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**Wildland Fire
Leadership**



Fire Management *today*

In this issue ...

*This special issue of **Fire Management Today** presents leadership visions for wildland fire management. The articles in this issue are mostly from previous volumes of the journal, going back to its very beginnings in 1936. The articles cover a century of changing leadership visions.*

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Victoria Christiansen, Chief
Forest Service

Shawna A. Legarza, Psy.D., Director
Fire and Aviation Management

Kaari Carpenter, General Manager • Hutch Brown, Editor

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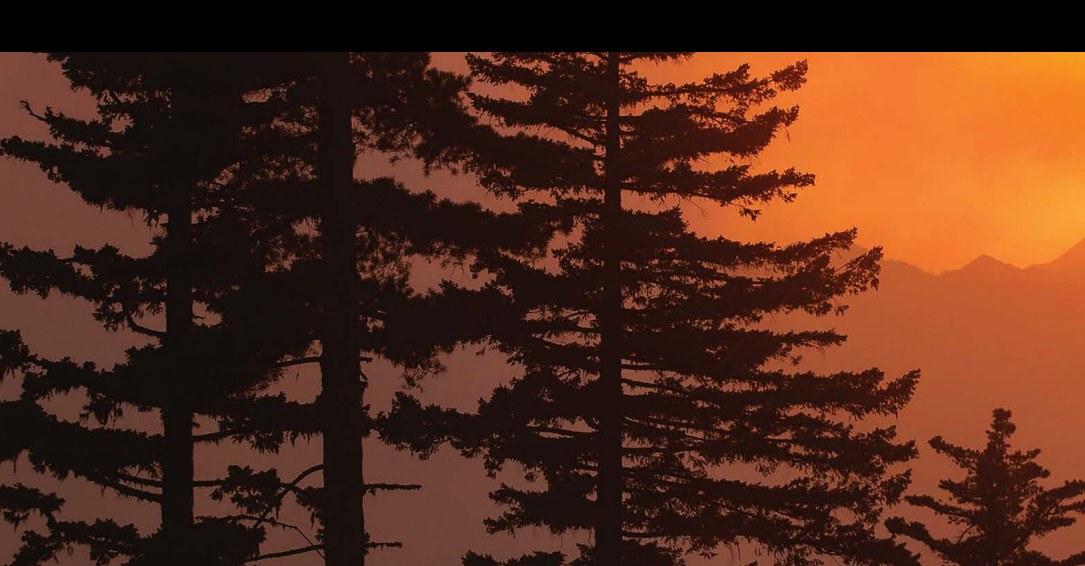
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On the Cover:

The sun sets through smoke-filled skies on the Happy Camp Complex Fire, ignited in September 2014 on the Klamath National Forest in California. Photo: USDA Forest Service.

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Firefighter and public safety is our first priority.

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ANCHOR POINT

Learning From Past Leaders

This issue of *Fire Management Today* focuses on leaders who helped shape Forest Service fire and land management policies, past and present, in response to the challenges we all face. Many amazing leaders have influenced our Nation's land management, our response to challenges, our people, and our policy of managing fire on the landscape. Each generation of managers has been rewarded with both the successes and challenges of leading in a complex system. As we have learned from our past leaders, we must continue to challenge the norms, practice humble inquiry, and continue to improve the wildland fire system for current and future generations.

As I read these articles, I noticed that the fundamental systemic challenges our past leaders faced are very similar to the challenges we face today. Today, we still cope with the political, societal, and economic challenges associated with managing fire across a landscape shaped by an emerging infrastructure and human population. You will read about the corresponding social issues, such as managing fire for resource benefits versus putting a fire out as soon as possible. You will learn about the evolving fire environment from concerns going back to the mid-1970s around the wildland-urban interface. You will see programmatic and policy changes that help mitigate challenges associated with using fire as a tool on the landscape. And, finally, considerations affecting workplace environment and personnel can be gleaned from various



By Shawna A. Legarza, Psy.D.

*Director, Fire
and Aviation Management
Forest Service*

articles—the challenges associated with managing people and the activities of Mother Nature.

The articles in this issue contain reflections about fire response, fuels management, prescribed fire, smoke, people, homes, and organizations—all part of the wildland fire system we operate in today. As we read, we must study, we must learn, and we must continue to move forward with improvements to the wildland fire system. So many things remain the same, yet so many things are also different today. We live in complicated environments that will always be challenging and must be maintained.

A system built on political, societal, and economic issues controlled by Mother Nature can cause devastation. In 2018, we had the most devastating and costly year for fire and land management to date, with the Forest Service alone spending about \$2.6 billion on wildland fire. Tragically, scores of Americans were killed, including 19 wildland firefighters. Over 58,000 fires were reported nationally, and they burned about 8.8 million acres (3.5 million ha). In California, the 459,123-acre (183,649-ha) Mendocino Complex Fire was the largest wildfire in California history. The 229,651-acre (91,860-ha) Carr Fire burned

into Redding, CA, and the Camp Fire tragically claimed 85 lives and destroyed 18,793 structures in and near the town of Paradise, CA. The 2018 fire year saw the worst structure loss since data collection began in 1999. Our wildland fire system has a huge financial impact on communities, so the challenge is greater than ever.

As leaders and managers working in this complex system, we continue collectively to make a vast array of improvements across boundaries and together with the public. We have much work to do. For example, the National Association of State Foresters identified more than 70,000 communities at risk from wildfire, and the wildland-urban interface in the United States contains about 44 million homes (about 34 percent of the national total), many of which are at risk from wildfire (Martinuzzi and others 2015).

We must continue to discuss the challenges raised by the wildland fire system. We must meet together before the fire starts, with Federal, State, and local governments and communities all working together to help manage the land and prepare for wildland fire. We must continue to come together, share lessons learned, and discuss political, societal, and economic challenges associated with living with fire. As leaders, we must encourage the American people to be prepared and to assess fire risks and alternatives for managing the risk, especially because nearly 9 in 10 wildfires are caused by humans.

Thank you to our past and current leaders in fire and land management! Collectively, we will continue to improve the wildland fire system.

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Leadership Visions: Preface to the Special Issue

Hutch Brown

The leadership focus has expanded from the techniques of fire control to visions for wildland fire management in the 21st century.

This special issue of *Fire Management Today* presents leadership visions for wildland fire management going back to the beginnings of this journal in 1936 — and before.

Leadership visions were of little importance in the original journal (called *Fire Control Notes*). The near-universal vision at the time was using the techniques and technologies of fire control to stop the “appalling wastage by fire,” as *Fire Control Notes* stated in almost every issue (see the sidebar). *Fire Control Notes* was a how-to manual for fire control, the policy that dominated

Hutch Brown is the editor of Fire Management Today and a program specialist for the Forest Service’s Office of Communication, Washington Office, Washington, DC.

Federal fire management from 1905 to the 1960s–70s.

Nevertheless, a robust public lands policy debate preceded the journal and continued thereafter, including a debate about the role of fire on the landscape. The first two articles in this issue reflect that debate and how it turned out for the Forest Service (see also Brown 1947; Farmer 1942; and Gisborne 1942). For its first 30 to 40 years, *Fire Control Notes* rarely entertained alternatives to fire control, even though it did publish articles on prescribed fire, suggesting the ongoing local and regional practicality of planned ignitions in the field of American forestry. In his article on “the fallacy of light burning,” for example, William B. Greeley conceded that “it is good forestry to burn an entire cutover area cleanly under careful control.”

However, Greeley disparaged “light burning” as “Paiute forestry,” reflecting contemporary awareness that American Indians managed landscapes in part through the use of fire. Greeley’s dismissal of indigenous knowledge also reflected his faith in the superiority of modern science and technology, a feature of Forest Service culture (and mainstream American culture at large) well into the 20th century (Cortner 2003; Gibbons 1999). Today,



FORESTRY cannot restore the American heritage of natural resources if the appalling wastage by fire continues. This publication will serve as a channel through which creative developments in management and techniques may be communicated to and from every worker in the field of forest fire control.

Leadership Vision for Fire Control

Almost every issue of *Fire Control Notes* until 1964, on its inside front cover, stated the same vision for fire control (shown above): stopping “the appalling wastage by fire.” Early Smokey Bear posters used the same theme, framing it as “this shameful waste.” The message was that wildland fire was not natural to American forests but rather the result of human carelessness and indifference. Wildfire would become as rare as it was in northern Europe (widely considered a model of forestry) if only people were careful with fire and applied “creative developments” in fire control “management and techniques.”

the Forest Service seeks to integrate indigenous knowledge into its own land management practices.

The article by John R. Curry, published in 1937, reflects growing disillusionment with early hopes that fire could be largely banished from the woods on the model of northern Europe (a model that might be changing under the impetus of climate change—see Zibitsev and Goldammer 2019). The persistence of large fires and fire seasons in the 1920s–30s led Curry and others to conclude that the Forest Service’s fire organization faced a “fire problem” far into the future. The solution they envisioned was to reorganize and professionalize the fire organization, creating more specialized roles and units for fire control while also developing more fire science.

The Forest Service pursued such measures in the 1940s–70s. With help from Smokey Bear, along with surplus military aircraft and other equipment modified for fire control following World War II, fire managers succeeded in reducing the number of wildfires and the area burned each year. By the 1980s, the average annual number of acres burned had fallen to less than 3 million, compared to more than 30 million in the 1930s. Fire control seemed to be working.

Not everyone fully agreed. The article by William R. “Bud” Moore in 1974 is a reflection on the 40-year career of a prominent leader in the fire community. It conveys the growing unease within parts of the community (including the Forest Service) over policies designed to control and domesticate nature on public lands (see also Moore 1996). Moore called for replacing a “growth ethic” (similar to what Aldo Leopold called “boosterism”—unbridled land development) with a “land and people ethic” in fire management planning. Aldo Leopold’s land ethic eventually contributed to the Wilderness Act of 1964 and the replacement of fire control in the 1960s–70s with more flexible policies allowing for fire’s natural ecological role, particularly in national parks and wilderness areas.



Results of a prescribed fire on Michigan’s Hiawatha National Forest in May 2018, showing rejuvenation of a mixed habitat of prairie, shrubs, and groves of trees needed by species such as sharp-tailed grouse. Photo: USDA Forest Service.

The article by Jack Barrows from 1974 takes up the theme of new fire policies (see also Aldrich and Mutch 1972; Baldwin 1972; and Gunzel 1974). Noting that “fires in the forest may be either good or bad,” Barrows welcomed a transition within the Forest Service’s fire organization from fire control to “a coordinated program responsive to the complexities of forest fires.” He called the new approach Forest Fire Management; indeed, the journal changed its name from *Fire Control Notes* to *Fire Management* in 1973. (“Notes” was added back to the title in 1976.)

By the 1990s–2000s, changing conditions across many landscapes, including the effects of both fire exclusion and climate change, were extending fire seasons and producing record fire sizes and severities in many States, along with rising firefighting costs. At the same time, the growing wildland–urban interface was placing increasing numbers of homes and communities at risk. The final set of articles in this issue, all by national

leaders, outlines approaches to meeting the mounting challenges.

The various approaches coalesce around the need to use a range of forestry tools grounded in science to sustain and restore resilient fire-adapted forests and grasslands on public lands. As you might expect, the approaches differ in emphasis. The earlier articles, still breaking with the 20th-century legacy of fire control, stress the need for using more planned and unplanned ignitions in fire-adapted ecosystems. The later pieces, more cognizant of climate change and other constraints, emphasize the use of a full range of land management tools, including grazing, timber sales, and stewardship contracts as well as both planned and unplanned ignitions.

Consistent throughout is the need for a safe and effective wildfire response. Agreement emerged on what became a vision for the National Cohesive Wildland Fire Management Strategy (WFLC 2014): “to safely and effectively extinguish fire, when needed; use fire

where allowable; manage our natural resources; and as a Nation, live with wildland fire.” The corresponding goals for the Cohesive Strategy are:

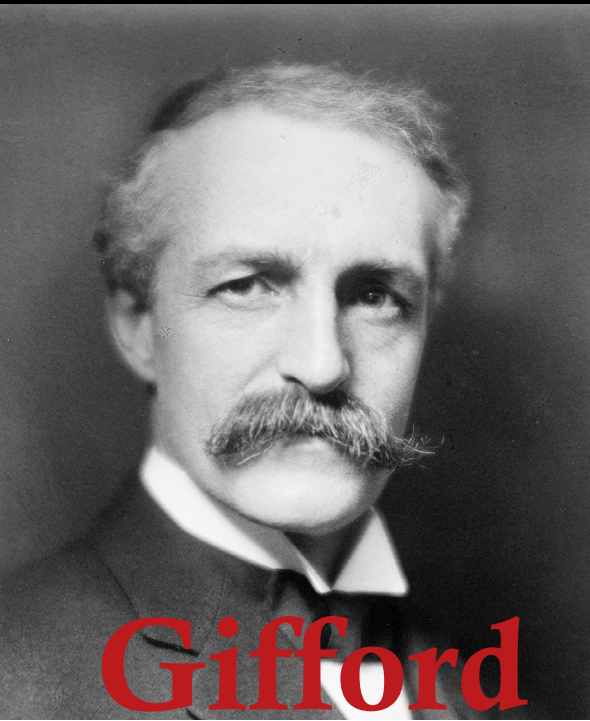
- To make landscapes across all jurisdictions resilient in the face of fire-related disturbances, in accordance with management objectives;
- To help people in the wildland–urban interface build communities and infrastructure that can withstand a wildfire without loss of life and property; and
- To give wildland fire managers the tools and resources they need to make and carry out safe, effective, efficient risk-based wildfire management decisions.

Articles setting the stage for the Cohesive Strategy have proliferated in *Fire Management Today* since the 1990s. In addition to those in this issue, they include (to name a few) Arno and Allison-Bunnell (2003); Barrett (2018); Bosworth (2003); Brown (2005); Comanor (1998); Pyne (2018); Rains and Hubbard (2002); and Williams (1998, 2002, 2004, 2005s, 2005b). Tom Harbour, the director of Fire and Aviation Management for the Forest Service from the mid-2000s to the mid-2010s, wrote a series of thoughtful lead articles for *Fire Management Today* with perspectives on the evolution of wildland fire leadership in the United States (see, for example, Harbour 2007, 2011, 2012, 2013).

The perspectives offered and concerns raised by articles such as these—and by those presented in this issue of *Fire Management Today*—show how the focus of wildland fire management has expanded over the past century. From the techniques and technologies of fire control, the focus has broadened to include a whole range of social, ecological, economic, and safety issues facing wildland fire managers in the 21st century.

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Gifford

Pinchot on Wildland Fire

Hutch Brown

At the turn of the 20th century, American foresters were divided about whether to use wildland fire for resource benefits or to exclude it for fire protection. In the 19th century, many Americans routinely used fire in the woods for such purposes as land clearing, roadbuilding, slash burning, and fuels reduction (Bramwell 2014; Brown 2003; Pyne 1982). Free-burning fires were often ignored unless they threatened farms, mills, homesteads, or communities. Cultures of fire use developed in regions such as northern California, the Flint Hills of the Midwest, and much of the South (Pyne 1982, 2015).

In 1882, Franklin B. Hough, founder of the USDA Division of Forestry (forerunner of the Forest Service), published his seminal work, *Report on Forestry*. The report quoted forest landowners who described using

Gifford Pinchot during his tenure as first Forest Service Chief (1905–10). Source: Library of Congress online collection; photo: Pirie MacDonald (1909).

Pinchot’s *Use Book* told Forest Service line officers that they have “no duty more important than protecting the reserves from forest fires.”

PINCHOT’S USE BOOK

At first, it was unclear which side of the debate the fledgling Forest Service would come down on. Gifford Pinchot, the first Forest Service Chief (1905–1910), understood that America’s forests were not like Europe’s and that the principles of European forestry had to be adapted to American conditions. Pinchot also understood that fire played an ecological role in the woods. In 1899, he authored a nuanced reflection on the relationship between forests and wildfires, pointing to “what might almost be called the creative action of forest fires” in the ecology of fire-adapted and successional forest types, including longleaf pine, lodgepole pine, and coastal Douglas-fir (Pinchot 1899).

For all his forestry experience and credentials, however, Pinchot was also a shrewd politician who later won two terms as Pennsylvania Governor. His main goal as Forest Service Chief was establishing a Federal forest system managed as a model of scientific forestry for the benefit of all Americans (Pinchot 1947). To succeed, he had to persuade a skeptical public.

Many Americans, especially in the West, regarded the forest reserves, first carved from the public domain in 1891, as an illegal land grab prompted by Federal overreach. The public domain had historically been subject to private acquisition and putting parts of it off limits to private ownership outraged many people, especially in the West. Pinchot faced, in effect, the first Sagebrush Rebellion (McCarthy 1992).

Pinchot understood that fire played an ecological role in the woods.

fire to reduce fuels and who praised its effectiveness and urged its wider application (Hough 1882). Hough himself, steeped in the principles of European forestry, condemned such practices. His report foreshadowed a national controversy over what came to be called light burning: Should land managers use fire in fire-adapted ecosystems for ecological and economic benefits? Or should they prevent fire and suppress it on the European model?

Hutch Brown is the editor of Fire Management Today and a program specialist for the Forest Service’s Office of Communication, Washington Office, Washington, DC.

In response, ever the Progressive politician, Pinchot stressed the practical utility of the national forests for ordinary Americans. In 1905, he wrote the first directive for Forest Service line officers in what came to be known as the *Use Book* (Pinchot 1905). In it, Pinchot argued that the national forests are “for the benefit of the community and homebuilder.” The “greatest single benefit” from the national forests, Pinchot averred, was “insurance against the destruction of property, timber resources, and water supply by fire.”

