the Landscape Management System.

The first step in classifying stands by fire risk is selecting the appropriate classification variable along with high, moderate and low risk class breaks. Fire Scoping is set by default to use Crowning Index, which is the wind speed in miles per hour (mph) needed to initiate and carry a crown fire. Based on the FFE Potential Fire Report, risk classes are defined as High risk (<25 mph), Moderate risk (25-50 mph) and Low risk (>50 mph). Classification based on Crowning Index may not be appropriate for all landscapes, especially in the forest/rangeland fringe with sparse stands where torching or crown scorch are a major cause of mortality. Thus, classifying on Crowning Index may show stands are at low fire risk from crown fire, yet there would still be a high risk of mortality from fire.

Fire Scoping allows the user to view distributions of all FFE output variables that are available for risk classification using the Fire Risk Variable Distributions spreadsheet. Crowning Index, Torching Index, Fire Type, Percent Basal Area Mortality and Flame Length distribution tables are created within the “Data” sheet for severe and moderate conditions, where appropriate. Other sheets provide graphs of the distributions so the user can see the interactions between the different variables and choose the variables and class limits that are appropriate for their landscape and their level of risk aversion. These parameters are then set in the Fire Scoping interface to be used as input for the Fire Scoping spreadsheet and Risk Mapper. Each classification variable has default values that can be used as a base classification. Fire Scoping can be run several times using different classification variables and class breaks, in a gaming context, to determine the appropriate classification system.

The Fire Scoping spreadsheet summarizes a tremendous amount of data across the spatial extent of the landscape and the temporal extent of the simulation and presents the results in tabular and graphical form (Figure 3). The many sheets contained in the Fire Scoping spreadsheet contain distributions of fire risk, elevation, quadratic mean diameter (QMD), trees per acre (TPA), basal area (BA), Reineke’s stand density index (SDI), dominant species, canopy structure and FFE Potential Fire Report variables. Each distribution is classified into High, Moderate and Low fire risk, as defined in the Fire Scoping interface with an individual distribution for each year of the simulation. By looking at each of the distributions the user can get an idea of not only the overall risk distribution on the landscape, but also what stand attributes are related to fire risk. Viewing post-treatment distributions gives insights into what aspects of treatments did or did not change fire risk. For example, a treatment removing only the trees <6” DBH may reduce risk in some stands, but overall may not reduce density or change the canopy fuel distribution enough to sufficiently reduce risk. Fire Scoping with LMS gives users the ability to compare the risk reduction performance of multiple treatments and select the best treatment for specific forest types and structures.

The Risk Mapper works as a customized ESRI ArcView project file that maps fire risk based on the FFE-FVS output variables and class limits set in the Fire Scoping dialogue. The Risk Mapper, in conjunction with ESRI ArcView 3.x, allows mapping and spatial analysis of fire risk on a multiple-stand or landscape level. Maps of fire risk are created for each year of the simulation directly in ArcView using the classification variable and class limits set in the Fire Scoping interface (Figure 4). These maps can then be used with any other GIS data that can be used with ArcView, such as shapefiles or cov-

