Fire and Fuels Buildup

What is the fire and fuels problem?

Recent history has seen an increasing trend of record-breaking wildfires on public forests and grasslands. In 2002, wildfires burned 7.2 million acres in seven Western states, 23 firefighters died, and 815 structures were damaged. That year, the USDA Forest Service, Bureau of Land Management, and other federal and state agencies spent more than $1 billion for fire suppression. Average fire suppression costs during the 1990s were about one-half that figure.

Why so many large fires? "The most extensive and serious problem related to health of national forests in the interior West is the over-accumulation of vegetation, which has caused an increasing number of large, intense, uncontrollable and catastrophically destructive wildfires," according to the General Accounting Office (1999). During the past 10,000 – 15,000 years, North American forests have evolved under the influence of humans and natural fire.(USDA Forest Service 2003) Indigenous people harvested timber and used fire for thinning and land clearing to meet their needs for shelter, hunting, gathering, and protecting their communities. In the arid West, where moisture is too scarce to support fungal decay, fire is the primary mechanism for removing dead trees and limbs from the forest floor. Climate factors and widespread wildfire suppression efforts, which became effective after World War II, have contributed to overgrown conditions over the past 75 years. Many forests now require hands-on active management to restore fire-adapted ecosystems (Sebellius and Rosen, 2003).

All vegetation—live and dead—on forested lands (tree branches, twigs, cones, snags, moss, and tall brush) serves as fuel for fires. Heavy fuel accumulation and altered vegetation composition along with sustained drought have increased fire intensity, spread, and resistance to control, particularly in the West. The problem is compounded by urban sprawl and conversion of large ranches to small ranchettes and urban subdivisions that are adjacent to or intermingled with public lands. This results in more homes and structures near areas where large wildland fires occur. As a result, firefighters who are trained for wildland fire suppression must focus more effort protecting homes and human lives.

An estimated 190 million acres (Schmidt and others 2002) of all federal forest and range lands (including BLM, National Forest, National Park and National Wildlife Refuges) are at increased risk of catastrophic wildfire. These acres are in a condition class described as "significantly altered from the normal range," which is the most severe of three fire-hazard classes. The other two classes are lands within "historic range" and at "moderate risk" for wildland fire. National efforts to map fire risk have determined that about two-thirds of National Forest System lands are in the two categories outside of their historic range (USDA Forest Service 2000). Many millions of acres of state-managed and privately owned lands adjacent to public lands are also at high or moderate risk of fire.

The areas that are called moderate to high risk are prone to large intense fires that overwhelm suppression efforts. These large areas are in danger of losing key ecosystem

components. For example, losing large areas of open-fire dependent Western ponderosa pines, along with associated plants and wildlife, is a distinct possibility.
Remaining lands have a lower risk of wildfire damage but may require periodic treatment of fuels to maintain this status. This is particularly true in the Southeast, where historic fire return intervals are as short as 3-5 years. Effective fuel treatment will require some mix of treating different land classes as forest and range ecosystems change over time.

What can we do about it?

Some 73 million national forest acres and 397 million acres across all ownerships have been identified as high-priority treatment areas (USDA Forest Service 2000). The Forest Service's "Cohesive Strategy" for addressing fire-adapted ecosystems outlined an approach to the fuels management challenge. One option is a 15-year treatment schedule that includes fuels treatments of 4.2 million acres per year. Some treatments would be made on lands in all three conditions classes. The strategy would not attempt to treat all acres at risk. Research shows that by strategically placing fuel treatments to impede fire spread, only 30 to 40 percent of lands need treatment to significantly reduce the size and cost of severe fires (Finney 2001). Conversely, a one time treatment of all high fire risk areas would not fully address the fuels problem, as landscapes continue to change over time and fuels would build up on many lands currently in historic condition, without periodic maintenance treatments (Beighley).

Federal land management agencies developed a National Fire Plan to effectively (1) target resources for fire suppression; (2) reduce hazardous fuels on federal and adjacent land, and restore land health in fire prone areas; and (3) work directly with communities to ensure adequate protection and to provide effective community assistance. The plan emphasizes cooperation among federal and state, tribal and local organizations and communities. It aims to restore fire-adapted ecosystems as the best long-term solution to reduce risk to communities, provide for public and firefighter safety, and ensure sustainable resources.

How effective is fuel reduction in reducing catastrophic fire?

The 2002 Hayman Fire, which burned 138,000 acres in Colorado, provided the first large-scale study with comparisons of fuel treatments (Graham 2003). A team of 60 researchers and resource professionals evaluated fire behavior, the effects of fuel treatments on burn severity, home destruction, post fire rehabilitation activities, and social and economic issues. They concluded that some recent prescribed burns appeared to stop the fire locally while other areas modified fire behavior but did not stop the fire. In areas with moderate conditions, recent burns appeared to have lower fire severity than older burns. Removal of surface fuels alone can dramatically alter fire behavior within one year of treatment.

