Fire Management today

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Cooperative Fire Management

United States Department of Agriculture
Forest Service

New Mailing Address

Events since September 11, 2001, have made it necessary to change the addresses for regular mail delivered by the U.S. Postal Service to *Fire Management Today*. Our new mailing addresses are printed in "Guidelines for Contributors" on page 42.

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On the Cover:

Monte Dolack's painting of a fire scene in the wildland–urban interface reflects the threat facing many American homeowners and communities. Cooperative fire management programs nationwide are designed to reduce the threat by educating homeowners, treating hazardous fuels, improving firefighting resources, and other means. Dolack's painting graces posters and other materials designed to promote the national Firewise Communities program (see the article by Cynthia Bailey beginning on page 4).

The FIRE 21 symbol (shown below and on the cover) stands for the safe and effective use of wildland fire, now and throughout the 21st century. Its shape represents the fire triangle (oxygen, heat, and fuel). The three outer red triangles represent the basic functions of wildland fire organizations (planning, operations, and aviation management), and the three critical aspects of wildland fire management (prevention, suppression, and prescription). The black interior represents land affected by fire; the emerging green points symbolize the growth, restoration, and sustainability associated with fire-adapted ecosystems. The flame represents fire itself as an ever-present force in nature. For more information on FIRE 21 and the science, research, and innovative thinking behind it, contact Mike Apicello, National Interagency Fire Center, 208-387-5460.

Firefighter and public safety is our first priority.

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Short Features

Firewise Workshops Ignite Community Action

Cynthia Bailey

The 2000 fire season provided dramatic evidence that local citizens must play a more active role in protecting their communities from wildland fire. Communication among a diversity of community leaders, followed by transforming words into action to build fire-prudent neighborhoods, is the goal of the national Firewise Communities workshops. The workshops bring professionals together to discuss their occupational perspectives while they learn how to incorporate sound Firewise planning concepts.

As we build more homes near the wildland–urban interface, the threat to life and property from wildland fire increases. Firewise workshops emphasize community fire safety by fostering partnerships among the people who plan, regulate, build, buy, sell, and protect homes.

Firewise Communities workshops feature approaches to implementing fire-resistant practices in community developments, assessing hazards, developing and modifying structures, and implementing Firewise landscaping and building techniques. The national Firewise Communities program is guided by the Wildland/Urban Interface Working Team of the National Wildfire Coordinating Group (see sidebar).

Cynthia Bailey is a freelance writer living in Stevensville, MT.

Severe fire seasons and evolving insights into land and resource management have generated a series of recent initiatives for wildland fire management.

In the Beginning

The National Wildland/Urban Interface Fire Program was established in 1986 to help firefighters and communities mitigate the impact of wildland fire on residential areas. The USDA Forest Service, the National Fire Protection Association, and a variety of other Federal agencies and national organizations support the program.

Firewise Communities is one of the most successful projects of the

Smoke billowing behind a home in Valley of the Pines, ID. This and other homes in the wildland–urban interface were threatened by the 1994 Star Gulch Fire. Firewise Communities workshops are designed to help communities in the wildland–urban interface assess fire hazards and implement fire-resistant landscaping and building techniques. Photo: USDA Forest Service, 1994.

National Wildland/Urban Interface Fire Program. The target audience for each workshop is a spectrum of community leaders. The people who determine whether a community can withstand the effects of a nearby wildland fire are those who influence how neighborhoods are designed, built, maintained, and protected.

In the past century, the U.S. population has nearly tripled, with much of the growth flowing into areas where wildland fires have historically occurred. Since 1970, more than 15,000 homes and 21,000 other structures have been lost to severe wildland fire in the United States. These losses have generated suppression costs of $25 billion and insurance restitution costs of $10 billion. Because of the staggering costs associated with wildland fire, Firewise Communities workshops stress the economic benefits of improving fire safety within communities.

As wildland fire continues to ravage rural communities, the USDA Forest Service and partners are sponsoring a 3-year series of regional Firewise workshops.

Of particular concern is the building/loss/rebuilding cycle that occurs after wildland fires sweep through an area. Low-cost loans and insurance funds help homeowners rebuild. Unfortunately, property owners often recreate the same conditions that led to the original loss by rebuilding nearly identical homes on the same sites. The Firewise Communities program teaches homeowners to break this cycle by remembering the motto, "Making sensible choices for safety from fire in the wildland–urban interface."

Why Firewise?

Although no community is completely safe from wildland fire, wise community design and prescribed fire can mitigate the impact of fire. Firewise Communities emphasizes that every citizen has a responsibility to recognize fire as an inherent part of the ecosystem and that solutions and options exist to help communities adopt a Firewise lifestyle.

The Firewise Communities program is founded on the conviction that homes can be designed, built, and maintained to withstand wildland fire without intervention by local firefighting resources. Communities that are designed using Firewise concepts can save lives, homes, views, wildlife habitat, and recreational settings, while protecting investments and increasing property values. Firewise practices, promoted since 1986, have attracted new, nontraditional partners in fire protection and fire

Firewise Communities

Firewise Communities is a national mitigation planning program that encourages communities to include land use planning, building codes, landscaping codes, zoning, and fire protection in developing new communities and retrofitting existing communities.

Firewise Communities supports the idea that positive incentives to build better structures and communities must be placed at the beginning of any project, as structures are being planned, rather than at the end, after a disaster has destroyed them.

The goal of Firewise Communities is to ensure that homes are designed, built, and maintained to withstand a wildland fire without the intervention of a fire department or wildland fire agency.

Firewise Communities is principally supported by the National Wildfire Coordinating Group and its Wildland/Urban Interface Working Team, which includes the:

- National Fire Protection Association,
- USDA Forest Service,
- U.S. Department of the Interior (USDI) Bureau of Indian Affairs,
- USDI Bureau of Land Management,
- USDI Fish and Wildlife Service,
- USDI National Park Service,
- U.S. Fire Administration,
- National Association of State Foresters,
- National Association of Fire Chiefs,
- National Association of State Fire Marshals, and
- National Association of Emergency Managers

For more on Firewise Communities, including lists of stakeholders and upcoming workshop dates, see the organization's Website at <http://www.firewise.org/communities/>.

Firewise workshops have reached more than 600 community leaders representing about 400 communities in 39 States.

safety education, and have saved an estimated $40 million annually in fire suppression costs.

National Workshops

The first of 26 Firewise Communities workshops was held in Deerfield Beach, FL, in November 1999; the final session is scheduled for Washington, DC, in April 2003. The Firewise workshops introduce community leaders to Firewise concepts during a 3-day program featuring dynamic presentations, state-of-the-art geographical information systems mapping, and wildland fire simulations. Workshop exercises give participants hands-on experience and an opportunity to discuss issues with professionals from a variety of disciplines. Speakers enhance the program by providing motivation, Firewise expertise, and local community "success stories" lending regional perspective.

Eventually, more than 2,000 community leaders and professionals—about 100 per workshop—will have participated in the Firewise series. Organizers encourage a mix of attendees who represent diverse professional disciplines as well as firefighters and foresters. Participants who have completed national workshops have scheduled an additional series of 1-day regional miniworkshops around the country, reaching more than 1,500 additional attendees.

Recognition Program

Knowing that thousands of communities are at risk from wildland fire across the United States, the organizers of the Firewise Communities program have initiated a new activity—working with at-risk communities to highlight their Firewise work. Recently honored communities that have exemplified the Firewise Communities program include Prescott, AZ; Glendale, CA; Orange County, FL; Ormond Beach, FL; Frenchtown, MT; Santa Fe, NM; and Sundance, UT.

The Firewise concept is that everyone in every community is responsible for fire protection. Firewise Communities workshops help define those responsibilities to make a lasting impression on the people involved in community planning and to ignite action to change the way people live and work in every neighborhood within our fire ecosystem.

For additional information about the Firewise Communities workshops, contact Jim Smalley, 617-984-7483 (voice), 617-984-7056 (fax), jsmalley@firewise.org (e-mail); or Dan W. Bailey, 406-329-3933 (voice), 406-329-3806 (fax), dbailey@firewise.org (e-mail). ■

Correction: Roscommon Equipment Center's Origins

The Summer 2001 issue of *Fire Management Today* erroneously reported that the Forest Fire Equipment Center was established in Roscommon, MI, in 1976 (see Richard J. Mangan, "Equipment Standardization Reduces Costs on Wildland Fires," *Fire Management Today* 61(3): 11).

In 1929, the Michigan Department of Natural Resources and the USDA Forest Service jointly established the Forest Fire Experiment Station (FFES) in Roscommon, MI. In addition to researching fire behavior, FFES developed firefighting equipment, which by 1940 was the station's primary activity. In 1972, with the cooperation of the Northeast Forest Fire Supervisors, the Roscommon Equipment Center (REC) was formed using FFES staff. Since 1999, REC has been sponsored by the National Association of State Foresters.

Thanks for the correction go to Brian Hutchins, a unit leader engineer for FFES, Roscommon, MI. ■

Fire Education Corps Assists Homeowners

Danny Ebert and Jody Handly

In 2001, homeowners in the wildland–urban interface of Idaho and Nevada obtained a new resource: college volunteers willing to help them learn how to reduce the risk from wildland fires to homes and neighborhoods. Fifty-two college interns from the Student Conservation Association (SCA) Fire Education Corps, working through the nationally recognized Firewise program (see the article by Cynthia Bailey beginning on page 4), spent the summer educating homeowners on ways to make their properties more firesafe.

Origins

The 2000 fire season was the most severe since the 1950s. Some 8.4 million acres (34 million ha) burned nationwide, destroying more than 800 structures. Many of the largest blazes occurred in the Northern Rockies. Homes and communities in the region, especially in the wildland–urban interface, clearly faced a growing threat from wildland fire.

In the fall of 2000, representatives from Idaho's Boise National Forest met with counterparts from the Home Depot, Inc., district for Idaho and Montana to sign a memorandum of understanding. The partners agreed to work together to educate rural communities on actions property owners can take to fireproof their homes and properties. The mechanism that both parties agreed to use was an education and prevention program patterned after the Firewise program.

The partners worked with the SCA, the National Fire Protection Association, the Keep Idaho Green Fire Prevention Committee, the U.S. Department of the Interior's Bureau of Land Management (BLM), the Idaho State Department of Lands, and local Resource Conservation and Development Councils to develop a project called the SCA Fire Education Corps. The project received $325,000 in funding through the National Fire Plan, a 1:1 monetary match with the Idaho Department of Lands, and another $140,000 through BLM's Nevada office.

Student Interns

"This project was the direct result of National Fire Plan funding in the fire prevention and education area. The project is emphasizing community assistance in the wildland–urban interface areas," said Guy Pence, Boise National Forest fire staff officer. The SCA interns worked in seven communities, five in Idaho (Boise, Coeur d'Alene, McCall, Pocatello, and Salmon) and two in Nevada (Carson City and Elko). Contributions included:

- Helping rural fire prevention and education districts with homeowner inspections,
- Staffing workshops and model home demonstration sites at local Home Depot stores, and
- Working with communities or neighborhoods to develop fuel reduction projects.

In each community, seven-person teams were trained in wildland–urban interface property inspection and in methods for working with neighborhoods. They concentrated their efforts in areas where fires might start and spread to homes surrounded by dense, dry fuels. The SCA Fire Education Corps is a neighbor-to-neighbor program for working together productively to stop new fires and reduce homeowner risks from wildfires.

Enthusiastic Response

Congressional representatives briefed on the SCA Fire Education Corps responded enthusiastically. Christine Heggem, an aide to Senator Conrad Burns (R–MT), asked whether an SCA team could be based in Missoula, MT, to serve homeowners in western Montana.

"This is an ambitious program," said Pence. "Local communities and homeowners are measurably gaining from the education tips provided, for example by implementing simple landscaping activities."

For more on the SCA Fire Education Corps, visit the SCA website at <www.sca-inc.org/fire/home.htm>. ■

Danny Ebert is the Intermountain Region partnership coordinator for the USDA Forest Service, Boise National Forest, Boise, ID; and Jody Handly is the project leader for the SCA Fire Education Corps in Idaho and Nevada, Boise, ID.

Study Supports Cooperative Fire Protection in the West

Brian F. Weatherford

In the last quarter of the last century, the wildland fire protection agencies in the 17 Western States, by necessity, became close cooperators not only in wildland fire suppression, but also in prevention and especially public education. The necessity driving these agencies down the road to greater cooperation was an increasing number of large, damaging wildland fires that destroyed more and more structures; burned in or near wildland areas with growing populations; and motivated agency administrators to take a hard look at how they did business.

State agencies are cooperating more due to the increasing number of large, damaging wildland fires.