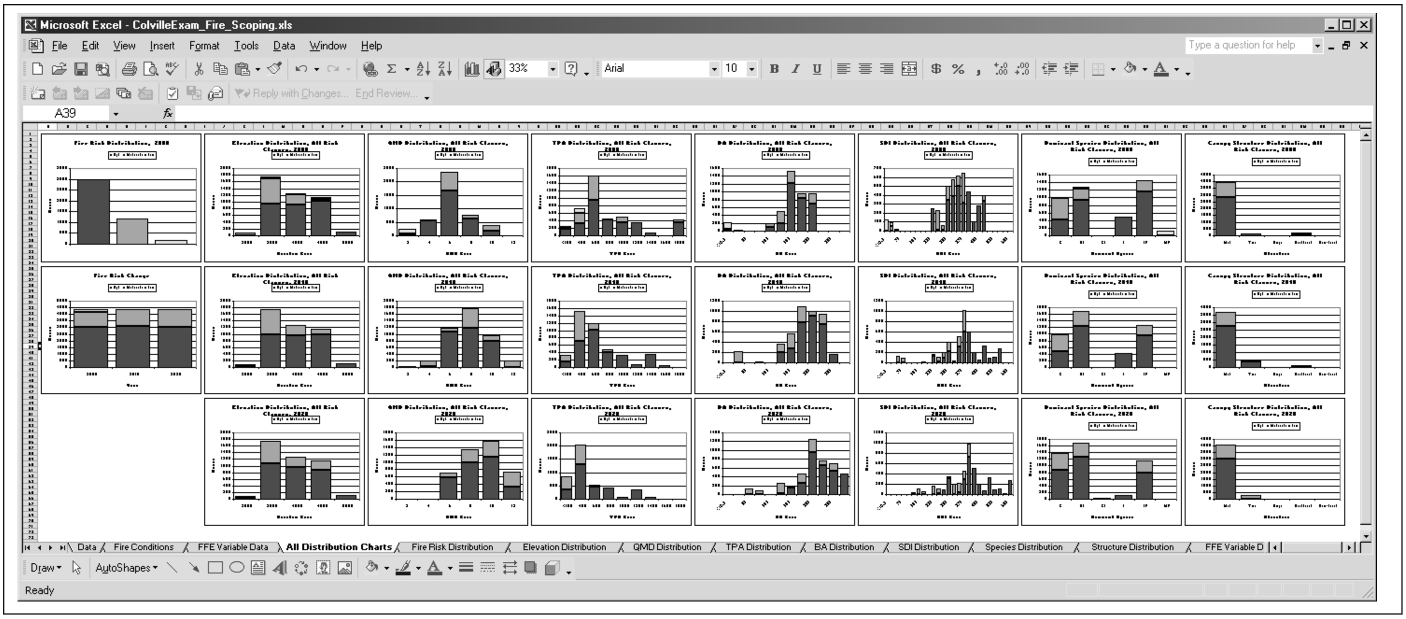


Figure 3. All Fire Scoping Report graphs are created in MS Excel by the Fire Scoping Tool.

erages, for further spatial analysis. With fire risk in a spatial context, additional themes such as critical habitats, roads or home sites can be analyzed in the GIS to help prioritize areas for fuel treatments to reduce risk.

Use of the Risk Mapper requires a landscape visualization-enabled portfolio that includes an ESRI shapefile of stand boundaries. ESRI ArcView 3.x must also be installed on the computer. If ArcView is not installed on the computer, the user will be notified when the Fire Scoping Tool is run and the Risk Mapper will be disabled.

The tools and capabilities of the LMS FVS-FFE Add-On allow modeling and analysis of fire risk associated with both current conditions and future management alternatives to be done within the user-friendly Landscape Management System. Through a selection of tables from FFE-FVS and a "point-and-click" interface to landscape-level graphical, tabular and map outputs, fire risk can be quickly and easily analyzed at stand and landscape scales. Using other capabilities of LMS allows fire risk to be analyzed in a multi-disciplinary context to assess trade-offs among many values, including harvest, economics, wildlife habitat and carbon sequestration. ◆