Fuel Reduction Treatments and Costs

Fuel treatments include (1) biological methods such as prescribed fire (a management-ignited fire under certain, predetermined conditions to meet specific objectives) and grazing; (2) chemical use (herbicides); (3) mechanical thinning (using saws, tractors, and chippers to cut up and remove woody materials); or (4) a combination of these methods. In high risk areas, some fuels often must be removed mechanically to reduce fuel loading before it is possible to use prescribed fire.

Particularly in the southeast, many forests within the historic range condition are periodically burned to limit rapidly growing vegetation. Recouping costs associated with forest restoration is a management difficulty.

The cost for implementing the 15-year option is projected at $825 million per year for a total of $12.4 billion to treat 73 million high priority national forest acres (USDA Forest Service 2000). Of course, this figure is only an estimate and (averaging about $170/acre) includes routine maintenance thinning of stands within historic range. It does not include planning and overhead costs and focus only on a portion of the lands in overall need of treatment (USDA Forest Service 2000). Forest Service and DOI agencies were allocated $400 million in 2002 for fuel treatment.

There is great variation in estimated costs depending on the types of stands to be treated. Gross costs for mechanical treatment of overgrown (high risk of fire) stands have been cited at $500-$1,000 per acre, stands at moderate risk could cost up to $400 per acre, and maintenance treatments for stands within their historic range should cost $50 to $100 per acre (Beighley 2003).

These treatments will not easily pay for themselves. Although high commercial value of large logs can fund a timber-harvest operation, vegetation removed for fuel hazard reduction is not so marketable. Small-diameter trees currently are in low demand, and the market values are low in some areas of the country. In the Interior West, the demand for small diameter trees and other material is among the lowest and the need to remove such trees is among the greatest.

Currently the technologies and the economic incentive for using these small diameter trees are minimal, and often the cost of transportation exceeds the market value of the material. Researchers, rural development specialists and forest managers are seeking new utilization options for small diameter timber such as development of value-added products and bioenergy. One National Forest demonstration project has used a special bundler for binding thinned woody material into tightly strung bales that are easily stored and transported to bioenergy facilities. Researchers also are developing cleaner and more efficient processes for product conversion, and better performing wood products, to support small log markets.

Working With Communities

The National Fire Plan also sets goals for working with communities, using the Forest Service's Economic Action Programs (EAP). These assistance programs provide grants and technical assistance for developing new or expanded forest technologies, products and markets. EAP provides technology transfer needed to apply research knowledge to develop new methods to utilize and market small diameter trees and other fuels. For example, small diameter trees, which were formerly unmerchantable, can be processed into flooring or other marketable products, or used in their round form in other structures. Fine fuels, also called small woody biomass, are being used in small-scale community renewable energy systems. EAP grants are funding rural community-based projects directly and indirectly for hazardous fuel reduction as ecosystem restoration.

Not only a public lands problem

The Forest Service, BLM and other federal and state agencies do not "own" the problem of excess fuels and fire risk alone. Many acres of private lands are also at high or moderate fire risk.

Many communities and their watersheds are intermingled with undeveloped wildland, a situation called the wildland-urban interface. The federal agencies are working with state, tribal, and local public officials to help prioritize fuels treatment within the wildland-urban interface.

The National Fire Plan also designated $11 million for fiscal years 2001–2003 for developing "Firewise," an educational program for landowners and communities to learn effective fire prevention. The Firewise vision is homes designed, built, and maintained in order to survive wildfires without the intervention of the fire department.

Firewise targets homeowners, firefighters, builders, landscapers, insurance companies, and public officials and helps to facilitate community safety. It includes technical assistance to communities and national recognition for communities that improve planning and mitigation of fire hazards. Firewise shows homeowners how to reduce fuel buildup and more effectively fireproof their homes. More information is listed on the website **firewise.org**.

International Context

International programs have focused on two areas: where land management alters ecosystems from their historical fire regime and climatic events that affect catastrophic wildfires. In many countries besides the U.S., historical land management in some ecosystems has led to buildup of fuels and increased risk of catastrophic fire. Widespread logging and forest conversion for agriculture in some tropical areas has opened the canopy, allowing moist forests to dry out and become prone to unnaturally widespread forest fires. Climatic events including extreme El Nino events in 1997-98 have sparked large-scale wildfires that overwhelm local fire suppression. The Forest Service is working on several large scale international collaborative efforts in fire and fuels management and also has worked with other government and international agencies (including USAID) to provide fire suppression capabilities and disaster response support.

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