Wildland–Urban Interface Fires

It used to be just a California problem, the annual march of brushfires into subdivisions sprawling into the wildlands. The Bel Air Fire of 1961 destroyed more than 400 homes in Los Angeles County and might well have been the first true "modern-era" wildland–urban interface fire; however, it took a couple of more decades of fire disasters for the term to catch on.

By the end of the 1980s, wildland fires were commonly threatening and frequently destroying large numbers of homes in other Western States. In 1988, the Westberry Trails Fire in South Dakota burned 57 structures; in 1989, the Lowman Fire in Idaho burned 25 structures and the Black Tiger Fire in Colorado burned 44 structures. Also, the 1988 fires in the greater Yellowstone area repeatedly burned out of the backcountry to threaten whole communities. Increasingly, large wildland fires were threatening people's homes and other improvements, requiring the mobilization of large numbers of fire engines for structure protection. The growing need for structure protection drove wildland fire suppression costs to new highs, frequently busting city, county, and State budgets and requiring increasingly high Federal disaster reimbursements.

During the 1990s, "wildland–urban interface" (W–UI) became widely accepted as the standard term for identifying areas where urban types of development in wildland fuels were increasing the number of wildland fires with large structure loss. In 1991, a series of more than 30 wildland fires in the vicinity of Spokane, WA, developed into a firestorm that destroyed 191 structures, creating the largest demand for mutual-aid fire protection resources in the history of the State. Also, in the fall of 1991, the Oakland Hills Fire in Oakland and Berkeley, CA, became the worst W–UI fire ever, burning a mere 1,600 acres of manmade forest but destroying 2,900 structures and taking 25 lives. Such a huge wildfire in a densely developed urban area was not new; it had happened in the same hills in 1945 and in 1970. Now, however, towering eucalyptus and pine trees overshadowed the tightly packed, shake-roofed bungalows and mansions scattered along steep, narrow streets. The "natural" environment so valued by homeowners had grown thick and decadent; firesafe guidelines were mostly ignored and rarely enforced; and the hot, dry winds of fall turned a picture book setting into a scene of smoking devastation in just a few hours.

By 1996, the W–UI fire problem was endemic even to Alaska, where the Miller's Reach Fire destroyed 454 structures located in dense black spruce forest. The 1990s also saw major structure loss wildfires in Arizona, Colorado, Montana, Nebraska, New Mexico, Oregon, Utah, and even Guam. The 20th century ended with a bang when, in October 1999, the wind-driven Jones Fire burned 264 structures on the outskirts of Redding, CA.

Growing Cooperation

As these types of fires became more common, greater effort was made to understand the W–UI fire problem, especially in the West, where hot, dry summers, frequent high winds, and dense forest and brushlands make wildfire an annual event. With

Brian Weatherford is a unit chief (retired) for the California Department of Forestry and Fire Protection and a fire protection consultant in Redding, CA.

larger fires burning in heavier fuels and threatening greater numbers of improvements, fire agencies found it necessary to increase their cooperative efforts. During the 1980s and 1990s, the fire agencies in the West developed broad cooperative agreements and joint operating plans to ensure that the closest resources (regardless of what color the engine might be) made the initial attack on new fires (at least in critical areas). Federal, State, and local government agencies greatly expanded their mutual-aid agreements and operating systems to ensure rapid deployment of fire resources in the numbers needed to protect hundreds of homes from wildland fire. State fire managers were meeting with and sharing information and physical resources with their Federal and local counterparts.

Neighborhood devastated by the 1991 Oakland Hills Fire, about 6 months after the event. Buckling of a steel platform (above), once part of a hillside home, indicates the intensity of the firestorm, which destroyed some 2,900 structures and took 25 lives in residential parts of Oakland and Berkeley, CA. Logs and snags frame the chimney of a surviving home (below), remnants of the thick intermix vegetation that fueled the flames. Photos: Hutch Brown, USDA Forest Service, Washington, DC, 1992.

The Western State fire managers, at their annual workshops, began to devote more time and effort to jointly studying the spreading W–UI fire problem. The terminology was refined to recognize four different types of W–UI scenarios (see sidebar on page 11). Greater effort was made to identify areas where the threat was the greatest, learn what measures would be most effective in mitigating the problem, and devise ways to increase public awareness and the efficacy of fire prevention efforts in targeted high-fire-hazard areas.

Since 1998, the Western State fire managers have produced an annual report, *Fire in the West*, which compiles fire statistics for the 17 Western States and shares information about the organization and activities of the various State wildland fire agencies. *Fire in the West* has evolved from an activity report by the State fire managers to the Council of Western State Foresters into a comprehensive annual report for sharing information with a broad variety of stakeholders, from Governors and legislators to local fire agencies and community-based Fire Safe Councils.

As the disastrous 1999 fire season came to a close, the Western State fire managers decided to begin a comprehensive evaluation of the W–UI fire problem. Using a grant from State fire assistance funds, they commissioned a study to identify the extent of the problem and recommend appropriate strategies and tactics that could be adopted by the individual Western

States to begin coping with the problem. The study was to be published as a special edition of *Fire in the West*.

State-Funded Study

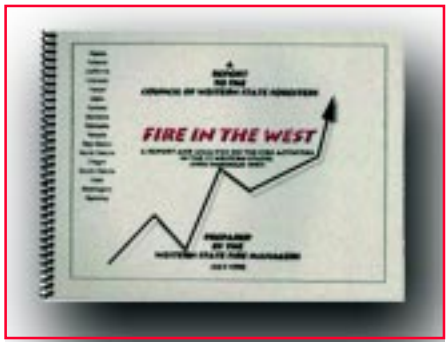
Wildland fire expert, author, and publisher William C. Teie (retired Deputy Director, California Department of Forestry and Fire Protection [CDF]) and fire protection consultant Brian F. Weatherford (retired Unit Chief, CDF) conducted the study during the spring and summer of 2000. Together, they brought more than 70 years of wildland fire experience in the West to bear on the issue.

The study began with a comprehensive survey questionnaire that went to the State fire managers of the 17 Western States and the Pacific Island Territories asking them to describe the extent of the W–UI fire problem in their jurisdictions and the level of effort directed toward solving the problem. Fire managers provided information about their authority, budgets, and priorities for everything from fire codes and regulations, to prevention programs, to fuelbreaks, to prescribed fire, to assistance to local fire agencies. Data, comments, and recommendations from the fire managers became the meat of the report.

Additionally, the consultants made field trips to various parts of the West to learn about significant fires (such as the 1989 Black Tiger Fire; the 1991 Spokane Firestorm; and the 2000 Cerro Grande Fire in Los Alamos, NM). They also met with officials from agencies involved in W–UI fire prevention and mitigation projects, such as FireWise (in Alaska and Colorado), FireFree Bend (in Oregon), and FireSafe Spokane (in Washington). They sat down with key players in a comprehensive, high-tech wildland fire hazard classification study in Boulder County, CO. They visited the Forest Products Lab of the University of California, where a major project with CDF is developing comprehensive mitigation guides for the W–UI fire problem (*Fire Hazard Zoning Field Guide*, *Property Inspection Guide*, and *Structural Fire Prevention Field Guide*). They drew on the experience and expertise of numerous State and local fire officials who are actively doing something about the problem in their jurisdictions.

Study Findings

Fire in the West: The Wildland/ Urban Interface Fire Problem, published in October 2000, contains the first comprehensive evaluation of the W–UI fire problem in the West. The report includes a synopsis of State and local W–UI fire prevention and mitigation projects and a strategy and recommended



Cover from Fire in the West, *an annual report by fire managers in 17 Western States. The report compiles fire statistics and shares information about the organization and activities of the various State wildland fire agencies.*

Publications from agencies in the West involved in wildland–urban interface fire prevention and mitigation, including Fire Safe (in California) and FireWise (in Alaska and Colorado).

actions for dealing with the problem.

The report found that, despite a potential for large losses of structures to wildland fires in each of the Western States, most State forestry departments are not adequately empowered (legally or fiscally) to effectively address the problem. Many States have not begun the process of mapping and assessing W–UI areas, and some that have are not yet sharing the information with other fire agencies, planners, and developers. Although ignition-resistant construction and defensible space have been identified as the two most important factors in the survival of structures during wildland fires, most Western States still do not have comprehensive codes, regulations, and building standards for firesafe development. Several successful community-based programs are reaching the target audience (homeowners, legislators, planners, and developers) with messages on the potential for disaster in the W–UI. However, a major cooperative effort will be required to change public perceptions and attitudes and to generate a concern for fire safety that will overcome existing public apathy and political inertia.

Cover from Fire in the West: The Wildland/Urban Interface Fire Problem. *Published in October 2000, the State-funded report contains the first comprehensive evaluation of the wildland–urban interface fire problem in the West.*

Types of Wildland–Urban Interface*

The wildland–urban interface (W–UI) is where humans and their developments meet or are intermixed with wildland fuels. There are four different W–UI conditions:

1. **Interface condition:** Structures abut wildland fuels. There is a clear line of demarcation between structures and wildland fuels along roads or back fences. Wildland fuels do not continue into the developed area.
2. **Intermix condition:** Structures are scattered throughout the wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area.
3. **Occluded condition:** Structures abut an island of wildland fuels, normally within a city, such as a park or other open space. There is a clear line of demarcation between structures and wildland fuels along roads or fences.
4. **Rural condition:** Scattered small clusters of structures (such as ranches, farms, and resorts) are exposed to wildland fuels. There might be miles between clusters of development.

*These definitions are used by State agencies in the West. They have not been adopted nationally.

Study Recommendations

Major recommendations in the report include:

- Implementing the FireWise public education model throughout the West;
- Developing a cooperative plan to apply for and effectively use Federal, State, and local funds that may be available for public education;
- Fuels treatment;
- Improved initial-attack capability;
- Improved mobilization of local fire forces; and
- More efficient use of mutual-aid forces during extended attack and major fire situations.

The report recommends that the States first map and assess the extent of the W–UI problem and share this information with the fire community, developers, and legislators. It calls for a comprehensive mapping effort, with common, interactive data bases to define and delineate the W–UI areas and provide maps that can be used in the field by planners, developers, and fire officials.

The report also recommends that fire managers collaborate with key players in various "forest health" initiatives and projects to help ensure that fuel reduction and hazard mitigation projects are included in forest improvement plans. The report calls for the adoption of the new Urban–Wildland Interface Code as the basis for a comprehensive fire law enforcement. It also urges all States to become parties to the Interstate Civil Defense and Disaster Compact authorizing interstate use of fire protection resources.

Another recommendation is that each State develop its own major incident management teams, using Federal, State, and local fire and disaster management experts. Finally, the report calls upon the States to assume a leadership role

in improving the safety and effectiveness of local government forces on wildland fires, especially in the W–UI.

Comprehensive Analysis

Fire in the West: The Wildland/Urban Interface Fire Problem provides the first comprehensive analysis, strategy, and description of mitigation measures that State forestry agencies can use to reposition themselves to acquire needed authority and funding, improve cooperation with Federal and local agencies, and begin to effectively address the widespread and increasingly dangerous W–UI fire problem in the West. The report demonstrates that cooperative efforts between Federal, State, and local fire agencies can effectively mitigate problems. It holds out hope for increasing Federal and State participation in what for a long time has been considered a "local problem." For a copy of *Fire in the West: The Wildland/Urban Interface Fire Problem*, contact Deer Valley Press, 5125 Deer Valley Road, Rescue, CA 95672; call 1-800-445-1950 toll-free; or visit the Deer Valley Press Website at <http://www.deervalleypress.com>.* ■

* The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement of any product or service by the U.S. Department of Agriculture. Individual authors are responsible for the technical accuracy of the material presented in *Fire Management Today*.

Websites on Fire*

Thirtymile Fire Investigation

On July 10, 2001, four firefighters perished in a burnover on the Thirtymile Fire, Okanogan National Forest, WA. This site features reports and information related to the accident investigation and prevention plan.

Found at **<http://www.fs.fed.us/fire/fire_new/safety/investigations/30mile/index.html>**

Joint Fire Science Program

A partnership among six Federal land management agencies might seem an unwieldy beast, but the Joint Fire Science Program (JFSP), established in 1998, proves that such an arrangement can effectively fill the gaps in knowledge about wildland fires and fuels. The USDA Forest Service and USDI Bureau of Indian Affairs, Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and U.S. Geological Survey are collaborating to provide wildland fire and fuels information and tools to specialists and managers who make wildland fuels management decisions.

The information and tools generated from JFSP-funded research help agencies to develop scientifically based land use and activity plans. The JFSP solicits proposals for science projects designed to answer questions or resolve problems related to wildland fuels issues. Research projects in 2001 focused on demonstrating and evaluating various fuels treatment practices, and their environmental effects and cost effectiveness.