He told Forest Service line officers that they have “no duty more important than protecting the reserves from forest fires.” He directed them to enforce fines against “the willful setting of a fire,” reminding them that even a “surface fire in open woods, though not dangerous to old timber, does great harm by killing seedlings.”

UTILITARIAN RATIONALE

Pinchot thereby came down against light burning. Perhaps he was influenced by European notions of fires and forestry; perhaps, eager to build support for the national forests, he was swayed by timber growers lobbying to keep fire out of the forest reserves (Bramwell 2014). Regardless, Pinchot’s arguments for fire control were based on a utilitarian rationale of practical self-interest for people who depended on the national forests. Specifically, he argued that:

- Communities and homeowners benefit from the national forests by using them for timber, water supplies, and forage for livestock;
- Wildland fires threaten private property as well as the timber, forage, and water supplies that people get from public lands;
- Even surface fires damage forests by killing young trees and preventing regeneration; and
- Therefore, no one should be allowed to set fires and all fires should be put out to protect private property and valuable resources on public land such as timber.

The Organic Act of 1897 implicitly supported a policy of fire exclusion, instructing the Secretary of Agriculture to “make provisions for the protection against destruction by fire ... the public and national forests which may have been set aside or which may be hereafter set aside.” At the time, the Federal Government had the only dedicated forestry organization capable of large-scale fire protection—the Forest Service, which was up to the task (in Pinchot’s view) and therefore entitled to the job of administering the forest reserves on behalf of the American people. Accordingly, line officers had no higher duty than preventing and controlling wildfires, thereby serving communities, homeowners, and the entire Nation. In effect, Pinchot’s *Use Book* rejected the rationale for light burning and made fire control—the policy of fire exclusion—a central purpose of Pinchot’s newly created Forest Service.

THE BIG BLOWUP

Pinchot’s benefactor, President Theodore Roosevelt, left office in 1909. Roosevelt’s successor, President William Howard Taft, fired Pinchot for insubordination in 1910 (for Pinchot’s side of the story, see *Breaking New Ground* (Pinchot 1947)). Cut loose from its founder and visionary leader, the Forest Service was adrift and demoralized. Emboldened, opponents in Congress promptly cut 50 percent from the agency’s budget and were preparing, under the leadership of Senator Weldon B. Hayburn of Idaho, to dismantle the National Forest System (Egan 2009).

Arguably, what saved the national forests—and ultimately settled the light burning controversy—were the great fires of 1910 (Bradley 1974; Egan 2009; Pyne 2001). Altogether, more than 50 million acres burned nationwide that

Wallace, ID, following the Big Blowup. The great fires of 1910 destroyed part of town. The national shock and horror following the wildfire disaster contributed to an emerging consensus supported by national leaders like Gifford Pinchot on the need to suppress all wildland fires. Source: U.S. Library of Congress; photo: National Photo Company (1910).



year (Pyne 2001), including more than a million acres in what became known as the Big Blowup.

On August 20, 1910, Chinook winds—hot dry winds blowing downslope—began sweeping across the Northern Rockies with near hurricane force. Lasting 48 hours, the great winds whipped more than a thousand previously ignited smoldering wildfires into raging infernos and drove them together across great swaths of northern Idaho, eastern Washington, and western Montana (Pyne 2001). Huge forest fires burned through homesteads and into communities. Thousands fled on crowded trains or, in the case of Forest Service fire crews, retreated to towns and tried to defend their perimeters. Ninety-two people are known to have perished, including 78 firefighters trapped in the mountains.

Shocked by the disaster, the Nation looked for leadership in forestalling future wildfire catastrophes—and Gifford Pinchot, expert in public relations, took the stage (Egan 2009; Pyne 2001). Though no longer Chief, he barnstormed the country on behalf of the Forest Service, demonizing wildland fires and burnishing the agency's credentials as the Nation's premier firefighting force. Blaming Congress for the disaster, Pinchot asserted that, with sufficient resources, the Forest Service could have controlled the fires.

Former President Theodore Roosevelt, still beloved by many Americans, weighed in on the issue by publicly praising the Forest Service for the “wonderful work done ... in fighting the great fires this year” despite the “very inadequate appropriation made” by Congress (Roosevelt 1910). The popular journals *Collier's* and *Harper's Weekly* supported Pinchot and Roosevelt, calling for congressional action to help the Forest Service prevent future fire disasters. As a result, the agency enjoyed “a marked upswing in public interest and in funds for fire control” (Gisborne 1942). Congress restored Forest Service funding and passed the Weeks Act the following year, laying the national foundations for cooperative fire control

and for an expansion of the National Forest System into the Eastern States.

According to renowned early Forest Service fire researcher H.T. Gisborne (1942), the 1910 fires “were probably the greatest object lesson as to the importance of fire control that ever occurred, anywhere.” The lesson was not lost on the Forest Service, which promptly launched a campaign to drive fire from the woods, making fire control central to its mission and identity (Egan 2009; Pyne 2001). In pursuing a policy of fire control, the agency enjoyed Pinchot's lasting and vocal support (Pinchot 1947).

The Forest Service launched a campaign to drive fire from the woods, making fire control central to its mission and identity.

WAR ON WILDFIRE

That was a departure from Pinchot's early career, when the young forester took a more nuanced view of the ecological role that fire plays across American landscapes. As a tireless advocate for the Forest Service, however, Pinchot seems to have recognized the role that wildfire might play in the American imagination. Building on his *Use Book* of 1905 and seizing on the Big Blowup of 1910, Pinchot set the stage for the war on wildfire waged by subsequent generations.

Pinchot's hand-picked successor as Chief, Henry S. Graves (1910–1920), promptly took up the cause. “Uncontrolled light burning should be prohibited everywhere,” he intoned in *Protection of Forests From Fire* (Graves 1919). Described as a “milepost of progress in fire control” (Gisborne 1941), Graves' signature work called for rapid response to wildfires while still small, a tenet of wildland firefighting to this day. For the next 40 to 50 years, in the spirit of Gifford Pinchot, stopping

“the appalling wastage by fire”—a standard slogan repeated for decades on the inside front cover of this journal, then called *Fire Control Notes*—remained national policy.

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Forest Service Chief William B. Greeley (1920–28), shown here in 1921, not long after assuming his job as Chief. (Though grainy, this was his signature photo as Chief.) A passionate advocate of fire control, Greeley was instrumental in setting the Nation on the course of fire control, not least through this article. Interestingly, his article also states the case for the use of planned ignitions, which Fire Control Notes would support through ongoing articles on prescribed fire. Photo: USDA Forest Service.

Paiute Forestry or the Fallacy of Light Burning

William B. Greeley

The article is adapted from Fire Management Notes 60(4) (Fall 2000), pages 21–26; it first appeared in the March 1920 issue of The Timberman. When he wrote this article, William Greeley was an assistant forester for the Forest Service, Washington Office, Washington, DC. He went on to serve as Forest Service Chief from 1920 to 1928.

For nearly 20 years, a drive has been made in the Western States to put an end to the destruction of forests by fire. This effort has been backed by many timber owners and by State and municipal agencies with a fine spirit of cooperation. From year to year, it has received more widespread support in public sentiment.

In a large measure, the effort to stop destructive forest fires in the Western States has been successful.

The goal of this effort has been to keep fires out of the forest. It has sought:

- To make the woods as fireproof as practicable through the disposal of slashings;
- To reduce the number of man-caused fires by State control of the use of fire

and by creating a public sentiment wide awake at all times to keep fire out of the woods;

- To detect small fires quickly by patrols and lookout stations; and
- To put fires out by the systematic organization of all the forces available in an emergency.

KEEPING FIRES OUT OF THE WEST

In a large measure, the effort to stop destructive forest fires in the Western States has been successful. Millions of acres of both private and public forests have been efficiently protected. Thousands of small fires have been put out before doing serious damage. Many thousands more have been prevented through law enforcement and an educational campaign that has enlisted the support of the hunter, the camper, the logger, the railroad operator, the herdsman, and the settler. The effort has not prevented all forest conflagrations in seasons or localities of extreme drought. It has not yet solved certain problems in protecting forests that are still inaccessible stretches of wilderness, are still undermanned, or are subject to exceptional hazards by reason of local climate or local social and industrial conditions.

Bad fires still occur in European forests, which have been under systematic protection and management for 200 years. We can expect no less in the inaccessible and thinly populated portions of our Western States, which are exposed to climatic fire hazards as extreme as exist perhaps in any part of the world. To condemn the methods of protecting the western forests because they have not prevented all fires would be as sensible as to condemn the fire prevention work of our large cities because of the occasional Baltimore, San Francisco, or Chelsea fire. The protection of our western forests from fire, in which work timber owners and associations have taken a leading part, is one of the finest accomplishments in forestry yet witnessed in the United States. One of its best features is that it

has been brought about largely by the people of the Western States themselves and that its greatest asset today lies in the public sentiment of the West to keep fires out of the woods.

WHAT THE FOREST BURNERS PREACH

It would seem unnecessary to uphold the protection of our western forests as a work commanding the support of every forester and timber owner in the United States, but a propaganda is now being preached that subtly strikes at the very roots of it. The advocates of light burning, or “Paiute forestry,” assert that fire should not be kept out of the pine forests, by all odds the most extensive in our Western States. Instead of keeping fire out of the western pineries, the advocates of this system propose to burn them regularly every few years. They claim that a succession of light fires will keep these forests clean of inflammable material without injury to the merchantable stumpage. The frequent burning of small growth, underbrush, and litter supposedly would thus protect the woods from serious conflagrations. It is even claimed that pine forests protected by this system will not burn, that their young trees will not be seriously injured; and the whole thing is to cost but a fraction of a cent per acre.

This system is advocated by the Southern Pacific Railroad, which, because of its enormous Federal land grants, is one of the two or three largest timber landowners in the United States. It is supported by other large timber-owning corporations, particularly in California. Light burning has been preached in articles appearing in *American Forestry* and in various lumber journals. It is, in fact, a substitute offered to the people of the Western States for the present system of forest protection, which has hitherto made such splendid headway.

The light burners claim that their scheme was practiced by the Indians in various western pine forests long



Early Forest Service photo of firefighters digging fireline on a fire in Idaho, date unknown. Early firefighters were typically volunteers, often rounded up by Forest Service fire officers on the spur of the moment whenever a fire broke out. In the 1930s, the Civilian Conservation Corps mobilized thousands of firefighters for the Forest Service, enabling the agency to improve its initial attack and drastically reduce the number acres burned each year. Photo: USDA Forest Service.

Light burning, in actual practice, is simply the old ground fire, which has been the scourge of the western pineries, under a new name.

before the advent of the white man, asserting that [the American Indian] fired the forests regularly, not so much to facilitate his hunting or protect his dwelling as because his nature lore taught him that this was the way to prevent the “big” forest fire.* Their scheme means nothing more or less than a continuation of the frequent ground fire, which—whether started by Indians or by lightning—swept over many of our western pineries at frequent intervals prior to the coming of the whites and which was continued by the early hunters, prospectors, herdsmen, and settlers.

FIRE CONDITIONS IGNORED

The light burners proposed to “control” the destructiveness of the deliberate firing by burning the woods in the spring or fall, when the woods are sufficiently moist to prevent the fire from seriously injuring either old timber or young trees. A careful study of the area where this system has been intentionally practiced shows that such control amounts to little or nothing. The light burners ignore certain basic facts about fire conditions in our western pineries. They ignore the rapidity with which evaporation under intense sunlight in warm weather

* **Editor’s note:** The author’s disparaging language about “Paiute forestry” reflected a cultural bias against American Indians and their land management practices. Today, the Forest Service seeks to integrate indigenous knowledge into its land management.

dries up the litter in the pine woods. A south slope will be so dry as to make any fire exceedingly hot and destructive before a north slope will burn at all. Areas which will burn but lightly and irregularly early in the morning will flare up and consume in the most approved fashion by midafternoon. The moisture following light spring or fall rains often disappears so rapidly that the period of "safe" burning is a matter of hours, not of days. Actually to burn the western pineries, as the advocates of this theory propose to burn them, would, if it could be done at all, entail a cost for effective control many times

greater than the cost of an efficient system of fire detection and suppression.

Light burning, in actual practice, is simply the old ground fire, which has been the scourge of the western pineries, under a new name. Its use means a deliberate continuation of the destructive surface fires that were steadily and irresistibly eating up the pine forests of our Western States until they were placed under protection. In every Western State without exception, the pine forests have been thinned out, cut down in area, and replaced here and there by

brush or grassland; have often become diseased; and have, as the result of fire, lost much of the young growth that normally they should contain.

This has not been brought about by a few large conflagrations. It is the cumulative result of one fire after another extending over a period of 50 to 100 years. Every time a fire runs over these areas, a few more old trees are hollowed out at the base so that the next high wind topples them over, a few more fine logs become infected with rot through surface scars, and more of the young growth by which nature constantly seeks to recover lost ground is crowded out by brush. If surface burning is not stopped, the end is total destruction, a destruction which, though less spectacular, is just as complete and disastrous as when a forest is consumed in a crown blaze that kills everything at once.

If surface burning is not stopped, the end is total destruction just as complete and disastrous as when a forest is consumed in a crown blaze that kills everything at once.

Left: An open stand of ponderosa pine in 1936 on the Ochoco National Forest in Oregon. Right: An old ponderosa pine in 1922 after its 20th surface fire, with the inevitable "catface" (fire scar) burned through. Many early Forest Service officials might have regarded such stands, maintained by frequent surface fires, as understocked and degraded, on their way to becoming shrubland or grassland as fires gradually killed the large old pines while preventing regeneration. That's what the catface photo from 1922 seems to suggest, probably why it was taken. By contrast, land managers today might regard the same fire-adapted stands as in good condition (fire regime I, condition class 1), the eventual demise of individual trees notwithstanding. Photos: Ernest Lindsay, USDA Forest Service (1936); W.J. Perry, USDA Forest Service (1922).





Aftermath of the Big Blowup of 1910 on the Lolo National Forest in Montana. William B. Greeley was on the fireline during the great fires of 1910, which left a deep and lasting impression on the early Forest Service. Under the leadership of Greeley and others, the agency embraced a national policy of fire control. Photo: USDA Forest Service.

SOME FORESTS TOTALLY DESTROYED

The total destruction of pine forests has actually been caused by repeated firing in many parts of the West. The national forests of California alone, where light burning is most strenuously advocated, contain nearly 2 million acres of pure brush patches that formerly were heavily timbered. These brush patches cover nearly 14 percent of the timber belt in the national forests of that State. That they were once pine forests is fully attested by the occasional snag or half-dead tree still left standing, by the charred stumps, by tree roots half rotted in the ground. Those brush patches represent a loss to the forest resources of California today that we can safely put at 37 billion [board] feet of standing timber, with a value of probably \$75 million; and that loss will go steadily on if light burning of the pine forests is permitted.

In many other pine areas, the stand of timber not only is much less than it should be because of frequent surface fires but also has been reduced in volume and quality by disease, which follows in the train of the fire. Incense cedar is one of the important trees in the California pine forests, but its timber is so defective that the lumberman has often been unable to log it at all. An intensive study of sample areas has shown that 84 percent of the rot in incense cedar is

traceable directly to fire scars. A large proportion of the loss in volume and quality of pine stumpage, which is a normal thing in practically all western pine camps, is due to the same cause.

Aside from the gradual wiping out of the mature timber in these virgin forests,

the system of ground burning effectively cleans them of young tree growth. If all of the seedlings and saplings are not destroyed in the first or second fire, the third or fourth fire completes the job. It is absolutely impossible to ground-burn large areas repeatedly and save any young growth on them. The actual fires of the light burner prove this, whatever he may claim. As a matter of fact, the light burner does not want young growth. It is part of the inflammable debris which he would get out of the forest so as to render a "serious" conflagration impossible. When the mature timber in a light-burned forest is cut, the forest is at an end. Its productivity ceases. It becomes a brush patch.

LIGHT BURNING MUST BE REPEATED

This is the real issue which has been raised by the advocacy of light burning. The best that can be said for the system is that it is a means for protecting mature timber, although at considerable loss in the stumpage projected, supposedly more cheaply than by an efficient system of detecting and putting out fires. Experience has shown that to protect the mature timber, light burning must be repeated regularly at least every 3 or 4 years. At every burning, a lot of brush and young trees are killed but remain on the ground, furnishing the most inflammable of fire food. They must be removed by a later burning, which in turn leaves a certain amount of dead and inflammable material in its wake. The accumulation of litter from the needles and twigs of old trees in itself destroys the protective value of a light fire in 3 or 4 years. To carry out this theory of protecting old timber, the ground must be burned again and again and again. It is preposterous to assert that young trees can survive this process.

If the only solution lies in ... light burning, we had better harvest our mature stumpage without more ado and then become a wood-importing Nation.

In other words, let us recognize frankly that light burning is simply part of the game of timber mining. To the gutting of heavy cutting, it adds the gutting of total destruction to young growth. To cheapen the protection and utilization of old timber, it deliberately transforms the forest into a brush patch.

The issue raised by light burning is not what its advocates claim—the utilization of fire properly controlled as a means of forest protection. Everyone recognizes the utility of fire if properly controlled. The burning of slashings on cutover land is often essential not only to eliminate a menace to adjoining stumpage but also to protect young growth existing on the cutover land.

It may even be wise to burn up some of the existing young growth in order to clean up the slashings and give the area greater safety from future fires. In Douglas-fir areas in the Cascade range, where the new forest must be grown from seed in the ground, it is good forestry to burn an entire cutover area cleanly under careful control. In most of our spruce, balsam, and hardwood forests, part or all of the new timber growth is or should be on the ground at the time of cutting. If the land is not to be denuded and its productivity brought to an end, that young growth must be preserved as far as possible, and the firing must be done so as to preserve it.