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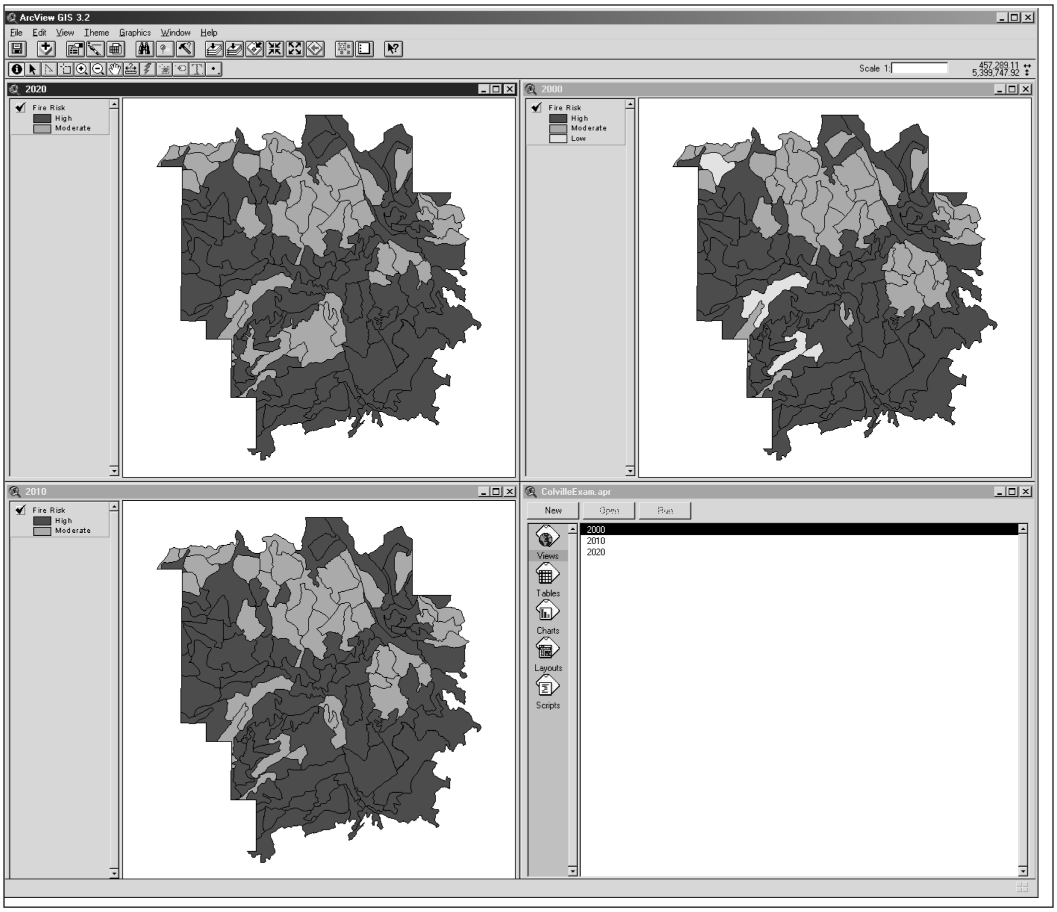

Figure 4. Fire risk maps created in ESRI ArcView by the Risk Mapper.

Policy Scoreboard

Editor's Note: To keep SAF members informed of state society policy activities, Policy Scoreboard is a regular feature in the Western Forester. The intent is to provide a brief explanation of the policy activity—you are encouraged to follow up with the listed contact person for detailed information.

Idaho Pilot Project Proposal gets a Hearing. The Public Lands and Forests Subcommittee of the Senate Energy and Natural Resources Committee met on March 24 to hear testimony on several bills including the Clearwater Basin Project Act (S. 433). If passed, the bill would provide for collaborative forest management on the Clearwater and Nez Perce National Forests in Idaho through the creation of an advisory committee to assist in the development and prioritization of projects on these forests. No action has been taken on the companion House version (H.R. 835) of the bill. Contact: Jay O'Laughlin, IESAF Policy chair, 208-885-5776; jayo@uidaho.edu.

Western Governors Association creates Forest Health Advisory Committee. The Western Governors Association has played an instrumental role in developing the 10-year implementation strategy for the National Fire Plan. The WGA remains committed to improving the wildfire situation and has formed an advisory committee with several members from each of the western states. The initial meeting was held in March in Reno, NV. Contact: Jay O'Laughlin, IESAF Policy chair, 208-885-5776; jayo@uidaho.edu.