A 10-person governing board, which meets several times a year, manages JFSP. Additionally, a stakeholder advisory group advises and assists the governing board on setting priorities and strategies for completing wildland fire and fuels research.

The JFSP Website includes commonly asked questions and answers, current and past research projects, instructions for submitting proposals, and contact information for members of the governing board and the advisory group. An online brochure provides a colorful, concise source of information about JFSP. The Website includes two pages of links to JFSP projects and deliverables, partnering-agency research facilities, relevant conferences, and other related sites.

Found at **<http://www.nifc.gov/joint_fire_sci/jointfiresci.html>**

* Occasionally, *Fire Management Today* briefly describes Websites brought to our attention by the wildland fire community. Readers should not construe the description of these sites as in any way exhaustive or as an official endorsement by the USDA Forest Service. To have a Website described, contact the managing editor, Hutch Brown, at USDA Forest Service, 2CEN Yates, Mail Stop 1111, 1400 Independence Avenue, SW, Washington, DC 20250-1111, 202-205-1028 (tel.), 202-205-0885 (fax), hutchbrown@fs.fed.us (e-mail).

Cooperative Fire Protection in Colorado*

Jim Hubbard

By the close of the 2000 fire season, 3,569 wildland fires had burned more than 167,000 acres (65,000 ha) in Colorado and destroyed more than 74 homes and other structures. A century of fire suppression, combined with changing land management practices, has left many of Colorado's forests unnaturally dense and highly susceptible to fire damage. Meanwhile, the State's record-setting population growth has driven many urbanites to the forested foothills in search of privacy in beautiful landscapes—the same landscapes that are at the highest risk from wildland fire.

The primary objective of the Colorado State Forest Service (CSFS) is to protect lives and property from fires in the wildland–urban interface (W–UI). The agency realizes that the W–UI fire problem will only worsen if left alone. We also realize that we can't solve the problem alone. With this in mind, the agency is intensifying efforts to form new and innovative partnerships that result in positive action on the ground.

Reducing Hazardous Fuels

Three things are needed to enable a fire to spread: heat, oxygen, and fuels. We have the ability to affect only one of these—the amount of fuels. Our main tools to reduce vegetative fuels are the thinning and removal of dense trees and the controlled use of low-intensity fire.

Jim Hubbard is the State Forester of Colorado, Fort Collins, CO.

* The article was excerpted from *Colorado Forestry: 2000 Annual Report* 9(1): 2–3.

The Colorado State Forest Service's primary objective is to protect lives and property from fire in the State's growing wildland–urban interface.

CSFS regularly provides both technical and financial assistance to private landowners who want to reduce the fuels around their homes and property. We also work with county, State, and other non-Federal land managers to reduce risks from catastrophic fire—fire that can threaten the valuable natural resources that we are working to sustain.

The most effective way to improve the survivability of a subdivision or a watershed is to reduce hazardous materials on a landscape scale involving multiple ownerships. That way, no matter where fire starts or which direction it burns, it will not have enough fuel to reach into the forest crowns, to become hot enough to damage forest soil, or to become so intense that firefighters cannot safely protect homes and structures.

CSFS is working with our partners to identify areas in the State where many priorities collide—places where there is community support for actively reducing fuels, where many landowners in a watershed are willing to implement fuels reduction on their land, and where there is an opportunity to improve water quality or wildlife habitat in addition to reducing the risks from catastrophic fire.

The Upper South Platte Project, for example, involves State agencies, the Denver Water Board, private landowners, and the USDA Forest Service in working collectively to improve the ability of their lands to resist catastrophic fire—and to thereby protect part of Denver's valuable municipal watershed.

CSFS also participates in the Four Corners Sustainable Forests Partnership. This is a four-State effort to creatively address the challenge of what to do with the variety of vegetative materials removed during fuel reduction projects and how to involve local communities in finding and implementing solutions.

Improving Local Firefighting Capacity

In addition to working on the land, CSFS addresses the W–UI challenge by helping local and volunteer fire departments improve their training and equipment. Local departments are crucial to successful fire response in Colorado because they provide initial attack on 90 percent

of our wildland fires and actually contain most fire starts within 10 acres (4 ha).

Fighting fire in the W–UI poses a unique challenge to response personnel because it demands both structural and wildland firefighting skills. With assistance from our Federal partners, CSFS works to help local fire departments meet the challenge by offering financial assistance to purchase personal protective equipment and by providing training through two annual fire academies as well as on-the-ground opportunities. At our fire equipment shop, CSFS employees also turn excess military vehicles into effective fire engines for loan to local resources.

Opportunity Through Education

Firefighters aren't the only ones who need "continuing education" on wildland fire. CSFS employees spend time providing information and training to homeowners in the W–UI, urban residents, schoolchildren, and others whose improved knowledge of wildland fire will improve our collective ability to make informed decisions.

Homeowners in the W–UI, for example, must understand that it is their responsibility to make their homes and properties more resistant to fire. Carving out defensible space around structures, using fire-resistant construction materials, enclosing decks, and locating firewood and propane tanks uphill and away from structures—these are things that private citizens can do to improve their personal safety. Colorado's Firewise program was developed with this in mind and is being presented to forest owners around the State.

> The most effective way to protect a subdivision or a watershed from wildland fire is to reduce hazardous materials on a landscape scale involving multiple ownerships.

In addition, CSFS staff participated in several Cooperative Wildland Fire Prevention/Education Teams that were dispatched in the wake of the 2000 fire season to help local residents understand the causes and effects of wildland fire and how they could act to prevent adverse impacts in the future.

Safety in Numbers

Whether we are trying to improve the survivability of a subdivision in the W–UI or to make a watershed more resistant to catastrophic fire, we must act in cooperation with those around us if we are to succeed. The old adage "United we stand, divided we fall" perhaps has never been more applicable than to our current situation.

Without a united effort, we will face continued seasons of large wildland fires, threatening more and more homes and, most importantly, placing public and firefighter lives at risk. We must work together to protect ourselves, our communities, and the tremendous natural resources that make Colorado such a wonderful place to live. ■

Smoke billowing from the Bobcat Fire behind a home in the wildland-urban interface near Fort Collins, CO, on June 15, 2000. Photo: J. Keith Schnare, USDA Forest Service, Intermountain Region, Ogden, UT, 2000.

Changes in Fire Hazard as a Result of the Cerro Grande Fire*

Dawn Greenlee and Jason Greenlee

On May 4, 2000, a prescribed burn was ignited on the Upper Frijoles Burn Units 1 and 5 on New Mexico's Bandelier National Monument. The units were located at between 9,000 and 10,000 feet (2,700–3,000 m) elevation in the Jemez Mountains, 6 miles (10 km) west of Los Alamos, NM. The burn was part of the Valle Project, an interagency fuel reduction program designed to reduce the risk of catastrophic fire in the Los Alamos region. The burn's objectives were to reduce tree densities and fuel loads in overgrown meadows and stands of aspen, ponderosa pine, and mixed conifer (NPS 2000). Two large wildfires had threatened Los Alamos in preceding years (the 1977 La Mesa Fire and the 1996 Dome Fire), causing researchers at the Los Alamos National Laboratory to publish a prediction that proved to be an uncanny harbinger of the events that followed (LANL 2000).

On May 5 and 6, the burn escaped and suppression actions failed.**

Like similar fires elsewhere, the Cerro Grande Fire burned hotter than historical fires because of fuel buildups from years of fire suppression.

The fire moved eastward through mixed-conifer vegetation into the lower elevation ponderosa pine vegetation on the Pajarito Plateau, where Los Alamos is located. It then skirted the northern and southern edges of town (fig. 1), burning about half of the town's perimeter. Before the fire was suppressed, it burned 42,858 acres (17,344 ha) and 235 residences. Like other recent wildland fires in the United States, this fire burned hotter than historical fires because of the buildup of fuels that had resulted from years of fire suppression.

Fire Hazard Study

Following the fire, the Federal Emergency Management Agency (FEMA) was asked to facilitate a management program that would ensure that the fire hazard did not become greater than it had been prior to the fire. FEMA commissioned a study by the authors to

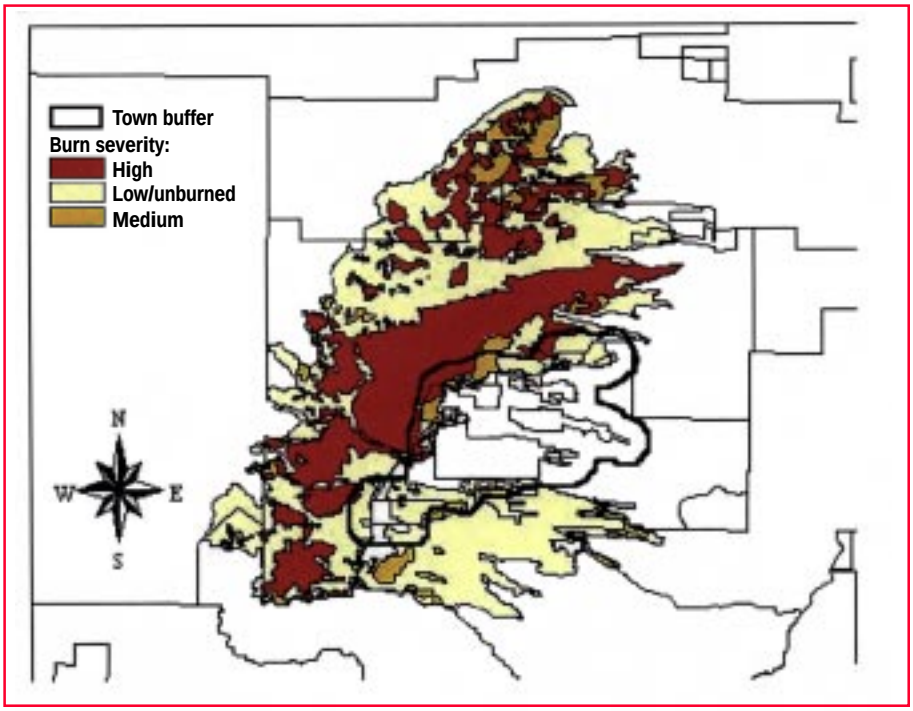


Figure 1—*Area burned by the 2000 Cerro Grande Fire in relation to a half-mile (0.8-km) buffer zone around developed private property in the town of Los Alamos, NM. If fuels within the buffer zone resist burning, the town will be exposed at most to long-range spotting from a future wildland fire. Illustration: Based on data from the Interagency Burned Area Emergency Rehabilitation Team (2000).*

Dawn Greenlee is a prescribed fire specialist for the USDI U.S. Fish and Wildlife Service in Hobe Sound, FL; and Jason Greenlee is a smokejumper for the USDA Forest Service in Missoula, MT. For the study reflected in this article, Dawn worked as a contractor for the Federal Emergency Management Agency (FEMA) under the Fire Research Institute; and Jason was affiliated with FEMA.

* This article is an abbreviated version of a detailed technical report, "Predicted Changes in Fire Danger in the Los Alamos Wildland–Urban Interface as a Result of the Cerro Grande Wildfire," prepared for the Federal Emergency Management Agency. For the full report, including many tables and figures, contact Dawn Greenlee by e-mail at dawn_greenlee@fws.gov.

** See Jim Paxon, "'Remember Los Alamos': The Cerro Grande Fire," *Fire Management Today* 60(4)[2000]: 9–14.

predict changes in fire hazard in the Cerro Grande Fire area by modeling fire behavior in postfire fuels over the next 23 years. The model could serve as a tool for fire managers elsewhere in determining the importance of timber salvage and other fuel reduction treatments following high-severity wildland fires.

Whereas low- and moderate-severity prescribed burns are conducted to reduce understory ladder fuels, high-severity wildland fires can have the opposite effect. Postfire fuel conditions can become more hazardous than before the fire, because fire-killed snags fall to create thick slash fuels. Trees are often removed after high-severity fires to prevent slash fuels from developing. In about 20 percent of the area of the 1994 Tyee Fire in Washington, fire-killed timber was salvage-logged or fuels were piled and burned, particularly in wildland–urban interface (W–UI) areas, both to recover timber value and to reduce future slash accumulation (Ellis 2000; Forest Service 1994). Following the 1998 Florida fires, trees in the community of Palm Coast were salvaged both for the safety of local residents and to reduce fire hazard and facilitate suppression efforts (Kuypers 2000). Similar treatments have been applied to high-severity fires elsewhere (Keeves and Douglas 1983). The authors examined changes in fire hazard resulting from the Cerro Grande Fire and addressed the need for salvage treatments or other fuel treatments, both in the areas burned and in unburned areas near the Los Alamos townsite.

Vegetation Types

The area of the Cerro Grande Fire is characterized by three primary vegetation types: ponderosa pine, mixed conifer, and pinyon/juniper.