The issue raised by light burning is, rather, whether or not our forest protection in the West is to be the kind of protection that conserves and promotes tree growth or whether it is to be simply an adjunct of timber mining. It is for this reason that I stated with conviction at the beginning of this article that light burning strikes at the roots of our forest protection effort in the Western States. The people living in and near the western pineries have been taught to believe that fire must be kept out of the woods. To a surprising degree, they have recognized the truth of that slogan. They have supported State legislation and private associations based upon that principle. They have come to believe that fire and forest growth do not go together. Their support of a genuine system of forest protection has been not only to save their virgin stumpage but also to perpetuate their vast pineries, which mean so much to the economic future of the West.

INCENDIARISM GETS ENCOURAGEMENT

Now comes an insidious doctrine telling everyone that this system of fire protection that has been built up with so much effort is unnecessary; that all we need to do with our western pine forests is to “touch ‘em off.” The plausible arguments advanced in advocacy of light burning make this proposal exceptionally dangerous. It weakens the confidence of the general public in real fire protection. It weakens

the support given by timberland owners to organized protective efforts, such as those that State and Federal agencies and many associations have been successful in bringing about. It tends to block progressive fire legislation in the Western States. It tends to encourage incendiary fires by the settler, prospector, and stock grower who has reasons of his own for wishing to clear the woods. It is a direct challenge to a national policy of forestry, for it strikes unmistakably at the effort to keep timberlands productive rather than permit them to become waste.

It goes without saying that we all recognize the difficulty in protecting the western forests efficiently from fire. If the only solution lies in the uninterrupted destruction of young growth by light burning, we had better harvest our mature stumpage without more ado and then become a wood-importing Nation. But that is not the solution. Billions of acres of national forest pinelands demonstrate the results of 15 years of successful protection from ground fires. In these forests, the brush patches are disappearing in thickets of vigorous pine reproduction. The actual growth of timber has been increased several times over what it was during the days of periodic fire. Not only is the merchantable stumpage fully protected, but the growth needed to supply our future requirements is also now taking place.

We can have real forests, full of growth and promise for the future, in our pineries generally if all interests get behind a real program of fire protection. This means a harder and more united effort by all agencies, public and private. It means progressive State legislation, which will require the disposal of slashings on cutover lands and enlist all forest owners in organized fire prevention. We should also have Federal legislation, which will give the Forest Service much greater resources for cooperating with local agencies in fire protection.

FIRE PROTECTION WANTED

Doubtless, we cannot absolutely prevent the occasional destructive forest fire

any more than it has been possible to prevent it in the European forests. A considerable portion of southern Europe has a fire problem analogous to that in the Western United States. This protection problem has not been solved, as certain advocates of light burning assert, by the custom of making fagots from limbs and twigs. Fagot making is a negligible factor in European fire protection for the same reasons that it would be in the Western United States because it has such a relatively small effect upon the actual inflammability of the forest. Fire protection has been brought about in southern Europe by the same methods through which it must be brought about in the Western United States: by an organized system of detection and suppression in which improvements and intensive use of the forests are the principal factors. And still southern Europe has its occasional bad fires, which are just as destructive as any that have occurred in the western pineries.

We can, as in Europe, reduce the destructive fires to a negligible average or aggregate loss if our efforts are concentrated upon a genuine system of fire protection. The only kind of protection that this system must admit is one that promotes the productivity of our forest lands in the long run. In building up this kind of forest protection, the public has the right to expect the cooperation of the large western timber owners, who have acquired enormous holdings under the liberal policy of the Government in disposing of its public domain, and particularly of the large railroad companies, whose enormous grants of public timberland should be regarded as a public trust.

We should no more permit an essentially destructive theory, like that of light burning, to nullify our efforts at real forest protection than we would permit the advertisement of sure cures for tuberculosis to do away with the sanitary regulations of cities, the tuberculosis sanitarium, fresh air for patients, and the other means employed by medical and hygienic science for combating the white plague. ■



Fire effects from a stand-replacing fire in 1910 in the San Francisco Peaks, Coconino National Forest, AZ. The persistence of great fires in the 1920s–30s, with tens of millions of acres burning nationwide in some years, dashed early hopes that wildland fire would become as minor in North America as it was in northern Europe. Photo: USDA Forest Service.

The Future of Fire Control

John R. Curry

The article is adapted from Fire Control Notes 1(5) (August 9, 1937), pages 255–257. When he wrote this article, the author was a senior silviculturalist for the USDA Forest Service, California Forest and Rangeland Experiment Station.

The emergency aspects of fire control loom large. The ever-present possibilities of disaster tend to confine fire control thinking to matters of the moment, the day, and the season. Seldom, therefore, do foresters stand off to consider this problem in its broader aspects or to consider the gains that fire control is making relative to long-time needs.

It would be well for the people interested in this field to scrutinize our present attitude toward this work and our organization for it to determine whether this problem is being approached logically. Is our organization such that it will enable us to obtain the maximum

Fire control development is handicapped by the old idea that the fire problem is of temporary importance.

improvement within this field? Does fire control offer to professional foresters the opportunities found in other fields of forest administration? Should forest fire control be regarded as a major field of the profession of forestry in America? If so, is it gaining that recognition?

VAIN HOPE: EUROPEAN MODEL

In the opinion of the writer, fire control development is handicapped by the old idea that the fire problem is of

temporary importance; that, eventually, as a result of certain emergency measures to be taken in the present or near future, this activity will rapidly diminish in importance. There seems to be a hope that fire in America will eventually reach the minor status that it has always had in the managed forests of Europe.

This line of reasoning I hold to be wholly fallacious. Not only do present trends in the fire business indicate this fallacy, but our increasing knowledge of fire behavior also points to the error.

It is a matter of record that the fire problem is increasing steadily in importance with increasing forest use and higher forest values. The time may arrive when fire losses will be reduced to a point where they do not offer a serious obstruction to forestry practice, but the period when fire problems will not challenge to the utmost the ability and ingenuity of American foresters will arrive only if the American climate, American forests, and

American people change essentially from what they are today.

People who have been engaged in fire control work for the past 15 to 20 years are, I believe, ready to agree on the long-time, continuing importance of fire problems. If so, these people as a group should make their feelings known so that this activity may receive equal consideration with other professional problems.

Failure of foresters to recognize the long-time characteristics of the fire control job is responsible for the present lack of specialized organization and development in this field. Foresters have not approached the problem in a professional manner because they have hoped from the beginning that the fire problem could be solved by a few years of intensive educational effort. Despite such efforts, a fire problem still exists. How should foresters approach it as professional men?

PROFESSIONAL APPROACH TO FIRE CONTROL

The professional approach, as I see it, starts with a detailed analysis of the job. Essential to the professional approach is a program of action that provides for:

1. An understanding of the basic principles involved, and
2. The development of skills and techniques to gain the objectives.

Forestry's present store of information and accepted skills and techniques in fire control are meager. Consequently, the instruction provided in professional schools is entirely out of proportion to the importance of fire control in the field of forestry practice. The young forester finds himself ill prepared for the job, which often consumes the greater part of his efforts. The difficulty seems to be principally a matter of organization. Fire control cannot complain of neglect in the relative distribution of funds. Have these funds been used to the best advantage considering the long-time nature of the work?

On the national forests at the present time, there is little specialization in

The period when fire problems will not be a challenge will arrive only if the American climate, American forests, and American people change.



Fire camp in 1936 on the Siskiyou National Forest in Oregon. Early fire crews were usually made up of raw volunteers, with none of the specialized professional roles within fire crews and fire camps today. Photo: USDA Forest Service.

fire control. Fire work is handled by general administrators. Although these men may have a consuming interest in the job, they have scant time to give to the development of technical problems. Other important phases of forest administration, such as grazing, forest management, and engineering, have each their specialists, while the most important job of all is administered directly by the supervisor, necessarily a man whose attention cannot long dwell on a single activity. The complicated jobs of prevention, of selection and training of men, of planning detection, communication, and transportation, and of organizing for fire suppression are the responsibility of everyone and consequently the direct responsibility of no one.

REORGANIZATION NEEDED

In the regional offices, reorganization is also desirable. The attempt to organize the branches of fire control in certain western regions was, I believe, a move in the right direction and one that should be revived. At present, fire control is ordinarily administered by an assistant to an assistant regional forester. It is placed, along with other miscellaneous or general jobs, in the Operation division. Fire control consequently does not receive the attention that it should in the formulation of administrative policies and plans. The chief of fire control attempts, even in important fire regions, to administer the job with a handful of assistants. Considering the amount of money spent in this field, the lack of administrative overhead is obviously inefficient management.



A group of smokejumpers at the airport in Missoula, MT, preparing for a practice jump in 1941. The emergence of specialized fire crews like smokejumpers and hotshots signaled the growing professionalism of the Forest Service's wildland fire organization. Photo: K.D. Swan, USDA Forest Service.

A Division of Fire Control has been created in the Washington Office, and this is a big step toward recognition of this field. As yet, however, the division comprises only three men, a force that is obviously inadequate to promote this activity on a national basis.

The fact that present development of specialized technique does not always demand the use of specialists should not hold back the assignment of specialists to field control. The need exists for more intensive thinking and planning for all phases of this work. If able men are assigned to fire control jobs, the art will develop rapidly. It cannot develop until men of this type are given the opportunity to work on these problems to the exclusion of other pressing jobs.

Forestry's present store of information and accepted skills and techniques in fire control are meager.

RESEARCH NEEDED

Research in fire control is urgently needed to provide better basic information for the foundation of fire control work. The research men assigned to this work are few in number and their attempts to specialize in any one phase of the problem frequently meet with disfavor. If they spend their

time on one fundamental problem, there is pressure to study something more practical, and this pressure often results in the disruption of long-time research projects urgently needed to establish our scientific footings. Research men in this field number scarcely a dozen workers, far too few to adequately approach this pioneering field.

If forestry had developed first in America, fire control would now be recognized as a major branch of forestry. A science of fire control would have developed, along with recognized highly developed techniques of attacking fire problems. In this country there is now developing a science of fire control. Growth must be rather slow; however, foresters can foster or retard this growth by their attitude toward the problem.

If men in the profession recognize fire control work as a permanent pressing problem and as a real part of professional forestry work, it can and should be organized on an adequate basis. The sooner fire control is thought of in this light, the sooner will knowledge and success in this field increase. Foresters should work toward a situation in which young men entering the profession with a bent for fire control work may see a career ahead of them—a career offering opportunities comparable to those of other recognized fields. ■



Towards the Future ... Land, People, and Fire

William R. "Bud" Moore

The article is adapted from Fire Management 35(3) (Summer 1974), pages 3–5. When he wrote this article, Bud Moore was the retired chief of Fire and Aviation Management, Forest Service, Northern Region, Missoula, MT. The article is taken from his remarks at the 1974 National Fire Chiefs Meeting in Washington, DC.

On a hot July afternoon over 40 years ago, a fire broke out in the Bitterroot Mountains a half mile from the cabin where my lumberjack dad and I were cutting firewood for a living. Armed with a number 2 shovel and my double-bitted axe, I legged it up the valley and made first attack. Driven by strong

winds, the fire crowed up the mountain through the pines and firs, and I was soon joined by Ranger Earl Tennant, who led a crew of husky, well-equipped firefighters.

We stopped the fire some time during the night and began mopup immediately. I learned to dig out stumps, mix cool dirt and hot coals, fell burning snags, and feel for hotspots in the ashes with my bare hands. My work must have been acceptable, because Ranger Tennant asked me to join him to help chain the perimeter of the fire and calculate its size, which I recall to be about 80 acres (32 ha).

I like the direction towards high-quality land management that now prevails throughout the Forest Service.

Forest Service fire crew digging fireline in 1934. The author first joined the Forest Service on just such a crew. Photo: K.D. Swan, USDA Forest Service.

Fighting that fire was my first paid duty in the Forest Service. The wages were 35 cents per hour; big money for me at the time. Now, some 40 years later, the pay remains good and gets better every time Congress meets. Nonetheless, at a time when I feel most proficient in fire and land management, I'm leaving the Service. Let me tell you why.

DIRECTION TOWARDS QUALITY

I like the direction towards high-quality land management that now prevails throughout the Forest Service. If I didn't, I would stay and help you design a more promising future. The fire and related land management concept that I believe in have good momentum. If they didn't, I would stay and help you make them work.

Every land manager should have heard Ben Lyon and Tony Dorrell present fire in multiple-use management at this meeting—and heard Dick Worthington's vow that reforestation and timber stand improvement would not be invested where fuel treatment and past fire losses were unacceptable. Certainly, those and similar penetrating presentations dispel any doubt that professional fire management is well on the way.

Beyond that, I am possessed with overwhelming conviction that the time has come when I can do more lasting good for this country from outside the Forest Service than from inside. And I want to leave while I'm strong. I feel strong. The Forest Service and fire and air management are in good hands. So it is time to go.

Now, in leaving, I'm tempted to tell you what I think you ought to do. But that would be presumptuous and contrary to my beliefs that reasonable men and women reasoning together can make better decisions than any one of us can



Big Salmon Lake in Montana, part of the South Fork Primitive Area on the Flathead National Forest, now part of the Bob Marshall Wilderness. Bud Moore, Bob Marshall, Aldo Leopold, and others in the Forest Service gravitated toward a land ethic, leading the agency to establish a system of primitive areas that became the core of the National Wilderness Preservation System after Congress passed the Wilderness Act in 1964. The author revered such primitive landscapes. Photo: K.D. Swan, USDA Forest Service (1934).

do by themselves. Nonetheless, from among the many great opportunities available to you, I shall mention four toward which I would direct most of my personal energy if I were to stay in the Service with you.

REPLACE GROWTH ETHIC

The first is to help replace the growth ethic with a true land and people ethic throughout America. To do this, you have to rise above the commercial product preoccupation that dominates the industrial age in our country. You must take a step beyond Gifford Pinchot.

As a prerequisite, you should again read Pinchot's *Breaking New Ground*. Then ask yourselves two questions:

1. How adequate would Gifford's philosophies be in today's competitive world?
2. How far has forest management advanced beyond Gifford's early-day concepts?

The first is to help replace the growth ethic with a true land and people ethic throughout America.

This probe will tell you that, more than ever before, we have to learn to share and conserve all products from the Earth. Most encouraging is our land use planning, which helps chart the way towards a stronger land and people ethic. Tie fire solidly into that planning.

Don't forget that the national forests can be catalysts for cultural change throughout America.

And as you progress, don't forget that the national forests can be catalysts for cultural change throughout America.

DEVELOP PEOPLE

The second opportunity is that of developing people fully capable of implementing high-quality land management. Fire management is a part of this opportunity. Our direction is sound, our plans are comprehensive, and our concepts are visionary. That is as it should be because there can be little progress without visions and goals.

But future results will be as good as our people's capability to do the jobs; and today, especially in fire management, our concepts are beyond our personnel's ability to implement. Much of fire management's future, then, centers on strong professional and technical personnel development.

IMPROVE QUALITY, REDUCE COSTS

The third opportunity is to improve quality and reduce costs. The people of this country will not long tolerate huge expenditures like fire suppression without demanding full accountability, nor should they. Fire programs can be improved in many ways to achieve better quality at far less cost to the taxpayer.

Costwise, we have lots of belt tightening to do in fire. And I regret that I won't be here to help train and hold our personnel accountable for the costs as well as the results.

MAXIMIZE INVOLVEMENT

And fourth, we can maximize people involvement in all national forest activities. It is ironic that in these times, when the youth of our country want to take part in worthwhile causes, we in the Forest Service—and in all industrial operations, for that matter—seek to reduce the number of people involved in our activities.

The solution to this dilemma is perhaps the greatest challenge facing the Nation in the years ahead. The national forests should be leaders in meeting this vital social challenge. Rather than seeking only to hold personnel

Fire programs can be improved in many ways to achieve better quality at far less cost to the taxpayer.

ceilings at a minimum, plans for each enterprise should respond to the question, “Have I involved all possible people meaningfully in this operation?”

DEEPER FEELINGS

The above are logical goals to pursue. But logic is one thing, feeling is quite another.

So in leaving, I want to share more deeply with you what this Forest Service means to me:

Lightning over the Bitterroots and the smell of smoke on hot August afternoons ...

Elk tracks in new-fallen snow and frozen bedrolls in mountain cabins ...

The rattle of packtrain hooves on mountain trails and the resinous smell of lumber on the green chain ...

The clank and clang of traffic at Washington National Airport and the stillness of night in the Bob Marshall Wilderness ...



The Lochsa River, a designated wild and scenic river on the Clearwater National Forest in Idaho. For the author, who knew the area when it was still roadless and later served here as district ranger, protecting it was what the Forest Service was all about. Photo: USDA Forest Service (August 5, 2011).

The bawl of beagles on the Cumberland and a pert girl named Jan who docks float planes on Prince of Wales Island ...

Canoe paddles and spray splashes on the Shenandoah and burned chamise in southern California ...

Grizzlies digging marmots in the Beartooths and old Dora Eaton, who spent 96 years in the same Appalachian mountain hollow ...

Loons yelling in the Boundary Waters and lunch with the Secretary of Agriculture in the Washington cafeteria ...

Dirt and heat on the fireline and delightful secretaries in monotonous Government buildings ...