National Policy Event for SAFers. The second annual SAF Legislative Days will be held June 15-16 in Washington, D.C. This is not only for personal development, but also for the development of state societies, divisions and chapters. Attending this event will provide an opportunity for you to represent your state on a national level with members of Congress, as well as make contacts and learn tricks of the trade that you can then use as you engage in policy issues in your state. Contact: Rita Neznek, associate director, SAF Forest Policy, 301-897-8720 x115; neznekr@safnet.org.

Update: President's Healthy Forests Initiative. The U.S. Forest Service website (www.fs.fed.us/projects/HFI.shtml) is a good source for keeping up to date on the many policy activities associated with the President's Healthy Forests Initiative, including the Healthy Forests Restoration Act signed into law in December 2003. An interim field guide for implementation of the HFI & HFRA was published in March 2004 and is available at www.fs.fed.us/projects/hfi/field-guide/.

Update: Stewardship Contracting. The Forest Service and BLM have issued final guidance to their field offices on how to develop, implement and monitor stewardship contracts and agreements. Through broad-based community public and community involvement, stewardship contracting is intended to achieve key land-management goals that improve, maintain or restore forest or rangeland health; restore or maintain water quality; improve fish and wildlife habitat; reestablish native plant species and increase their resilience to insect and disease; and reduce hazardous fuels that pose risks to communities and ecosystem values through an open, collaborative process. Stewardship contracting authority includes agreements with nonprofits, best-value contracts, designation by description, end results and goods for services. The guidance document, fact sheet, Q&As and other information can be accessed online at www.fs.fed.us/forestmanagement/projects/stewardship/handbook/index.shtml.

OSAF Members Strongly Endorse New and Revised Position Statements. Based on a referendum sent with ballots for state officers for 2004, OSAF members gave very strong support to four position statements approved earlier in 2003 by the OSAF Executive Committee. The positions include: Active Management to Achieve and Maintain Healthy Forests, Salvage Harvesting, Clearcutting, and Using Pesticides in Forests. With a return rate of 32 percent, member support for the individual positions ranged from 96 to 99 percent. Although not required under SAF policy guidelines, OSAF uses the referendum approach to strengthen the credibility and member understanding and ownership of the positions. Given the timeliness and visibility of the forest health and salvage harvesting issues, OSAF members are encouraged to make use of the positions to help convey their professional forestry views to key decision makers and the interested public. All of the statements are on the OSAF website at www.forestry.org. Contact: Paul Adams, OSAF Policy chair, 541-737-2946; paul.adams@oregonstate.edu.

2004 Ballot Initiative Petition Picture Clears. Two forestry-related initiatives are now in circulation for signature gathering, while two others have been withdrawn. Both are statutory measures, which require 75,630 valid signatures by July 2, 2004, in order to qualify for the November 2, 2004, statewide ballot. Initiative Petition #65 was the original Tillamook-Clatsop "50-50 Plan," as it would have required that 50 percent of these state forests be managed for "old-growth timber restoration" and the balance for timber production. But with no media notice, #65 and one of its siblings (#119) were withdrawn in favor of Initiative Petition #120, which was filed by one of the chief petitioners of the other two. All were very similar, thus this appears a "ballot title shopping" situation in which similar petitions are used to identify one with the greatest public support or that is least likely to face legal challenges.

Petition #120 would override the Board of Forestry's policymaking authority in its recent adoption of an updated management plan for the Tillamook-Clatsop Forests. Alternatively, the initiative would require the administrators of three university biology departments to appoint a team of technical specialists whose recommendations would direct the development of a new plan with measures required to create permanent old-growth preserves on 50 percent of the land area.

Initiative Petition #56 "requires, defines sustainable timber harvest practices and organic pest controls on state and private forest land." The chief petitioner of #56 was a co-petitioner for Measure 64, and #56 retains some language and emphasis of the latter, including major restrictions on clearcutting and chemical pesticides.

The text and status of Initiative Petitions #56 and #120 can be found at the Secretary of State's website at www.sos.state.or.us/elections/other.info/irr.htm. Contact Paul Adams, OSAF Policy chair, 541-737-2946; paul.adams@oregonstate.edu. ◆

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