Fuel conditions following a high-severity fire can become more dangerous than before the fire, because fire-killed snags fall to create thick slash fuels.

Ponderosa Pine. Ponderosa pine (*Pinus ponderosa*) forests are the dominant vegetation in and around Los Alamos. This forest type extends from 6,500 feet to 8,800 feet (2,000–2,700 m) elevation and dominates south-facing aspects in the Jemez Mountains below 8,000 feet (2,400 m) (Balice and others 1997). Prior to 1900, open stands with grassy understories and only 50 to 100 trees per acre (125–250 trees/ha) were maintained by frequent low-intensity surface fires, which thinned stands and limited the buildup of dead fuels on the ground. Historical mean fire return intervals were between 5 and 15 years (Allen 1989), but most of the area burned by the Cerro Grande Fire had not burned since 1883 (Allen 1989; Foxx and Potter 1981).

Exclusion of fire produced tree densities of between 286 (Balice and others 1997) and 1,300 (Forest Service 2000) trees per acre (706–3,200 trees/ha) and an accumulation of between 8 and 40 tons of fuel per acre (18–89 t/ha) on the forest floor (Balice and others 1997; Miller 1999). Stand basal areas were 60 to 80 square feet per acre (14–18 m^2/ha) (Forest Service 2000). Crown bulk densities were estimated at between 0.02 to 0.03 pounds per cubic foot (0.3–0.5 kg/m^3) (Armstrong 2000), much more dense than the 0.006 pounds per cubic foot (0.1 kg/m^3) needed to sustain crown fire activity (Agee 1996). Armstrong (1998) calculated that these pine stands would not, on any day in the fire season, develop 4-foot (1.2-m) flame lengths, even on the steepest (40-percent) slopes.

Mixed Conifer. Mixed-conifer stands are dominated by ponderosa pine and Douglas-fir (*Pseudotsuga menziesii*). This vegetation type is found on north aspects at 7,000 feet (2,100 m) and on all aspects up to 10,000 feet elevation (3,000 m) (Balice and others 1997). Prior to the Cerro Grande Fire, stands held an estimated 686 (Balice and others 1997) to 1,000 (Forest Service 2000) trees per acre (1,694–2,500 trees/ha), with basal areas of 160 square feet per acre (37 m^2/ha) (Forest Service 2000). Prior to the Cerro Grande Fire, stands in the fire area had crown bulk densities greater than 0.006 pounds per cubic foot (0.1 kg/m^3) and continuous ladder fuels (Armstrong 1998), which would enable the initiation of a crown fire when exposed to a surface fire with flame lengths greater than 4 feet (1.2 m). Utilizing weather data from 1977–96, Armstrong (1998) predicted that, on slopes greater than 40 percent, crown fire initiation would occur on mixed-conifer sites on approximately 60 percent of the days during the fire season.

On the Cerro Grande Fire, a crown fire did start in mixed-conifer stands, as Armstrong predicted; and, due to high crown bulk densities in neighboring ponderosa pine stands, crown fires spread through the pine zone (BAER Team 2000). These crown fires burned with flame lengths greater than 100 feet

Overall, our models predict that much of the Los Alamos area will be at a lower risk of fire as a result of the Cerro Grande Fire, but that some areas will be exposed to higher fire hazard.

(30 m) and moved at rates of spread greater than 1 mile per hour (0.4 m/s), with spot fires igniting more than half a mile (0.8 km) from the fire front.

Pinyon/Juniper. The dominant vegetation to the east of Los Alamos is pinyon/juniper. This vegetation type extends from 5,800 feet to 7,100 feet (1,800–2,200 m) elevation and is dominated by juniper (*Juniperus* spp.) and pinyon (*Pinus edulis*), with bunchgrass and shrub understories (Balice and others 1997).

Bark Beetles

Bark beetle outbreaks frequently follow the weakening of host trees by drought, overcrowding, and damage from windstorms, fires, and heavy snows (Amman and others 1989; Cates and Alexander 1982; Christiansen and others 1987; Furniss 1965; Hadley and Veblen 1993). Bark beetles have been reported to infest up to 87 percent of moderately to heavily fire-damaged trees (Amman 1991; Furniss 1936; Furniss 1965; Geiszler and others 1984; Hanula and others 2000; Pasek 1996; Ross 1997; Rust 1933; Safay 1981; Schultz and Kliejunas 1981; Stevens and Hall 1960). In New Mexico, stands with basal areas of 100 to 120 square feet per acre (23–27 m^2/ha) are considered to be at high risk for bark beetle infestation; when the stand's basal area is reduced below 80 square feet per acre (18 m^2/ha), the stand is safe from an outbreak (Allen-Reid 2000; Conklin 2000).

Bark beetle populations building up in fire-damaged trees can move into adjacent unburned stands (Celaya and Cain 2000). However, insect outbreaks were not seen following the Dome and La Mesa Fires (Allen-Reid 2000; Conklin 2000; Rogers 2000). USDA Forest Service entomologists tracked beetles in the Cerro Grande Fire area. On June 22, 2000, the Forest Service found that 5 to 10 percent of the trees in the burn with crown damage from 60 to 100 percent were infected with bark beetles (Conklin 2000; Rogers 2000). A high concentration of beetles was also found in the Santa Clara area within the burn (Armstrong 2000).

Calculating Fire Hazard

Our study determined changes in fire hazard and the threat of property damage by fire in the Los Alamos region by predicting changes in fire behavior that would result from fire-triggered changes in fuel. We used three fire hazard parameters to judge fire hazard in the Los Alamos area: susceptibility to crown fire, susceptibility to a fire with flame lengths greater than 4 feet (1.2 m), and susceptibility to a fire with rates of spread greater than 1 mile per hour (0.4 m/s). Flame lengths greater than 4 feet (1.2 m) are too intense to be attacked directly by firefighters, and rates of spread greater than 1 mile per hour (0.4 m/s) are difficult to suppress (NWCG 1998). Containing such fires would require bulldozers or indirect suppression tactics, such as burnout operations (which would be very difficult in W–UI areas without firebreaks between homes and the fire) or retardant drops (which are not always readily available).

We determined vegetation types, land ownership, and fire severity from maps provided by the Interagency Burned Area Emergency Rehabilitation Team (2000) and Koch and others (1997). Prefire and predicted postfire vegetation types in the Cerro Grande burn area were broken into fire behavior fuel models and National Fire Danger Rating System (NFDRS) fuel models. Fuel model assignments were based on interpretation of information from many sources (Armstrong 1998; Balice 2000; Balice and others 1997; Foxx 1996, 2000; LANL 2000; Miller 1999; Moeur and Guthrie 1981; Potter and Foxx 1981; Trader 2000; Tucker 2000), including prescribed fire prescriptions (Forest Service undated; NPS 2000) and onsite field comparisons of fuels to photo series (Anderson 1982; NWCG 1997).

We delineated a buffer area around the town of Los Alamos to focus particular attention on the fuels most critical for the safety of the town. If these fuels are resistant to fire spread, the town will be exposed at most to long-range spotting from a future wildland fire. The buffer was defined as the area within one-half mile (0.8 km) of sites classified as both developed (Koch and others 1997) and privately owned (BAER Team 2000).

We determined the average number of days when fuels would support 4-foot (1.2-m) flame lengths and/or rates of spread greater than 1 mile per hour (0.4 m/s) for each vegetation type by considering the percentage of area covered by each of

Both the increase in fire hazard in the high-severity areas of the fire and the potential increase in bark beetles can be mitigated through fuel reduction treatments.

the various NFDRS fuel models with their predicted fire behavior characteristics. For each vegetation type, we calculated the probability of high-, moderate-, and low-severity burns for years 1 through 5, 6 through 12, and 13 through 23.

We used FireFamily Plus 2.0 (2000) with inputs of local weather conditions to determine the number of days when the fuel models within each vegetation type would exhibit extreme fire behavior. We took weather data for the years 1993–2000 from the Jemez Remote Automated Weather Station (station 290702), located near the burn at 8,500 feet (2,500 m) elevation. The number of days when flame lengths are projected to be greater than 4 feet (1.2 m) and rates of spread greater than 1 mile per hour (0.4 m/s) was calculated for the fire season (March 15 to July 15). Calculations were made based on a 26- to 40-percent slope, the average slope for the area.

We calculated the number of days during the fire season when each vegetation type would exhibit intense fire behavior by summing the number of intense-fire-behavior days for each of the NFDRS fuel models, weighted by the percentage of area within the vegetation type occupied by that fuel model. The weighted average number of days during the fire season for the buffer area within one-half mile (0.8 km) of Los Alamos residences was calculated by summing the number of high-fire-danger days for each vegetation type, weighted by the percentage of area within the buffer occupied by that vegetation type. We used the same method to determine fire hazard changes for the entire burned area. Postfire averages were compared to prefire averages to determine whether each fire parameter showed an increase or decrease from prefire levels. Results were mapped in ArcView.

Changes in Fire Hazard

In the first 5 years following the fire, our model predicts that fire hazard near Los Alamos will, on average, be lower than it was prior to the fire (fig. 2, top left). Although flashy grass vegetation regenerating on parts of the burned area will support more rapid rates of spread and/or greater susceptibility to flame lengths over 4 feet (1.2 m) in some areas near Los Alamos, the risk of crown fire will be significantly lower, so overall average fire hazard will be lower.

From year 6 to year 12, fire hazard will increase over much of the burned area as slash develops, particularly in high-burn-severity areas (fig. 2, top right). Because of its proximity to such areas, the northwest edge of Los Alamos will be especially subject to more days with the potential for extreme rates of spread and high flame lengths; therefore, it will be at greater risk of both dangerously intense and very fast-moving fires. Although the risk of crown fire will be significantly lower than before the fire, fuels near town could still, on average, support a fire with a 4-foot (1.2-m) flame length on the same number of days as could prefire fuels.

In the 13th through the 23rd postfire years, fire hazard in the Los Alamos area will subside on average to levels lower than before the Cerro Grande Fire as slash fuels compact and decay and as flashy grass fuels are shaded out by regenerating trees (fig. 2, bottom). In this period, the fuels will not support crown fires, fires with flame lengths greater than 4 feet (1.2 m), or fires with rates of spread greater than 1 mile per hour (0.4 m/s) on as many days as before the Cerro Grande Fire. Although there are areas within half a mile (0.8 km) of Los Alamos that could sustain dangerous fires, there will be enough declines in fire hazard in the area to result in a net average reduction in fire hazard from prefire levels.

Overall, our models predict that much of the Los Alamos area will be at a lower risk of fire as a result of the Cerro Grande Fire, but that some areas will be exposed to higher fire hazard. Most of the increases in susceptibility to high flame lengths and rates of spread are on the northwest corner of town, in the high-severity areas of the Cerro Grande Fire.