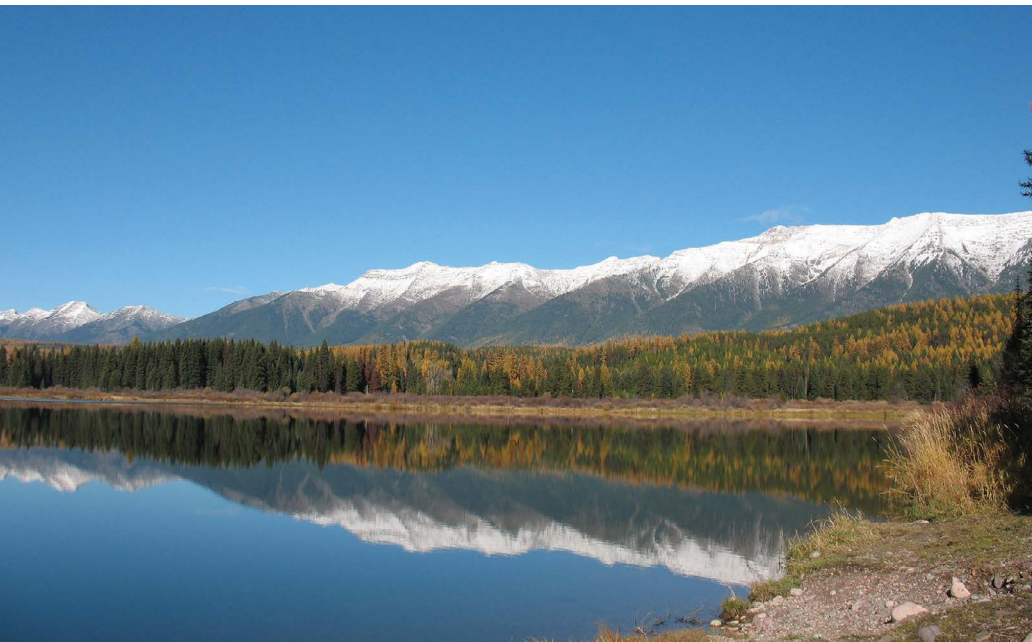
The tragedy of lives lost to fire and the delight of new research discoveries ...

Camping on 15 feet of snow in the Crags Mountains and flowers that open their petals only at night in Utah's deserts ...

Ski tips floating on deep powder in the Wasatch Mountains and empty bourbon bottles in New York's Hotel Astoria ...

People shouting, “Guard our land!” and the roar of bulldozers digging at the countryside ...

The Forest Service is comradeship, campfire rendezvous, training sessions, staff meetings; all this and much, much more.



The Swan Mountains and Rainy Lake, Lolo National Forest, Montana. For the author, the national forests were always “God’s Country.” Photo: Aubree Benson, USDA Forest Service (October 22, 2008).

But, to me, most of all, the Forest Service is the eager uncertainty of young men and women as they confront the old pro at their first job in the woods. With that thought, I want to tell you why I began work for and stuck with the Forest Service for over 40 years.

GOD'S COUNTRY

First of all, I love the land. To me, the national forests were God's Country. And they still are.

And the forest rangers were the best woodsmen, best packers, best rifle shots, and best fighters. Since I was only 15, I wasn't concerned about the best lovers. When I signed on, I thought I was joining the finest people in the country. Now, in leaving, I still feel that way about you all.

In reflecting on the past, it is obvious that critical events have much to do

with the course of life for each of us. Sometimes it seems we are born losers. Fortunately, some events make each of us a winner, too.

My big break in the Forest Service came when a ranger named Casey quit his job out in the Clearwater River country of Idaho. When Casey left, Forest Supervisor Myrick asked me to go out there and do the best I could to run the district. Thanks to some fine coaching by top woodsmen, I was ready, and Casey's resignation became my opportunity to bury myself in a lifetime of professional care for the land.

HIGH-QUALITY-PEOPLE SITE

In many ways, people are like trees. When you take an old tree out of a high-quality site, a vigorous sapling sprouts

to take its place. The Forest Service is a high-quality-people site. And in my leaving, I don't want you to merely gain another permanent full-time ceiling toward some reduced goal. Instead, I want the domino effect to cut loose one, maybe even two eager young saplings for full careers in service to our land.

So with full conviction that the Forest Service is in good hands, my wife Janet and I look forward to an exciting future. You can be sure that our eyes, our voices, our energies, and our pens will focus on the national forests. That's because, you see, we are convinced that America needs a stronger land and people ethic, and the best opportunity to lead the way lies with you who manage these priceless public lands. ■

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Management *today*

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- Wildland–Urban Interface

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Forest Fire Management — for Ecology and People

Jack Barrows

The article is adapted from Fire Management 34(3) (Summer 1973), page 16. When he wrote this article, the author was in the Department of Forest and Wood Sciences, College of Forestry and Natural Resources, Colorado State University, Fort Collins, CO.

Let the forests burn?

The provocative theme of this 1973 technical session [at the annual meeting of the Society of American Foresters] is punctuated with a question mark.

REEXAMINING FIRE CONTROL POLICY

Specific questions about letting forests burn involve considerations of ecology, outdoor recreation, timber supply, watershed protection, air and water pollution, and public safety. They are questions of why, when, and where.

Of special interest to foresters are the questions of how forests can be burned safely and efficiently to satisfy the needs of ecology *and* people. Also there are

the critical questions of who develops the policies, makes the decisions, and assumes the responsibility for the effects of forest fires.

I regard the present interest in reexamining forest fire policies as a healthy and timely development. Many forest fire control agencies have been doing this for some time. Professional fire personnel have long recognized the natural role of fire in some forest ecosystems. They have developed advanced technology for the use of fire.

Our knowledge of forestry and natural resources is now at a stage where a higher degree of sophistication in dealing with the many questions about forest fires is permitted. In particular, the advances in forest fire science and technology permit the development of significant new approaches to fire use and control.

If we are to achieve the potential benefits from an expanded role for the use of fire while at the same time

A patchy fire-adapted landscape with intermixed vegetation types—conifers, aspen, and meadow—in the Tenderfoot Creek drainage, Lewis and Clark National Forest, Montana. (Patches of gray indicate another kind of disturbance—insects and disease, perhaps precipitated by drought.) Photo: USDA Forest Service.

minimizing the hazards, it is critically important to develop appropriate concepts for the job at hand. We must gain a keen understanding of the whole galaxy of problems associated with both wanted and unwanted fires.

The phrase, “Let the forests burn,” whether used as a question or a slogan, is a gross oversimplification of the problem. Putting fire to beneficial use is a complex matter that cannot be answered by the simple expedient of letting the forests burn.

MANAGEMENT MAKES THE SCENE

However, there is an approach that will provide a coordinated program responsive to the complexities of forest fires. That program is appropriately termed Forest Fire Management.

First of all, forest fire management is based upon the concept that *fires in the forest may be either good or bad*. It also recognizes that the same fire may be good for some aspects of a forest ecosystem and at the same time be bad for the needs of forest industry or public safety.

Forest fire management is designed to resolve these conflicts. It applies management policies and technology for both wildfires and prescribed fires. It recognizes that factors of time, location, fuel flammability, ecology, and economics may make forest fires either wanted or unwanted.

Forest fire management provides systematic application of the alternatives for fire use, fire prevention, and fire suppression. ■

Return Fire to Its Place in the West

Bruce Babbitt

The article is adapted from Fire Management Notes 55(4) (Fall 1995), pages 6–8. When he wrote this article, the author was U.S. Secretary of the Interior, Washington, DC.

North of Interstate 70, in the Colorado Rockies, rise the slopes of Storm King Mountain. There, at 4 p.m. on July 6, 1994, a 300-foot (90-m) wall of flame swept uphill, taking the lives of 14 firefighters. The fire was not in redwood, pine, or cedar forests; it burned in shrubland of pinyon-juniper and Gambel oak.

From Mexico to the Canadian border, scrub trees such as these are taking over. Junipers advance across lowland

plains; doghair thickets of ponderosa pine fill gaps in the highland forests; spruce and fir crowd out aspen groves. In arid lands, these trees take what little water is available, creating a tinderbox of fuel.

WHAT HAS CAUSED THIS CHANGE?

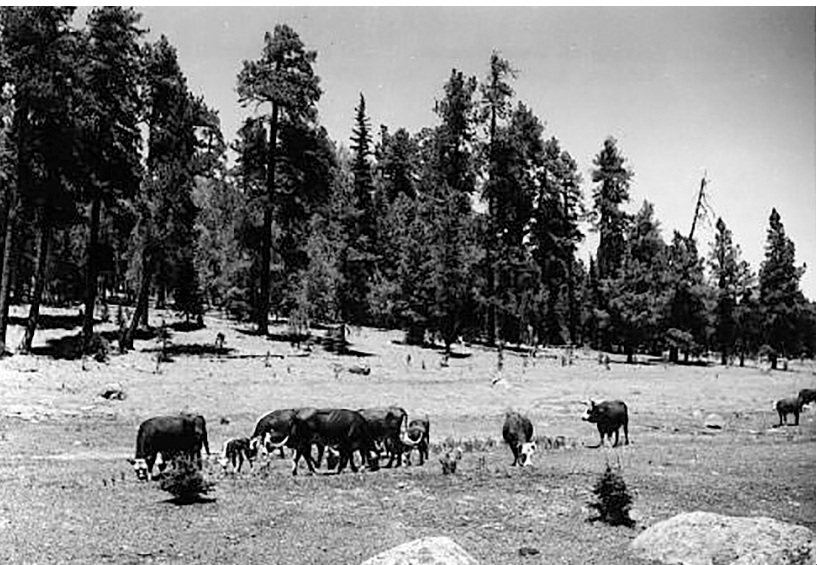
Why are our western forests and rangelands changing so dramatically? Because we have systematically removed natural fires. We have eliminated the frequent, light-burning fire cycles that used to thin the forests of young trees, kill off the spreading juniper seedlings, and hold brush in check.

The naturalist Aldo Leopold—then an Arizona forester and a firefighter himself—first recognized the extent of our impact in the 1920s (Leopold 1924). He observed a sharp contrast in the age grouping of Arizona junipers—ancient, fire-scarred trees that stood in a matrix of very young trees, all less than 40 years old—with no age groups in between. Leopold surmised that beginning in the 1880s, something had intervened to keep fires from spreading after ignition. That “something” was ranchers and their livestock; the ranges were grazed “to death.”

Even as Leopold documented his hypothesis, the Forest Service had begun a campaign to exclude fire across the continent. Sparked by the fires of 1910 in the Northern Rockies and prodded by the Government in Washington, DC, the Forest Service took up fire suppression with a vengeance.

The war on fire accelerated after World War II. Airplanes that had dropped paratroopers and bombs during the war soon carried smokejumpers, fire retardants, and chemicals—all with the aim of putting out every fire by 10 a.m. the next morning. It was an effective campaign—so effective, in fact, that

Left: Cattle grazing on summer range in Arizona in 1939, with ponderosa pine woodland in the background. Right: Bulldozer operations to control juniper encroachment on rangeland near Show Low, AZ, in 1957. As a forester and line officer for the Forest Service's Southwestern Region in the 1910s–20s, Aldo Leopold studied grazing effects on rangeland in the Southwest. He concluded that overgrazing during a cattle boom in the 1880s depleted native grasses that historically carried frequent low-severity fires through grasslands and open woodlands. The fires and competition from native grasses limited the number of woody plants, sustaining open rangeland. As the grasses vanished and the fires disappeared, woody plants took over, forming thickets of pinyon-juniper and ponderosa pine and depleting the range. Bulldozing and other brush control techniques that did not use fire had mixed success. Photos: USDA Forest Service.



even today it often mutes any suggestion that in some cases fire improved the health of ranges and forests and that there is a risk of excluding fire.

WHEN FIRES ARE EXCLUDED

Paradoxically, as fire exclusion escalates, wildfires fight back with increasing ferocity. In the absence of fire, ground fuel accumulates and crowded forests become more susceptible to disease and insect damage. So when lightning inevitably strikes, the odds are much higher that fire will flare up faster, burn hotter and higher, crown into the big trees, and demolish entire forests in what professionals call a “stand-replacing fire.” These intense, densely fueled wildfires are also increasingly expensive to fight—and they have unpredictable results.

The only way to break this vicious cycle is to put controlled fire back onto the land. We must return the flame to recreate the cycles of light burning where ground fires moved swiftly across the land, consuming brush and accumulated ground fuel, pruning out thickets, and maintaining healthy stands of forests.

Another advantage of prescribed fire is timing. Wildfires typically ignite at the worst times—during the dry “fire season,” when they can break out of

Putting prescribed fire back onto the landscape would be a lasting memorial to the brave firefighters who lost their lives in 1994.

control and when human resources and equipment are stretched dangerously thin. By contrast, prescribed fire allows us to choose weather, temperature, and season for burning, often in the spring or fall, when the air is cool and moist enough to keep fire within limits. Also, land managers have time to plan and construct adequate firebreaks or to reduce the fuel load by hand thinning around valuable sites and trees.

Yet, despite mounting evidence of the benefits, prescribed fire is still not widely used in the West (table 1). From 1984 to 1993, on 270 million acres (109 million ha) of U.S. Bureau of Land Management (BLM) lands, wildfire and prescribed fire together burned an average of 944,000 acres (382,000 ha) per year. At that rate, a given acre of BLM land would burn once every 287 years. An acre of national forest land would burn once every 237 years.

By contrast, studies show that the vast majority of western public lands, including rangelands, chaparral, and ponderosa pine forests, burned historically every 10 to 50 years. Prescribed burning should approach that historical level.

THE PUBLIC’S REACTION TO FIRE

Why have we been slow to return fire to its rightful place? For many years, the Smokey Bear-educated public saw only the risks of fire, not the benefits. Also, when the public learned that the smoke in their air came from planned fire, they instinctively opposed it. Similarly, the liability issues are quite real—no prescribed fire is ever 100 percent escape proof, and property damage can and does occur.

After the public’s initial shock at the [fire] damages in Yellowstone [National Park in 1988], once recovery began, it was clear that fires are a natural and necessary part of the ecological succession. The public must also learn that either we pay now with some inconvenience or we will undoubtedly pay a higher price later with larger, smokier, uncontrollable wildfires. And while fear of liability can paralyze prescribed fire managers at any level, the alternative of allowing fuel to build up to feed the inevitable big wildfire is even worse, as hillside residents in southern California can readily testify.

OUR CHALLENGE AS LAND MANAGERS

As managers of the land, our challenge is to assess those risks and work out cooperative protection agreements with participating landowners. Of course, we will have to coordinate prescribed fire plans with the U.S. Environmental Protection Agency and State air quality regulators. In addition, we must become forceful advocates of this forest health “tool.” If we gave prescribed burning just a fraction of the time and energy that our predecessors put into fire exclusion campaigns, prescribed fire would soon take its rightful place on the land management agenda.

Table 1—Average annual area burned on Federal land by wildfires and prescribed fires, 1984–93, by agency.

Agency	Acres (ha) managed	Acres (ha) burned	
		Wildfire	Prescribed fire
Forest Service	191 million (77 million)	535,700 (216,800)	305,550 (123,650)
Bureau of Land Management	270 million (109 million)	876,000 (355,000)	68,339 (27,656)
National Park Service	80 million (32 million)	219,500 (88,830)	66,500 (26,900)
U.S. Fish and Wildlife Service	92 million (37 million)	466,859 (188,931)	142,000 (57,500)

Note: ha = hectares.



Prescribed fire to maintain an open woodland of mixed conifer on the Colville National Forest in Washington. Photo: USDA Forest Service (April 9, 2001).

Bringing prescribed fire up to its full potential for restoring western forests and rangelands will require concerted action at both the Federal and State levels. A first essential step is for Federal agencies to elevate prescribed fire to full status in the Federal land use planning process. Both the Forest Service and the BLM are required by law to produce and regularly update land management plans at the forest and district level. Yet even a casual sampling of current plans reveals how little attention is paid to prescribed fire; most plans do not even discuss the concept, much less undertake serious analysis. Even environmental organizations—usually so quick to prod Federal agencies with lawsuits challenging the adequacy of the planning process—seem to have entirely overlooked the use of fire as a management alternative important enough to require discussion in virtually all land use plans.

Plans for the use of prescribed fire must include the States and their political subdivisions, for it makes little ecological or economic sense to confine prescribed fire to Federal lands when the benefits could be extended to all landowners—including State and private.

THE WEEKS ACT

Fortunately, there is a good precedent right at hand. In 1911, a time when fire suppression efforts often failed for lack of coordination, Congress enacted the Weeks Act. This act and successive legislation provided matching grants to States willing to adopt comprehensive fire suppression plans acceptable to both the State and the Forest Service.

The time is right to expand this proven Federal and State partnership beyond fire exclusion to the broader objective of introducing fire onto the landscape as a routine management tool. Congress could extend existing Federal cooperative grants to require that

States, to be eligible for existing revenue sharing, must produce prescribed fire plans acceptable to major Federal and State land agencies.

Arguably, we do not even need new legislation because the 1978 Weeks Act amendments expressly authorize the U.S. Secretary of Agriculture to provide assistance to the States to plan and organize programs of “prescribed burning.” In the 18 years since those words were written into law, individual agencies have made sporadic progress; yet the development of true statewide, multiagency plans remains to be achieved.

In the end, however, plans are just so much paper without the leadership and money to put them into effect. Comprehensive prescribed fire plans will require additional funds. The logical source of funding is revenue produced by public lands. Just as rent is a source of funds for the maintenance and upkeep of a building, so the receipts from the products of the land—like timber sales and grazing fees—should be allocated for upkeep of the land. We can easily obtain the dollars to invigorate and renew range and forest resources through prescribed burning.

A comprehensive movement that puts prescribed fire back onto the landscape, that increases the health and productivity of the land, and that reduces the risks and destruction of wildfires that do occur would be a lasting memorial to the brave firefighters who lost their lives during the summer of 1994.

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Valley Complex Fire in 2000, with elk taking shelter in the Bitterroot River near Sula, MT. Photo: John McColgan, USDA Forest Service (August 6, 2000).

How Can We Reduce the Fire Danger in the Interior West?

Mike Dombeck

The article is adapted from Fire Management Today 61(1) (Winter 2001), page 5–13. When he wrote this article, the author was the Chief of the Forest Service, Washington, DC.

Our highest goal on the fireline is to protect the safety of our citizens, including our firefighters themselves.

The 2000 fire season will long be remembered. By late August, more than 6 million acres (2.4 million ha) had burned nationwide, with much of the fire season left to go. On average during the preceding decade, only 3.6 million acres (1.5 million ha) had burned during the entire fire season. Nevertheless, the 2000 fire season was hardly exceptional from a historical perspective. From 1919 until 1949, more than 29 million acres (12 million ha)

burned on average each year, far more than in 2000—or any other year in recent decades.

In 2000, most of the worst fires were in the interior West. Their cause? A combination of hot, dry weather; prolonged drought; bad luck; and excessive fuel buildups that accelerated fire spread.

In August 2000, I traveled with President Bill Clinton, Secretary of Agriculture Dan Glickman, and Secretary of the Interior Bruce Babbitt to the Burgdorf Junction Fire on the Payette National Forest in Idaho. In addition, I discussed the situation and long-term prognosis with our leaders in the interagency wildland fire community in Boise, ID. Most importantly, I visited fire camps and rural areas in Idaho and Montana to talk with firefighters and community leaders, hear their insights, and listen to their concerns.

They taught me much about the wildland fire situation in the West.

Like other Americans, they wanted to know what more we can do to protect American lives, property, and wildland resources from the extreme fire danger of recent years in the interior West.

FIREFIGHTING PRIORITIES AND PREPAREDNESS

After more than a century of wildland firefighting, the United States has the best trained, best equipped, most effective firefighting organization in the world. The key to our success has been nationwide cooperation. Wildland firefighting today involves many partners at multiple levels, from rural fire departments to Federal land managers.

All wildland firefighters in the United States share the same priorities:

1. Our first priority is safety. Our highest goal on the fireline is to protect the safety of our citizens, including our firefighters themselves, from the dangers of wildland fire.
2. Our second priority is initial attack. Our forces are trained and equipped to detect fires immediately, get to them quickly, and extinguish them before they spread. On average, we suppress 98 out of 100 fires during initial attack. For the few fires that get away, we marshal all the resources needed for containment.
3. Our third priority is to protect our communities at risk, including residences, sources of drinking water, historical and archeological sites, and infrastructure (such as powerlines and transfer stations).

On every fire, we strive to protect our Nation's wildland resources.

The nerve center of wildland firefighting, in close collaboration with our State partners, is the National Interagency Fire Center (NIFC) in Boise, ID. When fires get too big or too many for local or regional control,

NIFC springs into action. Through NIFC, we mobilize and coordinate resources from across the United States to fight wildfires anywhere in the Nation. During particularly severe fire seasons, NIFC calls on military or international resources under longstanding collaborative agreements.

Each winter, based on the best information and science available, we make long-range forecasts of weather conditions and the corresponding fire danger anticipated for the coming year. By February 2000, NIFC was already preparing for what we thought would likely be a severe fire season. Under our National Fire Preparedness Plan, NIFC has five preparedness levels. Each level corresponds to a certain degree of fire activity, telling us what resources we will need to meet the challenge.

By August, NIFC was operating at preparedness level V, the highest level, with dozens of major fires burning in several regions at the same time and all regular firefighting resources mobilized. In the previous 10 years, we had reached level V only a few times, the last time in 1996.

Our resources were taxed, but by mobilizing our available reserves, we were able to deal with the continuing high levels of fire activity. Here's some of what we did:

- The Forest Service and the land management agencies in the U.S. Department of the Interior, including the Bureau of Indian Affairs, Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service, directed all qualified fire personnel to be listed for fire duty, regardless of other resource priorities.
- The Forest Service issued a directive permitting all qualified former employees to enlist for fire duty.
- NIFC mobilized firefighters from Alaska and the Eastern States, where the fire season was less severe, for service in the western contiguous States.
- At NIFC's request, National Guard and active-duty military units were mobilized for fire duty. Additional units were available for training if needed.



Airtanker retardant drop on the 2017 Thomas Fire in California.

Fuel buildups in our western forests are the single greatest source of fire danger we face.

- NIFC mobilized all available C-130 military aircraft equipped with Modular Airborne Fire Fighting Systems, which turn them into airtankers.
- At NIFC's request, Canada furnished firefighting personnel and equipment under longstanding bilateral agreements. Australia and Mexico also supplied firefighting resources.

SEVERE FIRE WEATHER

Why was the 2000 fire season so severe? The immediate reason was the weather. In areas of the West where the worst fires burned, the previous 10 years had been hotter than normal. In 2000, we faced drought conditions throughout much of the West. Fuels were tinder dry and highly combustible, so fires started more easily, burned more intensely, and spread far more rapidly than normal. Under these

conditions, the fire season began 6 weeks earlier than normal.

Many western forests are adapted to periodic fire because they evolved in a fire-saturated climate (Arno 2000). Worldwide, according to the fire historian Stephen J. Pyne (1982), an estimated 44,000 storms per day produce 8 million cloud-to-ground lightning strikes. One strike in 25 in the northern Rocky Mountains is capable of starting a fire. A single storm system in June 1940 started 1,488 fires in the Northern Rockies; another in July 1965 ignited 536 fires in the Southwest.

Under drought conditions, a lightning strike can burn and kill forest stands in patchwork patterns that can reach for miles. In fire-adapted forests, such fires play a natural role in recycling nutrients and regenerating forests. At higher elevations in the West, severe fires occur naturally every 100 to 300 years, depending on the locality and site conditions.

One of our largest fires in 2000, the Clear Creek Complex, burned more than 200,000 acres (80,000 ha) on the Salmon-Challis National Forest in Idaho. I visited the Clear

When we excluded fire from the land, we upset an age-old balance between humans and nature.

Creek Complex and asked Incident Commander Joe Carvelho what we could have done to prevent the fire. Joe just shook his head and said, “After some 30 years as a wildland firefighter, I can tell you this: there’s nothing anybody could have done to prevent this fire. The land was ready to burn, so it burned.”

Nationwide, the past 45 years show a steady fluctuation in fire severity from year to year, with severe fire seasons alternating with lighter ones (fig. 1). When the weather is hot and dry, there are more large fires; when it is cooler and wetter, fires are fewer. The worst fire seasons in recent years include 1996 (6.7 million acres (2.7 million ha) burned) and 1988 (7.2 million acres (2.9 million ha) burned). The 2000 fire season was part of the same cyclical pattern.

DANGEROUS FUEL BUILDUPS

But weather is not the whole story. It takes fuel to feed a fire, and people have profoundly altered the fuel structure in many of our western forests, especially at the lower elevations where most people live and travel. How have we changed fire patterns by tinkering with fuels? And what can we do about it?

The answers are inscribed into the history of the land. Our forest ecosystems most threatened by fire, such as ponderosa pine, once had thousands of small, low-intensity fires every few years. Most fires weren’t hot enough to kill mature trees, but they did thin out the forest understories. The result was open forest with widely spaced old-growth trees.

Fire is an essential component in most of our western forests. Many forest types have been burning for as long as anyone can remember, and the number of acres scorched in 2000 was not out

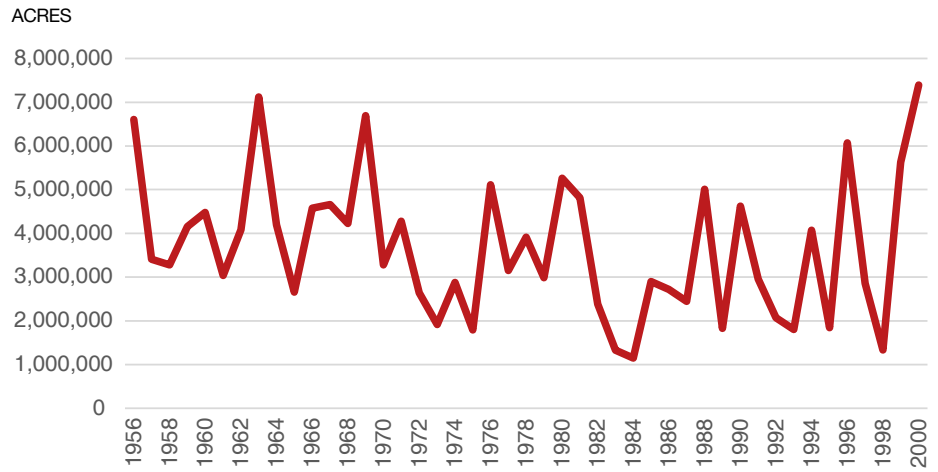


Figure 1 — *Acres burned in the United States by year, 1956–2000. Sharp fluctuations from year to year are due to changing weather conditions. When the weather is hot and dry, there are more large fires; when it is cooler and wetter, fires are fewer. Source: NIFC (2018).*

of the ordinary. For example, in the 1930s, 39 million acres (16 million ha) of our Nation’s forests burned on average each year, many times more than burned in 2000.

Some 90 years ago, we began putting out almost every fire we could because we thought fire bad for the land. By the 1940s, we had the resources to quickly extinguish most fires. Heavy vegetation, no longer cleared out by fire, built up in our open, lower elevation forests in

the West. For example, the density of ponderosa pines on Arizona’s Kaibab National Forest rose from 56 per acre (22 per ha) in 1881 to 851 per acre (344 per ha) in 1990 (GAO 1999). When fire now occurs, the dense fuels make the fire so intense that it can destroy entire forest stands.

In recent years, the average number of acres burned annually on our western national forests has soared. Today, 24 million acres (10 million ha) of national

Surface fire in 1931 on the edge of Garland Prairie on the Kaibab National Forest in Arizona, with ponderosa pines. Historically, such fires every few years kept grasslands and pine woodlands open. Photo: J.D. Jones, USDA Forest Service.



forests in the West are at high risk of wildland fires that could compromise ecosystem integrity and human safety. An additional 32 million acres (13 million ha) are at moderate risk. That's 56 million acres (23 million ha) at risk, or about 29 percent of the land in our National Forest System.

FALSE PRESCRIPTIONS

What's the answer? Some contend that we should just leave the land alone. After doing so much to despoil the land, who are we to tell Mother Nature what to do?

But most of the land is not in a natural state—and probably hasn't been for millennia. The land evolved with fire, often through firesticks brandished long before Columbus. We have ample evidence that American Indians used fire to clear many of our western valleys, creating the open, lower elevation forests that greeted the first European settlers (Boyd 1999; Pyne 1982; Williams 2000a, 2000b). When we excluded fire from the land, we upset an age-old balance between humans and nature.

The lush density of our western forests today is no more natural than the green of our lawns and gardens. Decades of fire exclusion have, in a sense, shaped

When we excluded fire from the land, we upset an age-old balance between humans and nature.

ecosystems that *never existed before*. Today, much of our landscape is a 20th-century product of our own firefighting success. To pretend otherwise, to shut our eyes and turn away from the thing we have created, would be to abdicate our responsibility as custodians of the land, our obligation to the American people to restore the land to health.

At the other extreme, some say we should build more roads and harvest more timber. The more we cut, they contend, the less there is to burn.

We tried that, and it didn't work. In the 1980s, we harvested up to 12.7 billion board feet (30 million m³) of timber annually from our national forests, three to four times more than we harvest today. To support the postwar timber boom, we expanded our forest road system to 380,000 miles (610,000 km), enough to circle the Earth 15 times.

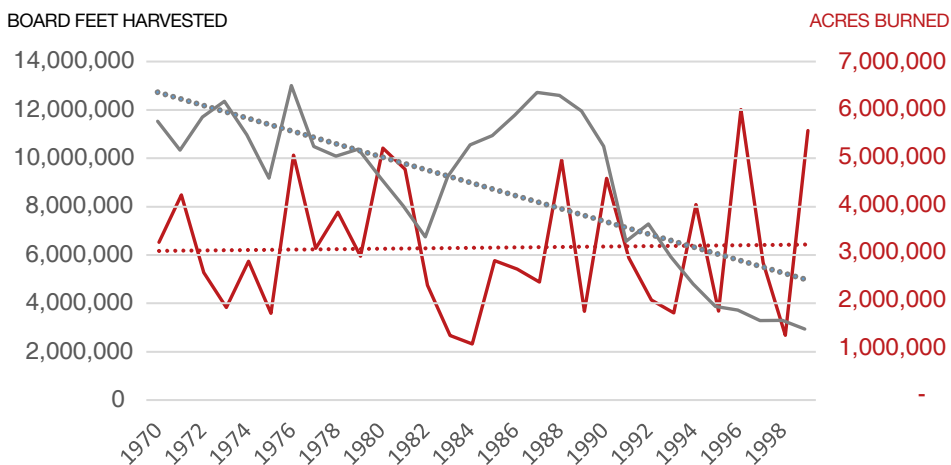
All that timber we harvested, all those roads we built at taxpayer expense did nothing to stop large fires. The soaring timber harvests of the 1980s coincided with some of our worst recent fire seasons (fig. 2). In fact, the 10-year average annual number of acres burned nationwide in the 1980s (4.2 million acres (1.7 million ha)) was higher than in the 1990s (3.6 million acres (1.5 million ha)), when timber harvest was low. There is absolutely no reason to believe that more commercial timber harvest will solve our wildland fire problem.

Why? Partly because large, merchantable trees—the kind that are profitable to remove through logging—aren't the problem. What we need to remove are the small-diameter trees and brush that have sprouted in the absence of low-intensity fire. These small-diameter materials, typically of little or no commercial value, are filling our forests, fueling our worst and largest fires. Fires that historically stayed on the forest floor now use small-diameter trees as handy ladders for climbing into the forest canopy, with devastating results.

Commercial timber harvest has a firm place on our national forests to help meet our Nation's need for wood fiber. But we must not let commercial interests masquerade as forest health policy. The goal of commercial timber harvest is the cost-effective removal of commercial-grade timber, not small-diameter trees that are relatively worthless on the market. Commercial timber harvest won't solve our forest health problem because that isn't its purpose.

In fact, the high harvest levels of the past were unsustainable. Today, Americans expect more from their national forests than just wood. They expect clean water; more than 60 million Americans get their drinking water from watersheds that originate on our national forests and grasslands. They expect healthy fish and wildlife and rich recreation opportunities. They expect to find places of beauty and serenity for solitude and spiritual renewal. Today, we harvest timber at lower, more sustainable levels—levels that will ensure not only

Figure 2 — Acres burned and board feet of timber harvested on the National Forest System, 1970–99 (NIFC 2018; USDA Forest Service 2018). There is no apparent correlation between the level of timber harvest and fire season severity. Relatively high harvest levels in the 1970s corresponded to both light and severe fire seasons in the 1970s–80s. A surge in timber harvest during the 1980s did not prevent relatively severe fire seasons in 1988 and 1990, and low harvest levels in the 1990s coincided with both light and severe fire seasons.



a steady supply of wood fiber but also all the other values and benefits that Americans expect from their forests.

THE SOLUTION: RESTORING THE LAND

Sooner or later, rivers will fill their floodplains and fire-adapted ecosystems will burn. However, we do have the ability, if not the will, to minimize the impacts of floods and fires on human beings by making thoughtful development and resource management decisions that acknowledge the realities of nature.

The key is living within the limits of the land. For that, we must look to the land and its history. If we impaired the health of the land by removing its low-intensity fire, then perhaps we can help bring the land back to health by restoring some of that fire.

The Forest Service has made a start. In the 1970s, we stopped excluding fire from the land. Today, we have a comprehensive fire management strategy that includes fire use and small-tree removal to treat excess fuels and reduce

the risk of unnaturally severe fires on our national forests and grasslands.

Where it is safe, effective, and appropriate, we are restoring low-intensity fire to the land. From 1994 to 1999, we increased our annual fuels treatments by more than 300 percent, from 385,000 acres (156,000 ha) to 1.32 million acres (534,000 ha), mostly through prescribed burning. That's still not enough.

Small-tree removal can be a tool for restoring forest health, and we are using it. Where vegetation is too thick to safely burn, we are exploring options for removing the small-diameter trees and brush that are overcrowding our forests. The trick is to find cost-effective ways to remove forest materials of little or no commercial value.

Through our Forest Products Laboratory, the Forest Service is finding new uses and markets for small-diameter timber. Our laboratory has an enviable record of working with private industry to improve wood use efficiency. For example, our innovation in recycling

and efficient wood utilization helped to increase products we can generate from a single log by 40 percent.

Today, one of our top research priorities is finding ways to utilize small-diameter trees. We are making remarkable headway: we have discovered ways to use small-diameter Douglas-fir for flooring and furniture and to use small-diameter red maple and ponderosa pine for building materials. In tandem with our research to make small-tree removal profitable, we are working with private industry to develop incentives for removing small-diameter trees.

Do our fuels treatments work? You bet. The 2000 fire season gave us plenty of evidence. On the Pike National Forest in Colorado, we treated a large area, then awaited the inevitable fires. Last June, the Hi Meadow Fire came roaring through the canopy, moving like a freight train. But when it hit the area we had treated, it dropped straight to the forest floor and started to crawl along the ground, burning the surface fuels and licking harmlessly at the trees. The stands we had treated were saved. On the Payette and Salmon–Challis National Forests in Idaho, I visited similar forest stands left intact after fires. The stands survived thanks to our treatments—prescribed burning and small-timber removal.