Implications

Whereas low- to moderate-severity wildland fires and prescribed burns generally diminish fire hazard by reducing understory and ladder fuels, a high-severity wildland fire can increase fire hazard. Where the Cerro Grande Fire burned intensely, there will be a greater threat to the W–UI than there was before the fire. Although many residences in Los

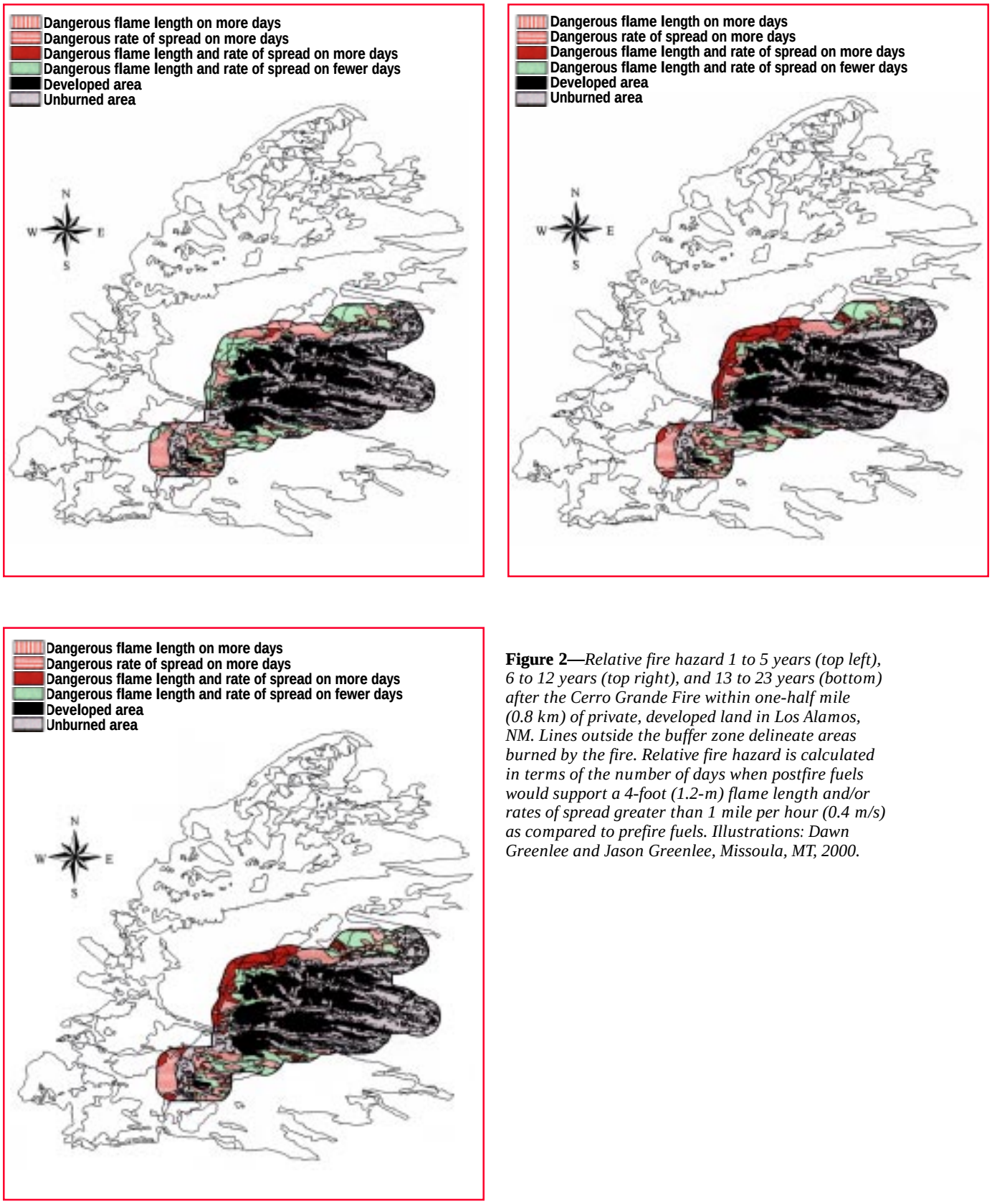


Figure 2—*Relative fire hazard 1 to 5 years (top left), 6 to 12 years (top right), and 13 to 23 years (bottom) after the Cerro Grande Fire within one-half mile (0.8 km) of private, developed land in Los Alamos, NM. Lines outside the buffer zone delineate areas burned by the fire. Relative fire hazard is calculated in terms of the number of days when postfire fuels would support a 4-foot (1.2-m) flame length and/or rates of spread greater than 1 mile per hour (0.4 m/s) as compared to prefire fuels. Illustrations: Dawn Greenlee and Jason Greenlee, Missoula, MT, 2000.*

Alamos will be less threatened by high-intensity wildland fire because of their proximity to low-severity areas of the Cerro Grande Fire, other areas, particularly the northwestern edge of town, will be at greater risk because the fire was high severity there. If a severe bark beetle infestation occurs in the unburned areas near town as a result of the wildfire, fire hazard would increase in those areas as well. Both the increase in fire hazard in the high-severity areas of the fire and the potential increase in bark beetles can be mitigated through fuel reduction treatments.

Predicted increases in fire hazard in the high-severity areas of the fire could be mitigated by salvage logging or by otherwise removing fire-killed trees or slash. Because the primary cause of high fire hazard in these areas is the slash fuel developing as fire-killed trees fall, removal of this heavy fuel load would prevent the predicted increase in fire hazard in these areas.

If bark beetle numbers increase as a result of the fire and enable the insect's spread into the unburned vegetation near the burn site, additional tree mortality would result in increased dead fuel loads and local increases in fire hazard. The increase in fire hazard would primarily be a result of additional dead fuel after insect-killed trees fell.

This potential increase in fire hazard could be mitigated in several ways. First, trees in the unburned areas in the vicinity of Los Alamos could be thinned so that the remaining trees would be less susceptible to bark beetle attack. Stands with basal areas below 80 square feet per acre (18 m^2/ha) are considered safe from beetle infestation. Many trees in the Los Alamos area are so dense that they are stressed from competition for limited soil resources.

Second, slash should be treated or thinning conducted at a time of year when the slash produced could dry prior to bark beetle flights, because certain bark beetle species (*Ips* spp.) can be attracted to slash produced during thinning operations. Likewise, when an outbreak develops, any nearby thinning should stop, because it will only contribute to the bark beetle problem. Thinning must be conducted prior to infestation. Alternatively, insect-killed trees could be removed after they are killed in order to prevent accumulations of dead fuel on the ground.

Prediction Tool

Our study shows that postfire fuels can be projected using technologies now available, and management decisions can be made based on these technologies. In this specific case, we suggested that the fire hazard could increase over some or all of the area burned (depending on postfire insect activity), and that fuel modification should be initiated to reduce the hazard, at least in the immediate area of the W–UI.

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Kenai Peninsula Borough: A Spruce Bark Beetle Mitigation Program

Michael Fastabend

Since 1991, spruce bark beetles in Alaska—particularly on the Kenai Peninsula—have spread at an unprecedented level. The infestation, the most intensive outbreak documented in North America, has devastated more than 1.4 million acres (560,000 ha) of the peninsula. The outbreak has created an extreme wildland fire hazard and increased the risk of catastrophic loss of life and property.

Task Force Formed

In 1998, concerns regarding the impact of the spruce beetle infestation on Alaska's forests, public safety, and ecosystems prompted the USDA Forest Service to establish a multiparty task force. As the lead agency for the Spruce Beetle Task Force, the Kenai Peninsula Borough was asked to prepare an action plan to manage beetle infestations in Alaska and to rehabilitate the infested areas.

Meeting in the spring of 1998, the task force considered public safety and fire protection its priorities. Additionally, members developed 50 policy recommendations, including a prioritized action plan for areas experiencing or at potential risk of beetle infestation. In June 1998, the task force presented its recommendations to Congress in the report, "An Action Plan for Rehabilitation in Response to Alaska's Spruce Bark Beetle Infestation."

Michael Fastabend is the spruce bark beetle coordinator, Kenai Peninsula Borough Spruce Bark Beetle Mitigation Program, Soldotna, AK.

The Kenai Peninsula Borough and cooperating agencies developed and implemented an integrated Spruce Bark Beetle Mitigation Program.

The report provided a broad strategy for addressing the impact of the spruce bark beetle and identified more than $13 million in projects designed to mitigate the safety hazards caused by the infestation and to lower the wildland fire risks. Congressional support helped the Kenai Peninsula Borough obtain a $416,000 grant in April 1999, a $2 million appropriation in February 2000, and a $7.5 million appropriation in February 2001 to implement task force recommendations. Initial priority projects, begun in 1999, included completion of a geographical information system (GIS) wildland fire hazard/risk assessment, identification of fire escape routes, creation of community zones of refuge, and production of a GIS land cover map.

Mitigation Projects

In 2000, the Kenai Peninsula Borough took steps to develop a FireWise Community Mitigation Program, provide community slash disposal, and remove dead trees along utility corridors and hazard trees in high-use public areas. The funds received in 2001 helped to accelerate implementation of all these valuable programs.

Projects for 2001 and 2002 include clearing hazard trees from road right-of-ways, removing fuels from borough parcels, expanding the FireWise Community Mitigation Program, and providing training and technical expertise to local fire suppression agencies and departments. In 2001, the Kenai Peninsula Borough implemented a 6-year reforestation/rehabilitation effort and a 3-year technical assistance program—both designed to transfer the mitigation program to beetle-affected communities statewide.

For more information on Alaska's spruce bark beetle mitigation program, visit <www.borough.kenai.ak.us/sprucebeetle/default.htm> or contact the Spruce Bark Beetle Mitigation Office, 36130 Kenai Spur Hwy., Soldotna, AK 99669, 907-260-6202 ext. 308 (voice) 907-260-6204 (fax). ■

Firesafe Spokane: Working With the Community

Ross Hesseltine

In 1991, a firestorm in Spokane County, WA, robbed 114 families of their homes and caused millions of dollars in damage. To help avoid a repeat performance, in February 1998, local concerned citizens and companies formed Firesafe Spokane—a nonprofit organization. The mission of the organization is to work with communities to create a safe environment and to reduce loss from wildland fires.

Education and Assistance

Education—the initial focus of Firesafe Spokane's efforts—brought members together with the Inland Empire Public Fire Educators. These two groups held community meetings to teach homeowners the benefits of defensible space and offered free property inspections to help create firesafe environments. In the spring of 2000, Firesafe Spokane proposed a cost-share program to help homeowners create fuelbreaks. In October, the cost-share program received a wildland–urban interface (W–UI) grant.

In November 2000, the Washington State Department of Natural Resources (DNR)—as part of its Firewise Washington program—asked Firesafe Spokane to design and manage a grant for fuel modification in northeast Washington. In March 2001, DNR received a generous W–UI grant to protect 1,200 local homes. By November 10, 2001, more than 1,600 homeowners in the W–UI had submitted requests for fire protection help. Firesafe Spokane has completed plans to provide survivable space around 1,900 homes, including a plan to protect a 150-home development. By November 9, 2001, fuel modifications in 428 plans were completed, protecting 1,580 homes. By December 30, more than 1,900 homes were scheduled for protection for less money than the

Firesafe Spokane's priority is to implement a fuel modification program and create defensible space around homes.

Ross Hesseltine is the executive director of Firesafe Spokane, Spokane, WA.

A Career Dedicated to Cooperative Fire Protection

In 1987, Washington suffered its first loss of homes from a wildland fire—the Hangman Hills fire claimed 24 homes. After this devastating event, Washington's Department of Natural Resources created a position dedicated to meeting the area's wildland–urban interface challenge. The position demanded a blend of fire prevention specialist, interagency cooperator, and fire educator; Ross Hesseltine—an 18-year veteran of fire control work as the district manager in Spokane, WA—was a perfect fit.

In northeast Washington during the devastating firestorm of 1991–92, wind-driven fires forced fire districts to triage alarms. All firefighters and equipment were committed to alarms. When a new fire was reported, it went unstaffed unless an imminent threat to human life existed. After the firestorm, Hesseltine designed and conducted a study to determine why more than 440 homes were saved in Spokane, even though 114 homes were destroyed.

Hesseltine evaluated the defensible space surrounding the homes involved in the firestorm. He determined that homes without defensible space suffered a 38-percent destruction rate. Homes with 1 to 10 feet (0.3–3 m) of defensible space suffered a 35-percent destruction rate. When the defensible space was increased to 30 feet (9 m) or more, the fire consumed only 3 percent of the homes. Unfortunately, during the 1991–92 firestorm, most of the homes had less than 30 feet (9 m) of defensible space.

Homeowners who prepare for a wildland fire incident continue to enjoy their homes even after experiencing a fire threat.

original grant to protect 1,200 homes. Additional homes were planned for protection in 2002.

Firesafe Spokane is helping local fire districts and the Spokane Parks Department obtain mitigation grants and is collaborating with Federal agencies on community planning opportunities.

Local Support

Local business and fire prevention communities support Firesafe Spokane. The program's diverse board of directors includes representatives from:

- Spokane Valley Fire Department;
- DNR;
- Avista Corporation; and
- Paine, Hamblen, Coffin, Brooke & Miller.

Firesafe Spokane remains dedicated to reducing loss from and cost of wildland fires, and we are available to help other groups and agencies in this important effort. For more information, contact Ross Hesseltine, Spokane, WA, 509-464-1086 (voice), Ross@firesafespokane.com (e-mail). ■

Home before (above) and after (below) thinning to provide survivable space. This was one of 150 homes in the Whispering Pines Subdivision, Deer Park, WA, which participates in Firesafe Spokane, a program to design and manage fuel modifications in northeast Washington. Photos: Tom Iraci, USDA Forest Service, Pacific Northwest Region, Portland, OR, 2001.

A Fire Hazard Mitigation Plan for Guam

David Limtiaco

The disastrous 1998 fire season, caused by El Niño, scorched more than 13,000 acres (5,300 ha) of the Territory of Guam's wildlands and urban and rural communities. Compounding the problem was Typhoon Paka, which struck in December 1997. Additionally, dry climatic trends had increased the island's fuel loading in the wildland areas, wildland–urban interface (W–UI), and conservation reserves, which cover more than 30,000 acres (12,000 ha).

The Problem

Guam has long faced a periodically severe wildland fire problem. El Niño and La Niña (following El Niño) years create severe back-to-back fire seasons (table 1), resulting in heavy damages and losses (table 2).