By no means, however, do we have all the answers. Forest Service researchers will review and evaluate various fuels treatments to assess which are most effective under what conditions and with what limitations. Our adaptive management dictates that we continue to learn from new experience, pragmatically applying treatments when and where they are shown to work. We must avoid quick fixes and one-size-fits-all approaches.

A COMPREHENSIVE FIRE MANAGEMENT STRATEGY

The Forest Service can't do it alone. Most wildland fires do not burn on national forest land. In 1999, for example, the National Forest System accounted for only about 11 percent of the acres burned nationwide. Moreover, wildland fires often cross jurisdictional

Prescribed fire to reduce fuels and let fire play its natural ecological role in a dry mixed-conifer forest type in central Oregon. The treatment was part of a 3-year Greater La Pine Basin Cohesive Strategy Project on Federal, State, and private lands near the community of La Pine. Photo: USDA Forest Service (January 26, 2017).



boundaries. Collaboration is the key to effective wildland fire management.

Our fire management strategy includes collaborative efforts to prevent wildland fires and to reduce fire severity by treating fuels. We are working with counties, States, and other partners nationwide, including homeowners and small woodlot owners, to reduce fuel loads and improve fire safety. Ultimately, private landowners must take responsibility for making their homes and properties firesafe by clearing away enough fuels to create a survivable space.

Through the collaborative National Wildland/Urban Interface Fire Protection Program [now the National Fire Protection Association's Firewise USA], we help Americans learn how to keep themselves and their property safe from wildfire. We furnish updates on fires and fire danger so people can plan for fire safety. For longer term planning, we offer tips on construction, landscaping, and other techniques for making homes firesafe and creating a survivable space.

Our fire management strategy includes rehabilitating burned areas. Wildfires leave behind safety hazards (such as falling snags) and the potential for property damage and resource degradation through postfire flooding and erosion. To counter the threat, we send Burned Area Emergency Rehabilitation (BAER) teams to areas affected by fire. BAER teams include hydrologists, soil scientists, engineers, archeologists, and other specialists who devise rehabilitation plans. Volunteers do much of the rehabilitation work, such as removing hazards and seeding burned areas. During and after the 2000 fire season, we treated hundreds of thousands of burned acres.

A LONG-TERM APPROACH TO LAND HEALTH

Fire has profoundly affected ecosystems in the past. Conversely, the absence of fire has severely affected ecosystems today, placing them at greater risk than ever. It took millennia for healthy forest ecosystems to evolve; after European settlement, it took decades to impair

their health. Restoring our forests to health will take more than just a few years. It will take imaginative new approaches based on our ever deepening understanding of the land and its history.

In the meantime, we can thank America's wildland firefighters—the best in the world—for risking their lives to keep the 2000 fire season from being far, far worse. It's worth remembering that 70 years ago, tens of millions of acres burned on average each year, up to 52 million acres (21 million ha) in a single fire season. In 2000, despite some of the worst drought conditions in memory, our firefighters succeeded in controlling almost every fire. For that, we owe a debt of gratitude to the skill and dedication of our women and men on the fireline, truly America's national heroes.

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SUCCESS STORIES WANTED

We'd like to know how your work has been going!

Let us share your success stories from your State fire program or your individual fire department. Let us know how your State Fire Assistance, Volunteer Fire Assistance, Federal Excess Personal Property, or Firefighter Property program has benefited your community. Make your piece as short as 100 words or longer than 2,000 words, whatever it takes to tell your story!

Submit your stories and photographs by email or traditional mail to:

USDA Forest Service
Fire Management Today
201 14th Street, SW
Washington, DC 20250

If you have questions about your submission, you can contact our FMT staff at the email address below.



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Living With Fire Isn't So Simple

Dale Bosworth

The article is adapted from Fire Management Today 64(4) (Fall 2004), pages 4–6. When he wrote this article, the author was Chief of the Forest Service, Washington, DC.

Would that it were so simple. Some would have us believe that if we just stop fighting fire, everything will be fine (Stahl 2004). Never mind the people who will lose their homes—they supposedly deserve it. Never mind the habitat loss for plants and animals—nature supposedly knows best. Just look, they say, at how the American Indians lived with fire.

WORKING WITH FIRE

Indeed, let's look. Near Seeley Lake, MT, where the spruce–fir forest naturally supports fires that are large but rare, researchers found a site where fires historically were far more frequent than nature would explain (Barrett 2004). American Indians using the site had burned the surrounding woods for centuries, perhaps to keep big fires from wiping out their camps in a drought.

A policy of allowing all fires to burn would be just as flawed as the old policy of putting them all out.

The Forest Service has done something similar at Seeley Lake by thinning to protect the local community.

Apparently, the American Indians did not believe that nature knows best. In fact, indigenous peoples nationwide used fire and other technologies to shape ecosystems to their liking (Boyd 1999; Pyne 1982; Whitney 1994; Stewart 2002; Williams 2002). Does that mean they were at war with nature? No. They worked with nature for self-protection and resource diversity. Many ecosystems flourished as a result, such as longleaf pine in the South (Bonnicksen 2000).

The Girard Grove near Seeley Lake, MT, with the world's champion western larch ("Gus"), more than a thousand years old and with a circumference of more than 22 feet. This site on the Lolo National Forest, restored by the Forest Service, was maintained by American Indians as an open mixed-conifer woodland through the frequent use of low-severity fire (note the ancient fire scar at the base of the tree). Photo: USDA Forest Service.

At the Forest Service, we learned the lesson long ago and ended the war against fire. Today, we work with fire to promote resource diversity and restore fire-adapted ecosystems. We stress homeowner fire safety programs, but we also protect the surrounding landscape. We do that because a home is more than just a house. Your home is the community you belong to. It's the surrounding landscape with everything it gives you, such as scenic beauty and clean water from your municipal watershed. If you've saved your house in a community devastated by fire—in a landscape blackened by fire—you've still lost your home.

Reconciling such needs in the context of fire-adapted forests and grasslands is central to our fire management today. Sometimes that means using fire in the woods; sometimes it means suppressing it. Through the use of both planned and unplanned ignitions, the Forest Service actually burns more acres on national forest land than we suppress.

MANAGING RISKS

Do we burn enough? Maybe not, but it's not as simple as that. A policy of allowing all fires to burn would be just as flawed as the old policy of putting them all out.

Three things keep us from using fire more:

1. The forests that need fire the most, such as ponderosa pine in the West, are often in no condition to burn. They are too overcrowded with vegetation. Under such conditions, simply letting fires go could have catastrophic results for communities and ecosystems alike.

2. Prolonged drought in many parts of the country contributes to the problem. When fire danger indexes are extreme, we usually decide to suppress fires that we might otherwise use to restore ecosystems. Our fire management plans never say, “Use fire no matter what.”
3. We use fire only within acceptable limits of social, economic, and ecological risk. For example, if a fire would severely damage soils or destroy habitat for endangered species, we suppress it. Our policy is to use fire where we can and suppress fire where we must.

The risks are compounded by the growing wildland–urban interface. Picture an island in a sea of gasoline. If you touch a match 10 or 20 miles (16–32 km) out, it might seem like a long way away, but the fire will still burn the island.

Our policy is to use fire where we can and suppress fire where we must.

Many forest communities are like that today. Surrounded by overgrown forests, they are in a veritable sea of fuels. Remote fires can easily roar out of the backcountry, like Cerro Grande did in 2002 [in New Mexico]. That same year, Hayman [in Colorado] made a 16-mile (26-km) run in a single day. Fire managers must weigh such risks before deciding to use fire in the backcountry.

THE RIGHT KIND OF FIRE

Our aim is to restore the right kind of fire to the land. Often, that means first thinning overgrown forests, then

waiting for the right weather conditions before igniting a burn. If we can restore healthy landscape conditions, then we can better control the results of a fire—yes, even in a drought. We’ve shown it again and again.

Our first priority, of course, is firefighter and public safety, but letting nature take its own course would not enhance human safety. Instead, it would heighten the lethal risk from huge fires like Biscuit in 2002 [in Oregon] or Cedar in 2003 [in California]. The best way to reduce the risk is to take some of the heat out of the ecosystem before these fires get started.

That will take some work. Nationwide, hundreds of millions of acres are at risk from wildland fires that could compromise human safety and ecosystem integrity (Schmidt and others 2002). Not every acre can be treated, nor should it be; strategically placed

Wildland fire bearing down on a home in the wildland–urban interface. This was the First Creek Fire in 2015 on the Okanogan–Wenatchee National Forest. Photo: USDA Forest Service.



treatments will protect and restore most values at risk.

Still, the needed treatments will be expensive. The question for Americans is this: Do we as a Nation want to pay sooner for treatments, or later—and vastly more—in human lives, suppression costs, and damage to homes, communities, and wildland resources?

NO EASY ANSWERS

There are no easy answers. Managing wildland fires is as complex as the ecosystems that Americans have entrusted to our care as public land managers. Decades ago, we moved beyond simplistic solutions when we dropped the old policy of fire exclusion. We cannot afford to go back now: a simple policy of not fighting fires is simply not an option.

For our policy to be sustainable, we must face today's fire environment in all of its social, economic, and ecological complexity. That means continuing to suppress fire where we must and using fire where we can while creating new fire use opportunities through ecological restoration. It's the best way to keep our firefighters safe, our ecosystems healthy, and our fellow Americans well served.

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Erratum in Spelling of Photographer Name

Hutch Brown

The lead article in *Fire Management Today* volume 76(2)—“Redirect That Load!” by Randall C. Thomas—contained the photo by the author shown here. The caption for the photo misspelled the photographer's name. It should have been Randall C. Thomas.

Hutch Brown is the editor of Fire Management Today and a program specialist for the Forest Service, Office of Communication, Washington Office, Washington, DC.





Managing Fire-Dependent Ecosystems:

We Need a Public Lands Policy Debate

Old-growth ponderosa pine woodland on the Deschutes National Forest in Oregon in about 1910. Such open stands, with perhaps a hundred trees per acre, were historically sustained by frequent low-severity fire (note the charring at the bases of some trees). Photo: USDA Forest Service.

Jerry Williams

The article is adapted from Fire Management Today 64(2) (Spring 2004), pages 6–11. When he wrote this article, the author was the Director of Fire and Aviation Management for the Forest Service, Washington Office, Washington, DC.

In wildland fire management today, we know that sustaining healthy, resilient fire-dependent ecosystems is the key to protecting people and property. We have departed from the policy of fire exclusion that characterized our fire management for most of the 20th century. There will always be a need to fight fire, but the wholesale exclusion of fire was a major

factor in putting our fire-dependent ecosystems at risk, particularly our long-needle pine forests, such as ponderosa pine. It is not so much that our suppression policy was flawed as it is that our fire use policy is too constricted.

THINGS COMING DUE

In a way, things are “coming due” for wildland fire operations in the United States. Things are coming due for our workforce—we rely on retirees during difficult fire seasons. Things are also coming due for some of our equipment, such as our airtankers—our average airtanker is 46 years old. And things are coming due for our forests—

nationwide, we have about 397 million acres (161 million ha) at risk from wildland fires that compromise human safety and ecosystem health (the area that Schmidt and others (2002) found to be in fire regimes I and II, condition classes 2 and 3).

The risk is due to altered fire regimes. Fire regimes are an expression of fire’s role in terms of historical or natural fire frequency and burning intensity. Fire managers expect large, stand-replacement fires in our long-interval fire regimes. Ecologically, that is how these forests established. Alarmingly, however, we are beginning to see landscape-scale, stand-replacement

wildfires in our short-interval fire regimes, such as ponderosa pine.

Sustaining these forests will require a management approach that uses fire as a bedrock. Historically, the ponderosa pine canopies were very open, with trees that were very big and widely spaced. Low-severity fires burned through on the ground every few years without doing much damage to the big trees. But fire exclusion and other factors allowed small trees and brush to build up in the understory. Today, where we once had a hundred large trees per acre, we might have thousands of small trees that “choke” the overstory.

In a drought, we now have continuous fuels from the ground into the canopy. When we get a fire, it climbs into the canopy and becomes severe and stand replacing. In 2002, four States in the West had their biggest fires ever, and a fifth State came close, partly because the fire regime has changed in our long-needle pine forests.

The USDA Forest Service recently mapped fire regime condition classes in relation to wildfire activity in the United

Fire protection in the WUI is not just about protecting houses—it’s about protecting quality of life.

States (Schmidt and others 2002). In many of our ecosystems, fire regimes have significantly changed from their historical range. The 397 million acres (161 million ha) most at risk nationwide constitute an area almost three times the size of France. In the West, nearly all of the area most at risk is ponderosa pine in the prolonged absence of periodic underburning.

From a social perspective, ponderosa pine forests are most common at lower elevations, where most people live, work, and play. That makes them of particular concern because of the huge fire danger they represent. It is no coincidence that many of our most costly, damaging, and destructive wildfires occur in these changed ponderosa pine forests, often in close proximity to the wildland–urban

interface (WUI). Stand structure is much more dense, with small trees and undergrowth choking the forest. Species composition has often shifted to Douglas-fir and other fire-intolerant species. And people have moved into the forest.

NEED FOR SOCIAL SCIENCE

That brings me to a second thing that we are learning to recognize: the *kind* of science we will need in fire management is evolving. Although the physical sciences will remain essential for understanding ecosystems and fire behavior, we will need a deeper understanding of the social sciences to help us widen the decision space we will need for ensuring the health, resilience, productivity, and safety of fire-dependent ecosystems.

The reason is that altered fire regimes in our long-needle pine forests are increasing the fire danger to communities. In the 2000 census, the five fastest growing States were all in the Western United States. By 2020, our 20 fastest growing counties are all expected to be in the South and West (Cordell and Overdevest 2001). Our population is gradually shifting from the Northeast and Upper Midwest to the South and West.

Why? Because people are moving to places they value for a better quality of life. People value forested settings. They value places with water, mountains, and amenities, such as hunting or hiking on public land. People are moving to the West or South to find these places. These are also the regions dominated by long-needle pine ecosystems with altered fire regimes.

The result is often a dangerous mix. People are moving in record numbers into forests that are increasingly susceptible to crown fire. The very qualities that people value—dense forests that provide a sense of seclusion and screening from neighbors—these same qualities put people at risk. The risks are enormous, and they go way beyond individual homes. If their houses are saved but the surrounding landscape is blackened, then as far as they’re concerned, people in the WUI

Burnout operations on the 2017 Tank Hollow Fire on the Uinta–Wasatch–Cache National Forest in Utah. Photo: USDA Forest Service.



We might argue that the extended-attack fire and the megafire are our two most important kinds of fire—one in terms of safety, the other in terms of cost.

have lost the very values that brought them there.

Fire protection in the WUI is therefore not just about protecting houses—it's about protecting quality of life. The wildland fire community is expected to protect the entire landscape—not only communities but also watersheds, viewsheds, recreational opportunities and other amenities, and forest health—everything people value in the WUI, everything they move there to find.

We will therefore need a better understanding of the social sciences. If we are going to protect quality of life in the WUI, then we have got to do more to understand people's motivations so we can better influence social attitudes and behaviors. We have to do a better job of addressing public biases and fears in connection with fuels management and fire use in our fire-dependent ecosystems. We also have to do a better job of addressing public preferences and lifestyles in the WUI. For that, we will need to take such fields as sociology, communications, community relations, and public administration more into account when we formulate policy for public lands.

FOUR KINDS OF FIRE

A third thing we are learning has to do with our suppression program in the context of the fuels and fire environment. Despite significant advances in our firefighting technology, budgets, and personal protective equipment, we are seeing an upward trend in the number of acres burned per acre protected. Also, again in spite of all the advances we've made, the number of entrapments and fatalities we're seeing remains a major concern.

Although accumulated fuels and drought predispose many of our forests to wildfires, we are coming to realize

that there are four distinctly different kinds of fire. We have good suppression strategies for two of them. But there are two other kinds of fire for which we do not have good strategies, and it shows in our statistics.

These four kinds of fire occur along a spectrum of size and complexity. They range from the small initial-attack fire to the enormous and complex "megafire." We have sound approaches for dealing with the small initial-attack fire and with the large fire. We train, organize, and staff to address the unique characteristics of these two types of fire. But for the transition or extended-attack fire and the so-called megafire, we do not do this well. We tend to treat the extended-attack fire like we do the initial-attack fire, only we fight it harder. And we tend to treat the megafire like the large fire, only—believing more is

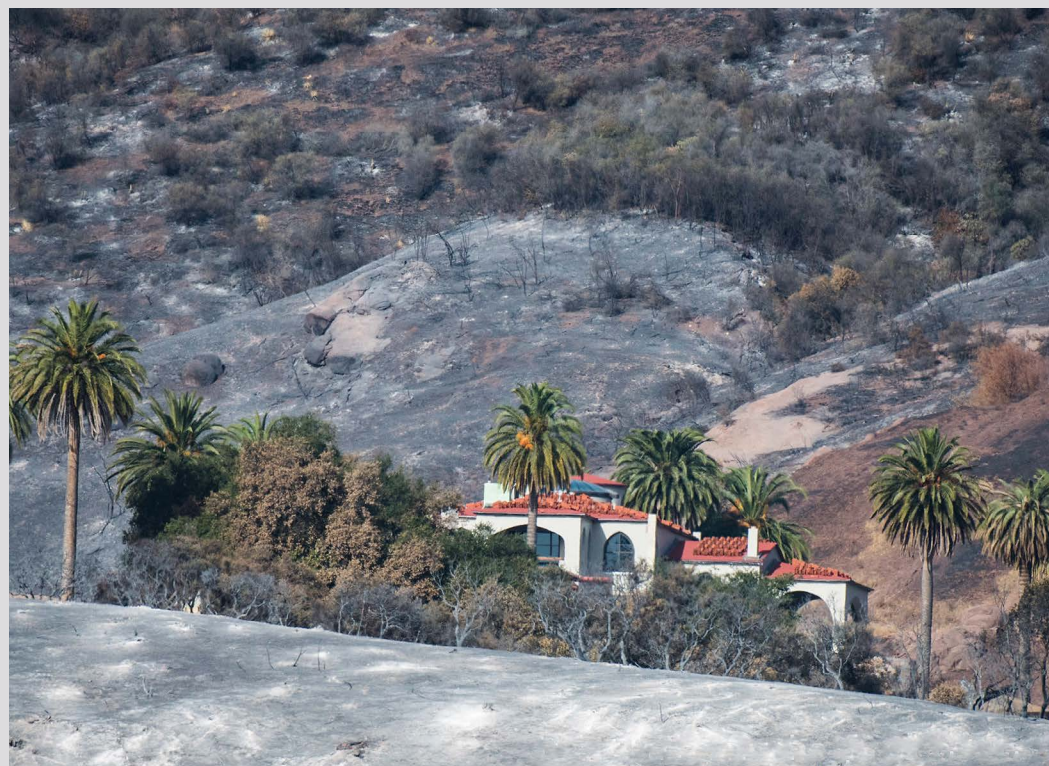
better—we fight it with more people, more equipment, and more money.