By 2000, many species were showing signs of severe drought stress. Other normally resilient species, such as coconut palms (*Cocos nucifera*), were frayed and brown, and isolated patches of ironwood (*Casuarina* spp.) were turning red and dying.

With more than 90 percent of the canopy destroyed by the drought conditions, more sunlight was penetrating and reaching the forest floor. Swordgrass (*Miscanthus floridulus*)—a shade-intolerant species—was flourishing. An excessive amount of swordgrass creates a fuels nightmare during fire season, usually causing fuel loading of 30 tons per acre (67 t/ha).

Typhoon Paka left tons of dead biomass littered across Guam's forest floors, adding to the fuel load caused by El Niño.

The Plan

The objective of Guam's fire hazard mitigation plan was to decrease the fire hazard and increase the fire protection capabilities of the entire island through prescribed fire, fuel load reduction, and fuels conversion. An effective way to reduce fuel hazard and convert fuels is to compartmentalize wildland areas that are adjacent to development and establish greenbelts along the boundaries and the periphery of the W–UI. To remove the swordgrass cover on strategic locations of the island's W–UI, we needed to mechanically control swordgrass, tree snags, and downed branches and use prescribed fire.

We identified strategic W–UI areas and adjacent wildland as targets for fuel hazard reduction through hazard mitigation and tree planting for fuels conversion. We surveyed, identified, and mapped a total of 20 acres (8 ha) for potential treatment. Then we replanted identified areas

Devastation caused by Typhoon Paka. In December 1997, a typhoon with gusts of up to 210 miles per hour (94 m/s) struck the island of Guam. The profusion of dead biomass left in the typhoon's wake exacerbated an already dangerous fire situation. Photo: Division of Forestry and Soil Resources, Guam Department of Agriculture, Mangilao, GU, 2001.

David Limtiaco is the chief of forestry, Division of Forestry and Soil Resources, Department of Agriculture, Government of Guam, Mangilao, GU.

Fire in the wildland–urban interface on Guam during a 1998 drought related to El Niño. Photo: Division of Forestry and Soil Resources, Guam Department of Agriculture, Mangilao, GU, 1998.

Table 1—*Territory of Guam, number of fires and acres burned, 1983–98.*

Year	*Number of fires*	*Acres burned*
1983[a]	960	10,247
1984	499	1,517
1985	313	1,153
1986	322	1,245
1987[a]	1,541	10,473
1988[a]	873	11,170
1989	289	2,456
1990	641	4,528
1991	473	1,551
1992[a]	993	12,505
1993[a]	1,187	3,205
1994	152	350
1995	622	5,726
1996	284	848
1997	500	800
1998[a]	1,900	13,000
1983–98	**11,549**	**66,874**

[a] El Niño and La Niña years.

We identified strategic wildland–urban interface areas and adjacent wildlands as targets for fuel hazard reduction.

with 35,000 Papuan wattle (*Acacia auriculiformis*) and 15,000 mangium (*Acacia mangium*). The planting sites were prepared using prescribed fire, tractor mowing, and bush cutting.

After successful propagation, we planted acacia in the periphery of the W–UI from July 2001 through October 2002. To minimize costs and increase public awareness and opportunities for public involvement, volunteers—schoolchildren, members of civic organizations, summer youth employees, forestry employees, and local communities—helped plant the trees. Realizing the importance of project maintenance, these groups were committed to postplanting monitoring, enrichment planting, and weeding efforts.

In 2000, we acquired five USDA Forest Service fire engines to augment the fire suppression capabilities of the Guam Fire Department. Recently, we designed vegetation projects to minimize fuel contributions, reinforced existing memorandums of agreement, conducted staff reviews, and made recommendations to ensure the steady progress and completion of project phases.

Benefit Analysis

Potential project results include:

- Safe wildland fire suppression at a minimum cost by reducing fuels and converting highly flammable

swordgrass to fire-resistant tree stands on the periphery of identified W–UI areas;
- Reduced number and size of wildland fires in the W–UI, lower resource loss, more public involvement, and a well-coordinated network for fire protection;
- Maximum positive effects from W–UI dollars; and
- Well-equipped and -trained firefighting forces.

Besides planting the acres treated through prescribed fire, we also seeded the areas that were control-burned with acacia to establish greenbelts and fuelbreaks (see sidebar on page 28). Greenbelts will help limit the size of future wildland fires, increasing the benefit from the project in terms of suppression costs required and providing long-term fire protection. ■

Swordgrass about 8 feet (2.4 m) high. On Guam, swordgrass can create a fuels nightmare during fire season, with fuel loadings of about 30 tons per acre (67 t/ha). Photo: Division of Forestry and Soil Resources, Guam Department of Agriculture, Mangilao, GU, 2001.

Table 2—*Territory of Guam, resource damages and losses from wildland fires.*[a]

Resource	*Damage (per acre burned)*	*Loss*
Watershed	$70	Reduced ground water levels through reduced capacity for water infiltration and retention in wildland areas.
Recreation	$83	Temporary loss of aesthetic values; possible long-term ramifications for the tourist industry.
Wildlife	$14	Loss of forest habitat; death and destruction of grassland animals and nesting areas; reduced hunting opportunities.
Soil	$1,034	Loss of 5 tons of soil per acre through postfire erosion; permanent loss of potential agricultural productivity; reduced streamwater quality through sedimentation; death of freshwater aquatic life through sedimentation and siltation; destruction of coral reef ecosystem through sedimentation and siltation.
Total	**$1,200**	—

[a] Based on *Resource Value Guide*, Division of Forestry and Soil Resources, Guam Department of Agriculture, Mangilao, GU, 1983.

Reforestation Success in Guam

In Guam, the rate of deforestation exceeds the rate of reforestation. Often, deforested government lands are converted to agricultural use or to housing development. Since early 1970, the Division of Forestry and Soil Resources in the Guam Department of Agriculture has tried to convert the deforested and fire-prone savanna into less flammable forest stands.

Reforestation methods in Guam rely on nitrogen-fixing exotic species, such as acacia (*Acacia* spp.), because they grow quickly in infertile soils. In 3 to 5 years, they form dense stands that are 20 to 30 feet (6–9 m) high, which slowly suppress the grasses beneath. Once the nitrogen-fixing species are established and the soil condition has improved, enrichment planting of broadleaf species is possible.

In the past 10 years, reforestation activities on Guam have accelerated. Reforestation of badly denuded and highly acidic areas in the southern portion of the island has been successful. In 1980, the Guam Forestry Division introduced Papuan wattle (*Acacia auriculiformis*) and mangium (*Acacia mangium*) in the Cotal Conservation Reserve off Cross Island Road. These species grew vigorously. Today, almost the entire reserve is planted with acacia species. Establishment of the forest stands shows that it is possible to successfully reforest the harsh and badly denuded areas in Guam and that highly flammable grasslands can be converted into fire-resistant tree stands.

Benefits included safer wildland fire suppression at a minimum cost by reducing fuels and establishing fire-resistant forest stands.

Acacia planting (background) for fuels conversion and soil erosion control. Photo: Division of Forestry and Soil Resources, Guam Department of Agriculture, Mangilao, GU, 2001.

Recycling Forest Service Fire Engines

Dennis Orbus

Have you ever wondered what happens to old green fire engines after shiny new ones replace them?

Fortunately for many folks, the USDA Forest Service recycles used fire engines and indefinitely lends them to forestry and public fire departments on Pacific Islands in Micronesia and Polynesia. Custom built to fight forest, brush, and grass fires in remote, backcountry areas of California, the engines have proven valuable in reaching isolated areas prevalent on Micronesian and Polynesian islands.

As part of a nationwide fire protection program in Hawaii, Guam, American Samoa, and the Commonwealth of Northern Mariana Islands, the Forest Service ships the operational engines at no cost to cooperating fire departments. A full complement of handtools, hoses, nozzles, fittings, and personal protective equipment usually accompanies the engines.

To help reduce life and property loss caused by wildland and rural fires, the Forest Service also offers fire training and other technical assistance, matching grants, and help in obtaining firefighting supplies. Last year, Pacific Island cooperating fire departments received $761,000 in matching grants for a variety of fire protection projects.

Used fire engines fight wildland fires in isolated areas on Micronesian and Polynesian islands.

For more information on this program, contact April Baily, USDA Forest Service, Washington Office, P.O. Box 96090, Washington, DC 20090-6090, 202-205-0891 (voice), abaily@fs.fed.us (e-mail). ■

Engine loaned to the Hawaii Division of Forestry and Wildlife on Kauai. This engine was one of six sent to Kauai after Hurricane Iniki struck the island in 1992, leaving an enormous fuel-loading problem. Photo: Dennis Orbus, USDA Forest Service, Pacific Southwest Region, Sacramento, CA, 1992.

American Samoans training on an engine. The Cleveland National Forest in California loaned the engine to the Department of Public Safety in Pago Pago harbor in American Samoa. Photo: Don Studebaker, USDA Forest Service, Pacific Southwest Region, Sacramento, CA, 1996.

Dennis Orbus is the assistant director of Fire and Aviation Management, Pacific Southwest Region, USDA Forest Service, Sacramento, CA.

Pennsylvania's Firewise Medal Communities Program

H. Alan Zentz, John Berst, and Paul Sebasovich

Owning a home in the rural countryside of the United States—far from the frenzy that often surrounds life in the big city—is a dream come true for many people. The natural setting of a country landscape, where homes are built primarily for their aesthetic value and economic considerations, affords an opportunity for an attractive lifestyle.

Unfortunately, too often rural homeowners ignore the need to protect their ideal dwellings from the threat of wildland fire—a natural part of the ecosystem. In the 20-State region served by the USDA Forest Service, State and Private Forestry, Northeastern Area, lack of proper fire planning when constructing new rural housing and inconsistent fire protection standards for existing housing are major problems.

Pilot Project

In late 1996, the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, in cooperation with the Pennsylvania State Emergency Management Agency, established a Wildland–Urban Interface Task Force to address the growing wildland–urban interface problem.

Alan Zentz is the wildland–urban interface/prescribed fire staff specialist, USDA Forest Service, Fire and Aviation Management, Northeastern Area, State and Private Forestry, Newtown Square, PA; and John Berst is the State fire supervisor and Paul Sebasovich is the fire prevention officer, Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, Harrisburg, PA.

Throughout the Northeast, about 25,000 wildland fires occur each year, threatening homes and communities that are unprepared.

In 1998, members of the task force applied for and received a grant of $35,000 through the Forest Service's Northeastern Area. They used these funds to formulate a marketing plan and develop products to implement a pilot Pennsylvania Firewise Medal Communities program in Monroe and Pike Counties in northeastern Pennsylvania.

To date, the communities of Emeral Lakes, Sierra View, The Shawnee Group, Saw Creek Estates, Winona Lake, and Thornhurst Country Club Estates have completed their emergency action plans and community fire hazard assessments.

Several communities have initiated hazard mitigation activities, which include proper signing of roads and residences, fuel reduction, rural water delivery, and improving existing road infrastructure.

Recognizing the success and benefits of the countywide pilot project, the task force sought to expand the project statewide. In the fall of 2000, the Pennsylvania Bureau of Forestry received a $500,000 hazard mitigation grant for this purpose. The grant was made possible through the National Fire Plan, and the funds were provided by the Forest Service's Northeastern Area.

Firewise Community Workshops

On September 24–26, 2001, the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, helped the National Fire Protection Association (NFPA) conduct a 3-day Firewise Communities workshop in Hidden Valley, PA. At the workshop, attendees learned how to improve fire hazard safety in the wildland–urban interface, create and nurture local partnerships, and integrate Firewise concepts into community and disaster mitigation planning.

Firewise Communities workshops are sponsored in part by NFPA and the USDA Forest Service, in cooperation with local stakeholders. For more information on the program, see the article by Cynthia Bailey beginning on page 4. For dates and locations of Firewise Communities workshops, visit the Firewise Communities Website at <www/firewise.org/communities/>.

By broadening the program, other communities will have an opportunity to become a Pennsylvania Firewise Medal Community and to mitigate identified wildland fire hazards by mechanically reducing hazardous fuels, creating better public understanding and awareness of existing wildland fire hazards, and conducting workshops in high-risk communities. The task force will develop a training/media packet to educate communities, form and maintain partnerships, aid in technology transfer, facilitate planning and assessment, and inform State and local media.

Firewise Medal Communities

All communities are invited to participate in the new Pennsylvania Firewise Medal Communities program. Firewise communities are those that avoid potential fire emergencies by addressing and correcting fire hazards, thereby preparing themselves for the threat of a wildland fire.