We might argue that the extended-attack fire and the megafire are our two most important kinds of fire—one in terms of safety, the other in terms of cost. Some 70 percent of our fireline fatalities occur on transition fires, such as South Canyon in 1994 or Thirtymile in 2001. We get into trouble when we keep using initial-attack tactics on a fire that requires a shift in thinking about potential fire behavior—when fire behavior has become too extreme for initial-attack tactics to be safe and effective.

Large fires and megafires are less than 1 percent of our fires, but they account for a disproportionately high percentage of our total suppression costs—about 80 percent—and of our total area burned—about 90 percent. The megafire accounts for the majority of these costs and acres burned, even though these fires probably comprise one-tenth of 1 percent of all fires.

We've learned that we can't go toe-to-toe with these big fires under extreme burning conditions. We've got to back off

Aftermath of the Thomas Fire, a megafire that started in December 2017 and burned more than 280,000 acres (112,000 ha) in southern California, resulting in two lives lost and destroying more than 1,000 structures. Photo: USDA Forest Service.





A restored fire-adapted ponderosa pine woodland on Oregon's Deschutes National Forest in 2017. Photo: USDA Forest Service.

and take a defensive posture. Megafires are qualitatively different from large fires and need a qualitatively different type of management, just as extended-attack fires need a qualitatively different type of management from initial attack. For both kinds of fire, we need to develop discrete strategies in terms of policy, procedures, and practices.

Many of us believe that the suppression fight against large fires and megafires will ultimately be won or lost on the fuels front, where we're using fire and mechanical fuels reduction tools to take a little heat out of the woods. Basically, we need to fight fire where we must but use fire where we can. We are getting megafires in long-needle pine forests because fire regimes there have been altered. The long-term solution is to restore these forests to something more resembling their historical condition and then get the right kind of fire back into the ecosystem.

Perhaps one of our lessons in accelerating fuels reduction work involves learning to mobilize for fire use operations like we mobilize for fire suppression operations. Although we've made progress toward a more balanced wildland fire policy, we still have to work on overcoming the bias toward fire suppression that stems from a legacy of fire exclusion.

NEXT BIG STEP

The three things we are learning—the need for more fire use, for a better understanding of the social sciences,

and for discrete strategies on the four kinds of fire—are all interconnected. In fact, our ability to make progress in one area depends on understanding all three. That brings me to what lies ahead: the next big challenge for wildland fire policymakers in the United States.

Many of us believe that the suppression fight against large fires and megafires will ultimately be won or lost on the fuels front.

Our objectives in wildland fire management are clear. Our aim is to protect values—to protect quality of life by restoring fire-dependent ecosystems such as long-needle pine. For that, we need to establish a total, balanced program of fire management where there is no longer any bias toward fire suppression or fire use.

Given these objectives, we have probably pushed our fire management policy about as far as we might effectively go. Today, our policy provides for fire use, suppression, and prevention. But I am afraid it is not balanced enough. I'll explain by giving a little history.

In 1995, the five Federal agencies with fire management responsibility in the United States wrote a collective policy

for fire management. In 2001, we updated the Federal fire policy. As part of the implementation process, we gave the revised fire policy to two outside panels for their review.

One panel was made up of fire experts. They were satisfied that our revised Federal fire policy reflected good science and sound fire management. The other team was made up of policy experts. They, too, were generally satisfied that we had provided a coherent fire policy.

But one of these reviewers, from the JFK School of Government at Harvard University, said our fire policy was missing something: a much larger public lands policy debate. We were setting ourselves up for failure, he said, without a broad public debate—a debate that addresses all the *long-term* social, legal, and economic factors that drive how we manage our fire-dependent ecosystems. These factors go way beyond our fire policy per se.

In other words, a sound fire policy must be predicated on a public lands policy that is not only socially acceptable but also ecologically appropriate and economically efficient over time. Our fire policy is somewhat “stuck” until we can do three things:

1. More effectively influence development or growth behaviors in the WUI;
2. Better align regulatory controls for clean air, clean water, and endangered species with the disturbance processes

Technical solutions are not enough. We also need social, legal, and regulatory solutions that focus on the dynamics of fire-prone forests.

that define our fire-dependent ecosystems; and

3. More specifically tailor resource objectives to be consistent with the ecological dynamics of fire-prone forests and grasslands.

Let me give a few examples to illustrate what I mean about the importance of a public lands policy debate for the viability of a balanced wildland fire policy.

First, let's consider the social influence on wildland fire policy. We know that we need to thin overcrowded long-needle pine forests to reduce fire danger in the WUI. The result would be a forest that is very open, with maybe only a hundred trees per acre. But people move to the WUI partly because they value the sense of seclusion and "naturalness" they get from lots of trees. They are used to seeing thick forests, with thousands of trees per acre. It's what they *think* of as natural and healthy, even if it isn't *really* natural, healthy, or resilient.

So people often object to a thinning project. Some people might object in principle to cutting any trees at all—there are even counties with ordinances against tree cutting. Other people might see it as affecting their quality of life if we remove most of the trees near where they live. In fact, our projects are often appealed and even litigated for just this reason.

Now let's look at the regulatory side of wildland fire policy. Under the Endangered Species Act, Federal land managers are legally bound to protect habitat for threatened, endangered,

and sensitive species. In the case of the northern spotted owl and Mexican spotted owl, we do that partly by managing for late-seral stand conditions to maximize canopy cover.

But managing for closed canopies might keep us in some places from restoring the more open forests that existed historically. The regulatory context can actually put us at cross-purposes. In fact, two of the megafires we had in 2002—the Biscuit Fire in Oregon and the Rodeo-Chediski Fire in Arizona—burned partly in areas we were managing for late-seral stand conditions. Ironically, such fires not only consume the old-growth forest we are trying to protect but also imperil the very species we are trying to sustain.

We are in some serious quandaries. Social and regulatory factors can freeze our ability to reduce fuels and restore long-term forest health. Here are some more examples:

- When we use fire, people sometimes object to the smoke. Under provisions of the Clean Air Act, prescribed fire emissions count as air pollution, whereas wildfire emissions do not—even though, over time, wildfire emissions have actually increased due to our attempts to exclude fire. People tend to focus on immediate impacts, not future benefits.
- When we mechanically thin trees, the reduction in vegetative cover can temporarily impair local water quality, which might trigger a

prohibition under the Clean Water Act. This is another example of a tradeoff between short-term environmental impacts and long-term environmental benefits.

- When we try to get people to be smarter about building houses and maintaining their property in the woods, they might see it as a States' rights issue or as Federal meddling in private affairs. Local building codes often favor economic expansion and development, even though development in some cases puts people, businesses, and local communities at risk in fire-prone forests.

We think we have the ecological science to restore fire-dependent ecosystems and better protect the people we serve, and technically maybe we do. But technical solutions are not enough. We also need social, legal, and regulatory solutions that focus on the dynamics of fire-prone forests.

As wildland fire professionals, we need to prompt a larger public lands policy debate that deals with values and tradeoffs if we hope to redeem our fire protection mandate. And we need to do it in the context of the dynamics of fire-dependent ecosystems. That is the next big step in the evolution of wildland fire policy in the United States—and maybe in other countries as well.

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We Need a New Age of Forestry

Jack Ward Thomas

The article is adapted from Fire Management 67(2) (Summer 2007), pages 39–40. When he wrote this article, the author was the Boone and Crockett Professor of Wildlife Conservation in the School of Forestry at the University of Montana, Missoula, MT. He was Chief of the Forest Service from 1993 to 1996.

A new age of forestry is needed in the United States. Recent dramatic declines in forest management have brought some undesirable consequences for forest health and wildlife.

Public concerns over retention of biodiversity (such as compliance with the intent of the Endangered Species

Act) have thrust concerns for wildlife front and center in forest management debates. Where those debates lead remains to be seen.

A total preservationist approach to management—standing back and letting nature take its course—has become increasingly prevalent. While appealing on the surface, this is not tenable in the long term because it will not protect forests, retain biodiversity, and provide some wood products over time.

A return to a totally economic-driven forestry is also not viable. Public reaction to past forest management practices—such as the visual impacts of clear-cutting—

The key to overall biodiversity will be creating and maintaining both younger early successional and late-successional forest stands.

Forest thinning in 1999 on the Umatilla National Forest in Washington to meet the national need for wood while also furnishing jobs. The thinning operation in a midsuccessional stand also restored a semblance of the increasingly rare early-successional conditions favored by many wildlife species. Photo: USDA Forest Service.

precludes harvesting at “economic maturity” from being the dominant factor in forest management decisions.

Public backlash to forestry practices of 1950 through 1975 resulted in a plethora of Federal and State laws and regulations that set forest management on course toward sustainability. Unfortunately, the pendulum of attitudes toward forest management has swung too far to the side of constraint.

WOOD CONSUMPTION

Today, most old-growth stands on public lands are protected, and provisions exist for recruiting additional old growth over the next decades and centuries. Many stands are in, or are moving into, middle-successional forest conditions—the least productive stage for enhancing biodiversity. The key to overall biodiversity, therefore, will be creating and maintaining both younger early-successional and late-successional forest stands.

Adding to the challenge of establishing the full spectrum of forest conditions essential to supporting the full spectrum of biodiversity is unprecedented wood consumption in the United States. Our per capita wood consumption rate is the highest in the world—and rising.

Increasingly, we depend on places beyond our borders to provide our wood, places with far less resources and knowledge of how to manage forests responsibly. When we import wood products, we export not only environmental consequences but also jobs and dollars.

Currently, the creation of younger forest conditions is increasingly dependent upon stand-replacing fire, insects

When we import wood products, we export not only environmental consequences but jobs and dollars.

and disease, and blowdown. Timber harvesting could play a similar role. The choice, to a large degree, is up to us.

The idea of “letting nature take its course” is seductive in its simplicity. But it has significant downsides. First, the timing, extent, and results of stand-replacing events are only marginally under human control. With human populations increasingly ensconced in forested areas, forest health already degraded, and the ability to use controlled burns limited, “hands-off” management—even for public lands—seems untenable in the long run.

Additionally, increasingly depending on “elsewhere” for our wood is morally bankrupt, economically unfeasible, and wasteful.

Clearly, there is work to be done in our forests. However, using taxpayer dollars for habitat alterations to provide

for biodiversity associated with early-successional forests and to protect structures in the wildland–urban interface against large-scale fires will prove cost prohibitive.

And, once such actions are begun, they must be maintained despite ever-mounting costs and the lack of offsetting returns.

A TRULY NEW FORESTRY

It seems the perfect time for a new forestry: not a simple reinstatement of what has gone before, but a new approach—one in which the environmental benefits are as significant as the wood produced. We have the know-how, technology, and trained professionals to do the job. Certainly, the need is ever more apparent.

This new forestry must focus on the landscape and accept the need to provide myriad values from our forests, including biodiversity, wood products,

clean air and water, and recreation. By adopting a new forestry on public lands and harvesting more trees from its private forestlands, our Nation can enhance biodiversity and lessen the impact of our consumption on forests around the world.

If the most fertile lands (usually in private ownership) were intelligently managed more intensively for wood production, pressure could be relieved on less productive lands. Those lands then could be managed with more emphasis on such things as biodiversity, scenic values, and watershed integrity.

The answer to what some consider past management sins is not prohibition. Rather, it is a change in approach to forest management—a new forestry. The old forestry is largely dead. But, we have learned much—enough to institute new approaches that will be more acceptable and more sustainable.

Like all species, humans must exploit the environment in order to live. There is no question of that. The question is how such will be accomplished in a sustainable and socially acceptable fashion. ■



Fire Management Into the Future

Tom Harbour

The article is adapted from Fire Management Today 69(3) (Summer 2009), pages 4–5.

When he wrote this article, the author was the director of Fire and Aviation Management for the Forest Service, Washington Office, Washington, DC.

Today, as I formulate this article, wildfires are burning in Arizona, California, New Mexico, and Texas. Earlier in the year, we've assisted in or managed fire suppression efforts in Florida, Oklahoma, and South Carolina. Another fire season is certainly upon us. So, what's different about this fire season? What's the same? And what does fire management look like as we look into the future?

WHAT'S DIFFERENT?

This year, we've received new guidance for the implementation of the Federal Wildland Fire Management Policy. While the policy itself has not changed,

the implementation guidance has been updated. That guidance established two categories of fire: prescribed fire and wildfire. Prescribed fires are defined as planned ignitions, while wildfires are started from unplanned ignitions.

Unplanned ignitions include the natural ignitions formerly referred to as wildland fire use. The new guidance allows for management of any naturally caused wildfire for resource benefits so long as the management response conforms to a unit's land and resource management plan. All human-caused fires, however, will continue to be suppressed using the safest, most efficient and effective means.

The Forest Service created the Wildland Fire Decision Support System (WFDSS) to provide incident-level support to fire managers under the "two-kinds-of-fire" framework. WFDSS is an array

Fire crew hiking into the 2016 Peterson Hollow Fire on the Uinta–Wasatch–Cache National Forest in Utah. Photo: USDA Forest Service.

of decision-support applications that calculate risk and probability and predict what might happen on a fire, providing fire managers with tools to determine the safest, most efficient and effective management options within applicable land and resource management plans.

WHAT'S IN THE FUTURE?

What changes do I see in our future? For an answer, I consulted the Quadrennial Fire Review (QFR). The QFR, an interagency assessment of current and future strategies and capabilities, identifies core mission points, future trends, and forces driving those trends. It is not a policy document and does not make policy recommendations. The first QFR was found to be an extremely accurate reflection of developments that have brought us to our current position. In January 2009, the second QFR was published. In it, I see the success of our future fire management efforts in promoting:

- Fire-adapted communities,
- Fire-adapted ecosystems, and
- Fire-adapted business practices—how we operate.

WHAT'S THE SAME?

What's the same is our ongoing commitment to long-term cooperation, management, and safety. We need to continue to work with existing partners, develop new partners, and make those partnerships as effective as possible. We need to continue our work to accomplish much-needed fuels projects to enhance the safety of communities and our firefighters when wildland fires happen. We need to promote the creation of fire-adapted communities

We need to use tools that help us evaluate risk and make better risk-informed decisions during fire incidents.

and elevate a widespread understanding of fire—how to live with fire and our responsibilities prior to, during, and after fire incidents.

We need to use better defined protocols for managing wildfires and the tools that help us evaluate risk and make better risk-informed decisions during fire incidents. The WFDSS tools will help managers identify and focus on high-value objectives where success is likely, making the best use of available firefighting resources.

We have a fire doctrine that promotes an informed, shared-learning culture in which firefighters avoid unnecessary risk and that encourages keen awareness and observation, knowing the leaders' intent at all times, and assisting with adaptable decision making in unexpected situations. Our doctrine is the heart of safe, effective fire management in this increasingly complex world of fire management. It's important that we continue to concentrate on the speed, agility, and focus associated with the fire doctrine at all times.