Communities must accomplish the following to qualify for Firewise Medal status:

- Review all pertinent information and materials in the Firewise Medal Communities packet;
- Prepare an emergency action plan (EAP), with the involvement of the local county emergency management association (EMA);
- Contact the Pennsylvania district forestry office to request a copy of the National Fire Protection Association's *Standard 299: Protection of Life and Property from Wildfire*, which provides local firefighter and landowner services, wildland fire protection information, and a wildland fire hazard assessment form (see sidebar);
- Complete a self-administered community fire hazard assessment; and
- Contact the local district forestry office to request that a Bureau of Forestry representative visit the community or property to review and assess the community fire hazard assessment rating.

Reducing fuels and maximizing access for firefighters and equipment increases the probability that rural homes will survive a wildland fire.

Medal Criteria

To reward communities that plan for and prevent a wildland fire emergency, the Pennsylvania Bureau of Forestry, in cooperation with the Pennsylvania Emergency Management Agency and the Office of the State Fire Commissioner, established criteria for Firewise Medal Communities. On request, a representative from the Bureau of Forestry visits a community to assess its qualifications for medal status. The Bureau then notifies the community of its awarded medal status and presents a handsome plaque for display in a public area.

Gold Medal. A Gold Medal Firewise Community has:

- A wildland fire hazard assessment (using the form contained in the NFPA's *Standard 299*) with a score of less than 50;
- An approved EAP, designed by the Pennsylvania Bureau of Forestry in cooperation with the Pennsyl-

Wildland Fire Hazard Assessment

The National Fire Protection Association has published a wildland fire hazard assessment form, with associated explanatory material, in *Standard 299: Protection of Life and Property from Wildfire*. The form helps rural homeowners determine their actual fire hazard rating and is also used to qualify a community for Firewise medal status. The form and accompanying material are available from any Pennsylvania district forestry office.

Potential fire hazards on properties located in or adjacent to the wildland–urban interface include:

- One road used as both an entrance and exit to the development;
- Road width less than 20 feet (6 m);
- Dirt or stone roads;
- Many roads with grades greater than 5 percent;
- Turnaround areas with an outside radius less than 50 feet (15 m);
- Dead-end roads longer than 200 feet (61 m);
- Average lot size less than 1 acre (0.4 ha);
- Streets without signage;
- Developments with large areas of dense, dry brush or dead wood;
- Many hilly areas with slopes greater than 30 percent; and
- Wood shake/shingle roofs.

vania Emergency Management Agency and the Office of the State Fire Commissioner, that the county EMA reviews and updates annually;
- A safety committee that regularly discusses fire and safety concerns and implements remedies;
- An annual 4- to 8-hour community fire and safety educational program approved by county EMA or fire officials; and
- Seasonal wildland fire safety awareness programs approved by county EMA or fire officials.

Silver Medal. A Silver Medal Firewise Community has:

- A wildland fire hazard assessment score between 50 and 68;
- An approved EAP that the county EMA reviews and updates annually;
- A safety committee that regularly discusses fire and safety concerns and implements remedies; and
- An annual 1- to 2-hour community fire and safety educational program approved by county EMA or fire officials.

Bronze Medal. A Bronze Medal Firewise Community has:

- A wildland fire hazard assessment score between 69 and 80;
- An approved EAP that the county EMA reviews and updates annually; and
- A safety committee that regularly discusses fire and safety concerns and implements remedies.

Firewise Developers

Developers that comply with the following specific Firewise guidelines—established by builders from around the United States—will mitigate the damage caused by a wildland fire to houses located in or adjacent to the wildland–urban interface.

Firefighters using hose to cool down a structure damaged by fire in the wildland–urban interface. Pennsylvania's Firewise Medals Communities Program is designed to help local homeowners reduce the risks they face from wildland fire, a natural part of the ecosystem in Pennsylvania. Photo: USDA Forest Service, 1990.

- Familiarize the local fire department with the development's street system, water sources, access points, and contact people;
- Check to ensure that hydrants are functioning properly;
- Create an alternate emergency escape route if the development has only one entrance/exit;
- Keep roadways accessible for emergency equipment by limiting street parking to areas wide enough to accommodate two-way traffic flow;
- Create a defensible space around common-area buildings by removing flammable vegetation to a distance of 30 feet (9 m) from structures;
- Thin and prune vegetation in common areas; and
- Ask the local power company to prune when vegetation grows to within 10 feet (3 m) of utility lines.

Firewise Homeowners

Implementing the following tips will improve the likelihood that a home will survive a wildland fire. During a fire, homes and yards are temporarily transformed into fuelbeds. Homeowners can reduce the fuel and decrease the potential for loss by:

- Replacing wood shingles with fire-resistant roofing;
- Removing dead leaves, needles, and branches;
- Keeping rain gutters free of leaves and debris;
- Using a spark-arresting screen on chimneys.
- Covering crawlspace entrances;
- Enclosing areas beneath decks and balconies;
- Screening louvers and vents;
- Prominently posting the telephone number of the nearest fire department;
- Trimming trees, brush, or high vegetation within 30 feet (9 m) of the home;
- Keeping pine trees 75 feet (23 m) from the home;
- Stacking firewood at least 50 feet (15 m) from the home;
- Keeping grass that is within 30 feet (9 m) of the home less than 4 inches (10 cm) high;
- Screening incinerators;
- Keeping fuel tanks farther than 10 feet (3 m) from the house; and
- Maintaining a 12-foot-wide (4-m-wide) driveway by cutting back vegetation.

For more information about the Pennsylvania Firewise Medal Communities program, contact Paul Sebasovich, Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, 400 Market Street, RCSOB 6th Floor, Harrisburg, PA 17105-8552, 717-787-2925 (voice), 717-783-7960 (fax), psebasovic@.state.pa.us (e-mail). ■

No Demobing Before Rehab!

Mary Zabinski

On May 29, 2000, just 3 weeks after the Cerro Grande Fire was ignited in northern New Mexico's Bandelier National Monument, the Viveash Fire erupted some 30 miles (48 km) to the east, on the Santa Fe National Forest. A human-caused blaze, Viveash grew to 2,000 acres (800 ha) by the end of its first day. Residents of nearby ranches and canyons were soon evacuated.

A Plume-Dominated Event

The dry previous winter had left little snowpack in the area. Fuel moisture was low and fire danger extreme. On its second day, Viveash roared through another 20,000 acres (8,000 ha), sending up a smoke column 20,000 feet (6,000 m) high. The fire moved northeastward, spotting a half mile to a mile (0.8–1.6 km) ahead of the main fire. Viveash became a fuel-driven, plume-dominated event.

By May 31, its third day, Viveash had spotted into the Gallinas River watershed, threatening the municipal water supply for Las Vegas, NM, and Mexican spotted owl habitat. The next day, some 1,500 acres (600 ha) more burned, but afternoon thundershowers and high humidity slowed fire activity. By June 2, evacuees were allowed to return to their homes.

On June 3, the fire was considered 70 percent contained and the burned area emergency rehabilitation (BAER) team began its assessment. Planning to rehabilitate dozer lines commenced on June 4, with the fire at 28,283 acres (11,445 ha) and containment expected 5 days later. Viveash eventually burned 29,000 acres (11,700 ha) in the watersheds of Cow Creek, Bull Creek, and the Gallinas River, tributaries of the Pecos River on the Santa Fe National Forest's Pecos–Las Vegas Ranger Districts. The fire burned through ponderosa pine and spruce–fir forests to elevations exceeding 11,000 feet (3,400 m).

> The Viveash Fire marked the first time that rehabilitation was virtually completed before the incident management team was demobilized.

Integrated Teamwork

Although gripping, the story of Viveash was hardly unique in a summer marked by a frenzy of crown fires across millions of acres in the Rocky Mountain West. What was unique is that the Viveash Fire marked the first time that BAER was virtually completed before the incident management team (IMT) was demobilized.

"This is unique to the fire management program in the U.S.," said Wayne Robbie, ecological inventory coordinator for the Southwestern Region of the USDA Forest Service. Robbie also served as Viveash BAER team leader.

"Historically, incident management teams have focused primarily on suppression or other forms of emergency action," Robbie said. "So

Aftermath of a high-intensity burn in the Lower Cow Creek drainage on the Viveash Fire in May/June 2000. In the background, a burned area emergency rehabilitation team assesses fire effects. Photo: Robert Eatner, USDA Forest Service, Albuquerque, NM, 2001.

Mary Zabinski is a writer/editor for the USDA Forest Service, Southwestern Region, Albuquerque, NM.

Support from incident management teams cut down on the time it took for rehabilitation treatments and provided crews and needed equipment.

Log erosion barrier installed on a slope following the Viveash Fire. Photo: Wayne Robbie, USDA Forest Service, Albuquerque, NM, 2001.

Effects of aerial and hand seeding 5 months after the Viveash Fire. Photo: Wayne Robbie, USDA Forest Service, Albuquerque, NM, 2001.

rehabilitation of the resource damage caused by fire suppression is incumbent on the team to complete. But burned area emergency rehabilitation is traditionally organized by the local unit and line officer. The BAER team works independently of the incident management team, although they both are responsible to the local line officer."

Robbie said that what was unique about Viveash was the integration of fire suppression and BAER objectives, with both teams working together to accomplish the goals of protecting life and property.

"At any one time, the BAER team was assisting with fire suppression damage rehab on dozer lines, and the IMT was assisting with BAER," said Robbie. "The large fires we had last year resulted in a higher percentage of the burned area being in a higher severity class. Given that, we knew it was going to be logistically difficult to accomplish any kind of treatments on the ground. Therefore, support from the IMT on both the logistical and operational side was necessary to get the BAER objectives accomplished in a timely manner." IMT support improved BAER efficiency, he said, cutting down on the time it took to install treatments and providing crews and necessary equipment, including aerial resources (see sidebar).

"The other aspect of having a team is their buying power," said Robbie. "By working with an incident management team, the BAER team was able to acquire equipment and services and whatever products were needed for the treatments. It's easier to acquire that when you have an organization in place that's used to dealing with procurement.

"So, typically, what may have taken a month or two in regards to BAER implementation only took 2 weeks from the standpoint of implementing treatments out on the ground. And what we're realizing, too, is that the crews that were used in this effort had actually developed some skills that they wouldn't normally have—such as how to install treatments in addition to their firefighting skills. This enhances their utility to a greater degree, so that now we not only look at type 2 crews for suppression efforts, but also for helping in other aspects of fire management, specifically, the BAER treatments.

Future Payoffs

"When we look at the broader context of fire in the future," Robbie continued, "in addition to suppression and fire use, these teams will probably have a higher level of involvement in rehab, which goes hand in hand with the whole picture of ecological restoration. Now you can get these projects done in an organized way over a short period of time."

Robbie believes that IMT responsibilities will expand as fire suppression becomes more complex. Expanded responsibilities will include the ability to manage what happens after a fire, such as flooding and other catastrophic events. Viveash provided just such an opportunity for IMTs to build the skills they will need. ■

As fire suppression becomes more complex, the responsibilities of incident management teams will expand to include more rehabilitation.

Rehabilitation on the Viveash Fire

The 2000 Viveash Fire on New Mexico's Santa Fe National Forest marked the first time that burned area emergency rehabilitation (BAER) was virtually completed before the incident management team (IMT) was demobilized. The fire saw four IMTs cycle through over 40 days of activity. Although the IMTs did not conduct the BAER assessment, they were instrumental in implementing BAER treatments on the ground through fire crews and aerial operations. Treatments included:

- Aerial seeding;
- Contour felling;
- Removing hazardous trees;
- Erecting log erosion barriers;
- Erecting trash racks (poles placed to catch debris) in stream channels; and
- Placing straw wattles (straw encased in tubular mesh) hauled in by helicopter.

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Wildland Fire Use

Cost-Effective Engine Plays Vital Role

Louie Casaus

New Mexico State officials declared the 2000 fire season to be the most destructive in recorded history—2,500 fires consumed 520,000 acres (210,000 ha). Compounded by extreme drought conditions, the severe fire activity destroyed several hundred homes and quickly stressed fire-fighting resources. New Mexico issued a call for fire suppression equipment and personnel, answered by many organizations around the State and throughout the Nation.

Cost Savings

One piece of firefighting equipment that the Las Vegas District of New Mexico's Energy, Minerals and Natural Resources Department did not have to request was a type 4 engine, well suited for wildland firefighting. A type 4 engine has a tank capacity of at least 750 gallons (2,839 L) and can deliver at least 50 gallons (189 L) of water per minute. In 1997, Canon Air Force Base sold a 1992 International 4-by-4 truck to the Las Vegas District. Had the district purchased a similar new vehicle, it would have set us back $100,000! Fortunately, through the dedication and hard work of district firefighters, the cab and chassis were put into service for less than $12,000.

The Santa Fe County Fire Department donated the first steel tank—recently upgraded to a 750-gallon (2,839-L) poly tank. The Las Vegas District installed an 18-horsepower engine and pump, along with a Robwen Flowmix 500,* which delivers a foam concentrate to the water stream.

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Donated Time

The grill guard was custom fabricated by Dominic Montoya-Gonzales, a local fire department member. Often donating their time and talent, district firefighters completed most of the remaining mechanical, sanding, and paint preparations; welding; equipment installation; and plumbing. Ready for action, Engine 44 proved vital to district firefighting during the 2000 fire season.

Acknowledgments

The author wishes to thank Thomas Bachicha, USDA Forest Service, Southwest Region, Albuquerque, NM, for his valuable assistance; and all those who showed dedication and perseverance in acquiring and readying this exceptional piece of firefighting equipment. ■

* The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement of any product or service by the U.S. Department of Agriculture. Individual authors are responsible for the technical accuracy of the material presented in *Fire Management Today*.

Type 4 engine that proved its worth during the 2000 fire season. The Las Vegas District of New Mexico's Energy, Minerals and Natural Resources Department purchased the vehicle from the U.S. Air Force in 1997. Many district firefighters donated their time and skills to prepare Engine 44 for active service. Photo: Louie Casaus, Forestry Division, New Mexico Energy, Minerals and Natural Resources Department, Las Vegas, NM, 2000.

Louie Casaus is a district forester for the Forestry Division, New Mexico Energy, Minerals and Natural Resources Department, and the program coordinator for the Federal Excess Personal Property Program in Las Vegas, NM.

Smokey's New Wildland Fire Prevention Message

Madelyn Dillon

Smokey Bear—the national symbol for wildland fire prevention—was created in 1944 by the Forest Service and War Advertising Council to promote the prevention of human-caused wildland fires. However, many people who grew up listening to Smokey's fire prevention advice have been wondering what he's been up to lately and why they haven't heard his familiar slogan, "Only you can prevent forest fires."

Low Fire Awareness

Smokey Bear is still roaming the Nation's wildlands, with a new, contemporary message, "Wildfires are caused by people you'd least expect—people like you." Smokey has refined his original message to remind folks that he remains the spokesperson for the prevention of potentially dangerous, destructive fires ignited by careless wildland visitors. The new message is intended to reawaken Smokey's image in the minds of today's recreationists on public lands, neighbors living in or near the wildland–urban interface, and even those who only occasionally visit public wildlands.

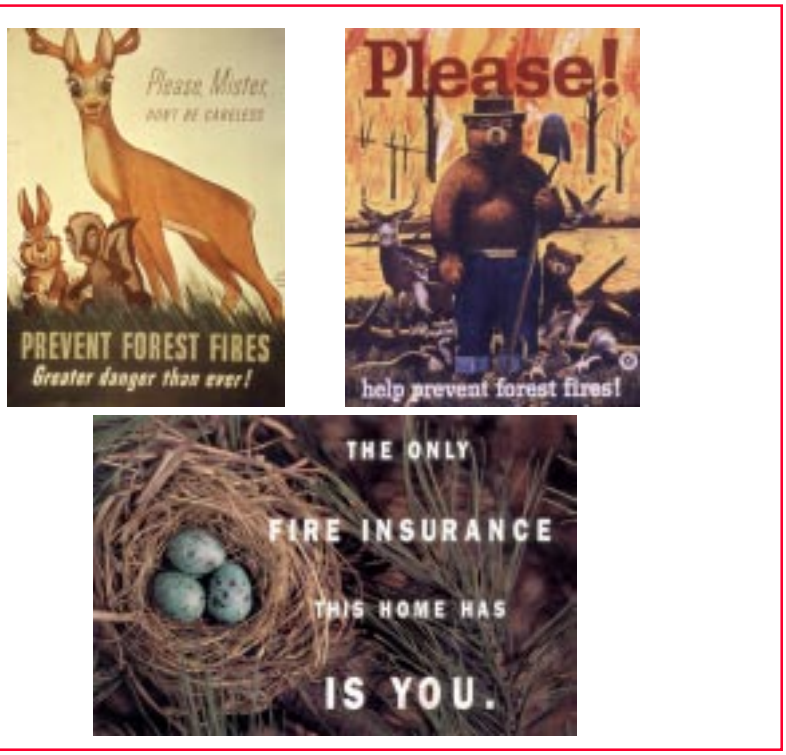
Research conducted in March 2001 determined that wildland fire awareness was low and that adults believed that they could never cause a wildland fire, even though these same people admitted to occasional careless cigarette disposal and campfire use. Researchers also discovered that, whereas older adults could easily recite Smokey's slogans, younger people were unaware of the important role that Smokey has played in land, water, and other natural resource use on public lands.

Smokey has refined his message to remind folks that he remains the spokesperson for wildland fire prevention.

Campaign Kickoff

In April 2001, the National Association of Broadcasters in Las Vegas, NV, officially kicked off the new Smokey Bear campaign. Television and radio spots aired the first public service announcements in May 2001.

For more information about the new Smokey Bear campaign, contact Jeannette Hartog, cooperative fire prevention coordinator, USDA Forest Service, Intermountain Region, 801-625-5245 (voice), jhartog@fs.fed.us (e-mail). ■



Evolving fire prevention art. In 1943, on the eve of Smokey Bear's birth, Bambi and friends warned against careless fire use (top left). During Smokey's heyday in the 1960s, the Bambi theme often subtly reappeared (top right). By 2001, fire prevention messages frequently took a less whimsical, more documentary turn (bottom). Illustrations: USDA Forest Service, 1943 and 1964; The Advertising Council, New York, NY, 2001.

Madelyn Dillon is the editor of Fire Management Today, *Fort Collins, CO.*

Guidelines for Contributors

Editorial Policy
Fire Management Today (*FMT*) is an international quarterly magazine for the wildland fire community. *FMT* welcomes unsolicited manuscripts from readers on any subject related to fire management. Because space is a consideration, long manuscripts might be abridged by the editor, subject to approval by the author; *FMT* does print short pieces of interest to readers.

Submission Guidelines
Submit manuscripts to either the general manager or the managing editor at:

USDA Forest Service
Attn: April J. Baily, F&AM Staff
Mail Stop 1107
1400 Independence Avenue, SW
Washington, DC 20250-1107
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Internet e-mail: abaily@fs.fed.us

USDA Forest Service
Attn: Hutch Brown, 2CEN Yates
Mail Stop 1111
1400 Independence Avenue, SW
Washington, DC 20250-1111
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USDA Forest Service
Attn: Hutch Brown, 2CEN Yates
201 14th Street, SW
Washington, DC 20024

If you have questions about a submission, please contact the managing editor, Hutch Brown.

Paper Copy. Type or word-process the manuscript on white paper (double-spaced) on one side. Include the complete name(s), title(s), affiliation(s), and address(es) of the author(s), as well as telephone and fax numbers and e-mail information. If the same or a similar manuscript is being submitted elsewhere, include that information also. Authors who are affiliated should submit a camera-ready logo for their agency, institution, or organization.

Style. Authors are responsible for using wildland fire terminology that conforms to the latest standards set by the National Wildfire Coordinating Group under the National Interagency Incident Management System. *FMT* uses the spelling, capitalization, hyphenation, and other styles recommended in the *United States Government Printing Office Style Manual*, as required by the U.S. Department of Agriculture. Authors should use the U.S. system of weight and measure, with equivalent values in the metric system. Try to keep titles concise and descriptive; subheadings and bulleted material are useful and help readability. As a general rule of clear writing, use the active voice (e.g., write, "Fire managers know…" and not, "It is known…"). Provide spellouts for all abbreviations. Consult recent issues (on the World Wide Web at <http://www.fs.fed.us/fire/planning/firenote.htm>) for placement of the author's name, title, agency affiliation, and location, as well as for style of paragraph headings and references.

Tables. Tables should be logical and understandable without reading the text. Include tables at the end of the manuscript.

Photos and Illustrations. Figures, illustrations, overhead transparencies (originals are preferable), and clear photographs (color slides or glossy color prints are preferable) are often essential to the understanding of articles. Clearly label all photos and illustrations (figure 1, 2, 3, etc.; photograph A, B, C, etc.). At the end of the manuscript, include clear, thorough figure and photo captions labeled in the same way as the corresponding material (figure 1, 2, 3; photograph A, B, C; etc.). Captions should make photos and illustrations understandable without reading the text. For photos, indicate the name and affiliation of the photographer and the year the photo was taken.

Electronic Files. Please label all disks carefully with name(s) of file(s) and system(s) used. If the manuscript is word-processed, please submit a 3-1/2 inch, IBM-compatible disk together with the paper copy (see above) as an electronic file in one of these formats: WordPerfect 5.1 for DOS; WordPerfect 7.0 or earlier for Windows 95; Microsoft Word 6.0 or earlier for Windows 95; Rich Text format; or ASCII. Digital photos may be submitted but must be at least 300 dpi and accompanied by a high-resolution (preferably laser) printout for editorial review and quality control during the printing process. Do not embed illustrations (such as maps, charts, and graphs) in the electronic file for the manuscript. Instead, submit each illustration at 1,200 dpi in a separate file using a standard interchange format such as EPS, TIFF, or JPEG (EPS format is preferable, 256K colors), accompanied by a high-resolution (preferably laser) printout. For charts and graphs, include the data needed to reconstruct them.

Release Authorization. Non-Federal Government authors must sign a release to allow their work to be in the public domain and on the World Wide Web. In addition, all photos and illustrations require a written release by the photographer or illustrator. The author, photo, and illustration release forms are available from General Manager April Baily.

Contributors Wanted

We need your fire-related articles and photographs for *Fire Management Today*! Feature articles should be up to about 2,000 words in length. We also need short items of up to 200 words. Subjects of articles published in *Fire Management Today* include:

- Aviation
- Communication
- Cooperation
- Ecosystem management
- Equipment/Technology
- Fire behavior
- Fire ecology
- Fire effects
- Fire history
- Fire science
- Fire use (including prescribed fire)
- Fuels management
- Firefighting experiences
- Incident management
- Information management (including systems)
- Personnel
- Planning (including budgeting)
- Preparedness
- Prevention/Education
- Safety
- Suppression
- Training
- Weather
- Wildland–urban interface

To help prepare your submission, see "Guidelines for Contributors" in this issue.

Annual Photo Contest

Fire Management Today invites you to submit your best fire-related photos to be judged in our annual competition. Judging begins after the first Friday in March of each year.

Awards

All contestants will receive a CD–ROM with all photos not eliminated from competition. Winning photos will appear in a future issue of *Fire Management Today*. In addition, winners in each category will receive:

- 1st place—Camera equipment worth $300 and a 16- by 20-inch framed copy of your photo.
- 2nd place—An 11- by 14-inch framed copy of your photo.
- 3rd place—An 8- by 10-inch framed copy of your photo.

Categories

- Wildland fire
- Prescribed fire
- Wildland–urban interface fire
- Aerial resources
- Ground resources
- Miscellaneous (fire effects; fire weather; fire-dependent communities or species; etc.)

Rules

- The contest is open to everyone. You may submit an unlimited number of entries from any place or time; but for each photo, you must indicate only one competition category. To ensure fair competition, the judge reserves the right to change the competition category for your photo.
- Each photo must be an ***original color slide***. We are not responsible for photos lost or damaged, and photos submitted will not be returned (so make a duplicate before submission). ***Digital photos will not be accepted*** because of difficulty reproducing them in print.
- You must own the rights to the photo, and the photo must not have been published prior to submission.
- For every photo you submit, you must give a detailed caption (including, for example, name, location, and date of the fire; names of any people and/or their job descriptions; and descriptions of any vegetation and/or wildlife).
- You must complete and sign a statement granting rights to use your photo(s) to the USDA Forest Service (see sample statement below). Include your full name, agency or institutional affiliation (if any), address, and telephone number.
- Photos are eliminated from competition if they lack detailed captions; have date stamps; show unsafe firefighting practices (unless that is their express purpose); or are of low technical quality (for example, have soft focus or show camera movement). (Duplicates—including most overlays and other composites—have soft focus and will be eliminated.)
- Photos are judged by a photography professional whose decision is final.

Postmark Deadline

First Friday in March

Send submissions to:

USDA Forest Service
Attn: Hutch Brown, 2CEN Yates
Mail Stop 1111
1400 Independence Avenue, SW
Washington, DC 20250-1111

Sample Photo Release Statement

(You may copy and use this statement. It ***must be signed.***)

Enclosed is/are _____ (*number*) slide(s) for publication by the USDA Forest Service. For each slide submitted, the contest category is indicated and a detailed caption is enclosed. I have the authority to give permission to the Forest Service to publish the enclosed photograph(s) and am aware that, if used, it or they will be in the public domain and appear on the World Wide Web.

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