SUCCESSES AND CHALLENGES

The continued success of our efforts



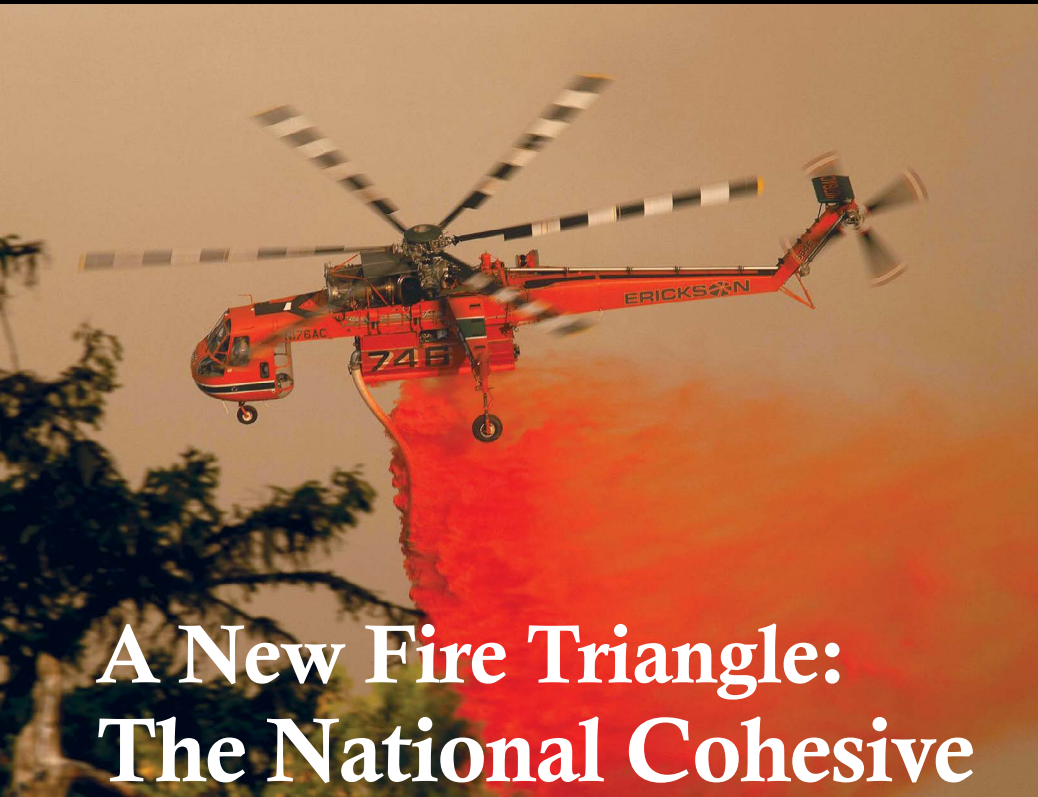
A firefighter from the Breckinridge Interagency Hotshots fires a section of prepared fireline on the 2018 Ferguson Fire near Yosemite National Park in California. Photo: USDA Forest Service.

depends greatly on our commitment to risk management and safety within our workforce and work practices. This requires continued investment in that workforce to meet and maintain the highest standards in the vital work we perform.

We work in a hazardous environment—it's a fact. The Federal Wildland Fire Management Policy, WFDSS tools, and existing doctrine can help us to minimize that hazard and be safe, efficient, and effective in our jobs; but it is incumbent upon us, both as an agency

and individually, to remain aware of the environment in which we work and look for ways to maintain safe practices in every aspect of our work.

In May of 2009, we mourned the loss of fellow firefighters Tom Risk, Mike Flynn, and Brian Bliss when Neptune Aviation Services Tanker 42 crashed while responding to a wildfire in New Mexico. We must always remember these firefighters and those we have lost before them, dedicating ourselves daily to safety and managing the risks we take in every action. ■



Heavy helicopter dropping fire retardant on the 2014 Happy Camp Complex Fire on California's Klamath National Forest. Photo: USDA Forest Service.

A New Fire Triangle: The National Cohesive Wildland Fire Management Strategy

Tom Tidwell

The article is adapted from Fire Management Today 70(2) (Summer 2010), pages 6–9. When he wrote the article, the author was Chief of the Forest Service.

Wildland fire is all about triangles—the familiar fire triangle of fuel, heat, and oxygen; the triangle that drives fire severity (fuels, weather, and topography); and the triangle of Federal, State, and local resources that provide fire protection in the wildland–urban interface (WUI).

Now there is a new triangle for fire protection in the WUI. Congress, through the Federal Land Assistance and Management Enhancement Act of 2009, has called on the U.S. Departments of Agriculture and the Interior to develop a joint cohesive wildland fire management strategy. In response, the Federal agencies are

preparing a strategy that focuses on:

- Restoring ecosystems on a landscape scale;
- Building fire-adapted human communities; and
- Responding appropriately to wildfire.

Each side of the triangle contributes to fire protection in the WUI. To succeed, each pillar in the strategy depends on the other two pillars.

ECOLOGICAL RESTORATION

One way to protect the WUI is to restore surrounding landscapes to a healthy, resilient condition. Healthy, resilient forest ecosystems are less likely to see uncharacteristically severe wildfires that turn into human and ecological disasters. The Forest Service is restoring healthy ecosystems and protecting the

When a wildfire burns into an area where fuels were previously reduced, the Forest Service consistently finds reduced fire severity.

WUI partly through the use of fire. As Stephen Pyne (2001) has noted, “Fire protection might be better grounded in fire’s calculated use than in fire’s unwitting suppression.”

Forest Service specialists are testing that hypothesis. When a wildfire starts in—or burns into—an area where fuels were previously reduced, the Forest Service assesses the results. In 2009, about a hundred such assessments consistently found lower fire severity, less damage, and lower suppression costs.

For example, the Los Padres National Forest in California conducted prescribed burns on more than 13,000 acres (5,260 ha) from 2005 to 2009. In 2009, when the La Brea Fire burned into the treated areas, suppression forces were able to contain that portion of the fire perimeter. Hundreds of nearby homes would otherwise have been threatened and many likely would have burned.

The Forest Service and other Federal land managers have taken such lessons to heart. From fiscal year 2001 (when the National Fire Plan was launched) to fiscal year 2008, the Federal land managers jointly treated 29.1 million acres (11.8 million ha), about 3.6

million acres (1.6 million ha) per year on average. More than half of the area treated was in the WUI.

But more is needed. Schmidt and others (2002) found that 127 million acres (51 million ha) of Federal land were at moderate to severe risk from uncharacteristically severe fires. At a treatment rate of 3.6 million acres (1.6 million ha) per year, it would take 35 years to treat the entire Federal area at risk, not to mention the much greater area—270 million acres (109 million ha) at risk in non-Federal ownerships. Meanwhile, millions of additional acres are likely to need treatment. Is the Nation even holding its own?

Restoration requires an all-lands approach, working across borders and boundaries to get the job done and marshaling resources across jurisdictions. The National Forest System contains only 20 percent of the Nation's forests. Fifty-six percent are in private landownership, and another 24 percent are in State, Tribal, county, municipal, and other

At a treatment rate of 3.6 million acres per year, it would take 35 years to treat the entire Federal area at risk.

Federal ownerships. Forest ecosystems typically form mosaics—mosaics of plant and animal communities and mosaics of landownerships. This is true not only in the East but also in the West, where the critical issues are the same: forest health, invasive species, fire and fuels, water quantity and quality, and wildlife habitat connectivity. Such issues neither begin nor end at national forest boundaries.

The Forest Service has therefore adopted an all-lands approach to conservation through cross-boundary partnerships. The National Cohesive Wildland Fire Management Strategy is



A partnership in Montana replanted a 55-acre burned-over area with whitebark pine seedlings in 2018 to restore habitat for Clark's nutcracker, Douglas squirrel, and grizzly bear. Partners included the Montana Department of Natural Resources, Swan State Forest, and the Flathead National Forest. Whitebark pine mortality in northwest Montana is the highest in the United States due to white pine blister rust, so the planted seedlings were selected from trees with high blister rust resistance. Photo: USDA Forest Service.

a start. Under the new strategy, Federal land managers will:

- Analyze the ecological components of landscapes that shape wildland fire conditions;
- Examine the impacts of wildfires, insects and diseases, invasive species, and vegetation management programs on the fire environment, especially in the WUI; and
- Identify strategies and priorities for fuels treatments and compare alternative fuels and restoration programs.

Based on the results, the Forest Service will work with partners across borders and boundaries to get more done on the ground—to build the fire-adapted natural communities needed to protect the WUI.

FIRE-ADAPTED COMMUNITIES

Ecological restoration is key, but it alone will not be enough. To protect the WUI, the Nation also needs to build fire-adapted human communities. About 70,000 communities in the WUI

are now at risk from wildfire, and only about 6,000—less than 10 percent—have community wildfire protection plans. From 2000 to 2008, nearly 28,000 homes, businesses, and outbuildings burned in wildfires. To make people, homes, and communities safe from fire, more work is needed, not only in the woods but also where people live.

No single entity can succeed alone. Federal, State, and local authorities have found effective ways of working together in the past. The Big Burn of 1910 set the stage for the Weeks Act of 1911 and the cooperative fire management partnerships that followed. The jurisdictional triangle of local, State, and Federal partners needs to become even stronger. The first step is to clearly define roles in order to build on each other's strengths.

The Forest Service's role is clear. The agency trains and equips firefighters to keep wildfires away from homes and communities—or at least to reduce fire severity to acceptable levels.

However, Forest Service firefighters are not trained and equipped for structure protection outside Federal lands. The



A home burning in the 2017 Uintah Fire near Ogden, UT. Photo: USDA Forest Service.

agency will do anything to save lives, but Forest Service fire managers will not put pilots and firefighters at risk—lives at risk—to protect someone’s poorly prepared private property in the WUI. Structure protection in the WUI is the role and responsibility of individual property owners and State and local agencies. It is up to State and local agencies—not the Forest Service—to protect structures in the WUI.

work through cross-jurisdictional partnerships before a fire starts rather than relying solely on suppression efforts after it starts.

The partners have an array of tools at their disposal. A good example is the national Firewise program, which encourages individual homeowners to take responsibility for making their properties firesafe. With funding from the U.S. Department of the Interior, the

Lightning-caused fires are often the only means, given limited resources, to achieve restoration goals on a landscape scale.

Individual homeowner responsibility is key. Americans have a long and proud tradition of individual freedom and private property rights, but with those rights and freedoms comes responsibility. The main responsibility for fire protection in the WUI lies with individual homeowners and communities.

Still, the Forest Service does have a role to play. Tens of thousands of Forest Service employees live in communities all over the country, many in the WUI. They have a vested personal interest in building fire-adapted communities. The Forest Service’s strategy is to

Forest Service administers a grant with the National Fire Protection Association to provide support and educational materials for the Firewise program. The program has been growing by leaps and bounds. From 2008 to 2009, the number of designated Firewise communities—communities able to survive wildfire without intervention—grew from 400 to almost 600.

Building fire-adapted human communities is the second pillar of the National Cohesive Wildland Fire Management Strategy, encompassing a series of tools, partnerships, and

processes needed to help communities reduce the risk of wildfire. Federal agencies will:

- Analyze the components of effective community wildfire mitigation;
- Assess the roles and responsibilities of Federal, State, and local governments;
- Examine land use and zoning;
- Study the use of community wildfire protection plans;
- Evaluate the effectiveness of fire prevention; and
- Explore the potential for engineered solutions, such as fire-resistant structures.

RESPONSE TO WILDFIRE

Nevertheless, even the best efforts to restore landscapes and build fire-adapted communities will not be enough. Suppression will be needed, and fire protection in the WUI will always be predicated on a response to wildfire. The question is: What is the appropriate response?

The question has two parts:

1. What should the Nation’s general strategy be in responding to wildfires?
2. What tactics should be used to implement our strategy?

The Big Burn of 1910 gave the Forest Service a rallying cry that resonated with Americans across the Nation: Put ‘em out, put ‘em all out, and put ‘em all out fast! Fire exclusion, in the form of the 10 A.M. Policy and various other policies, was for decades the national strategic response to wildfire.

It took decades to see how futile and misguided that policy was. Fire can be postponed, but in most landscapes, it cannot be excluded. Today, we are seeing the results: overgrown forests, in a drought, are fueling megafires. From 2000 to 2008, at least 11 States had record-breaking fires (Alaska, Arizona, California, Colorado, Georgia, Nevada, Oklahoma, Oregon, South Dakota, Texas, and Utah); if not for the Big Burn of 1910, the list would also include Idaho and Montana.



The 2018 Woolsey Fire bearing down on homes and communities in southern California. Photo: USDA Forest Service.

Accordingly, Federal wildland fire management policy has changed. The Forest Service still suppresses human-caused wildfires; but when lightning is the cause, if conditions are right, fire managers take the opportunity to allow fire to play its natural role. Lightning-caused fires are often the most appropriate means—often the only means, given limited resources—to achieve restoration goals on a landscape scale.

In summer 2009, the Federal land managers went a step further by revising their fire management guidelines (FEC 2009). Federal fire managers now have the flexibility to manage a lightning-caused wildfire to achieve multiple objectives. They also have the flexibility to change their objectives in response to the way a fire spreads across the landscape. Nevertheless, they remain as aggressive as ever in putting out wildfires that threaten lives, homes, and critical natural resources.

The Forest Service will aggressively fight fire in the WUI but will not put lives at needless risk.

But the most carefully crafted strategic response to wildfire isn't worth anything if not executed well. Forest Service fire managers have the expertise and experience to make sound decisions—to use the right resources in the right places at the right times.

The Forest Service will aggressively fight fire in the WUI, using every resource at its disposal. But fire managers will not put lives at needless risk. They will not put pilots in the air when it will make no difference in the suppression effort, and they will not put firefighters in harm's way when a fire will likely simply

jump over a fireline. To do so would be unconscionable, unprofessional, and irresponsible to the American people.

Appropriate fire response in the WUI is predicated on partnerships, and the Forest Service is strongly committed to supporting its State and local partners. In 2009, the agency provided:

- More than \$35 million in grants to State forestry agencies for preparedness, suppression, equipment, and other support, including training for more than 42,000 personnel;
- More than \$10 million in grants to volunteer fire departments for equipment and other support, including training for more than 24,000 personnel; and
- Through the Federal Excess Personal Property program, more than 800 pieces of equipment, including more than 400 trucks and trailers equipped with tanks, generators, and pumps.

A huge barrier to cooperative fire protection in the WUI is the inability of Federal, State, and local fire organizations to communicate with each other by radio. To solve the problem, the Forest Service is launching the Central Oregon Interagency Radio Integration Pilot Project. The goal is to have a single interagency radio system in place by 2013.

Appropriate fire response is the third pillar in the National Cohesive Wildland Fire Management Strategy. As part of the strategy, the Federal agencies will conduct a comprehensive analysis of wildfire response and suppression capabilities and provide a comparative analysis of suppression program alternatives.

RELATIONSHIPS ARE KEY

To summarize, the new cohesive wildfire management strategy rests on three pillars:

1. Restoring fire-adapted natural communities;
2. Building fire-adapted human communities; and

3. Responding appropriately to wildfire.

These three elements form a triangle for fire protection in the WUI. Each is necessary for success; and all three sides of the triangle rest, in turn, on the jurisdictional triangle of cooperation and collaboration among local, State, and Federal authorities. With this relationship in mind, citizens in and around Federal lands will be better able to live with fire than simply be subjected to it.

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A Forest Service engine crew from the Shasta-Trinity National Forest in California patrols for spot fires on the outskirts of a community during the Carr Fire in 2018. Photo: USDA Forest Service.





Bridger–Teton National Forest in Wyoming, part of the Greater Yellowstone Ecosystem. This national forest alone has more than 3.4 million acres of public land with pristine watersheds, abundant wildlife, and tremendous opportunities for outdoor recreation. Photo: Will Pattiz, USDA Forest Service.

Wildland Fire Management and Shared Stewardship*

Victoria Christiansen

The mission of the Forest Service is to sustain the health, diversity, and productivity of the Nation’s forests to meet the needs of present and future generations. Our mission extends beyond the national forests to the entire Nation’s forests and grasslands, and we work with State and private partners nationwide to support sustainable forest management across our Nation.

SUSTAINABILITY

The key phrase in our mission statement is “to sustain,” and conservation—or wise use—has always been at the core of our mission. Under visionary leaders like President Theodore Roosevelt, our Nation decided to leave a legacy of forests for our children and grandchildren. Americans developed methods and models for the sustainable use of America’s forest resources across landownerships—on State and Federal lands, on Tribal lands, and on private lands.

Today, Americans share a belief that forests are vital to families and

America’s forests are a broad social good that is vital to national prosperity and to personal well-being.

communities—that forests are a broad social good, vital to national prosperity and to personal well-being. All Americans, whether they own forest land or not, benefit from the Nation’s forest resources.

Forests provide sustenance, including 51 percent of the Nation’s water supplies. The national forests and grasslands alone account for about 18 percent of the Nation’s drinking water. Forests are also an indispensable source of green energy and green building materials. Forests furnish habitat for native fish and wildlife, along with outdoor

recreation opportunities for millions of Americans each year. Forests are places of privacy, of peace and seclusion and great natural beauty. Forests are home to many Americans, part of their family legacy, places where they can enjoy friends and family, places where they can indulge in the great American traditions of hunting and fishing.

All this is possible because America’s forest landowners and land managers long ago embraced the sustainable use of forest resources. Thanks to Theodore Roosevelt and other early conservationists, a third of the Nation’s

Vicki Christiansen is the Chief of the Forest Service, Washington Office, Washington, DC.

* The article is based on a speech by Chief Christiansen on May 3, 2019, in celebration of the 20th Anniversary of Forests and Fish, Washington Farm Forestry Association, Silverdale, WA.



A Redding Hotshot, Laura Spellman, uses a driptorch in a burnout operation on California's Mendocino National Forest to contain the Mendocino Complex Fire in 2018, the largest in State history. Photo: Cecilio Ricardo, USDA Forest Service.

land area is still forested today. In fact, the United States has the world's fourth-largest forest estate.

CHALLENGES

But America's forests are being whittled away by land use conversion to developed uses. Other challenges include habitat loss and forest degradation associated with a changing climate, including bark beetle outbreaks. Invasive species such as emerald ash borer, woolly adelgid, white pine blister rust, spotted knapweed, and more are threatening both forests and rangelands.

One national challenge is wildfire. Our Nation has over a billion "burnable" acres of vegetated landscapes, most of them naturally adapted to periodic wildland fire. About 80 million acres on the National Forest System overall are at risk from catastrophic fire, and about a third of that area is at high risk. Hundreds of millions of acres of other lands are also at risk, whether State, private, county, Tribal, or other Federal. We are all in this together.

In 2017–18 alone, wildfires burned almost 19 million acres nationwide and destroyed more than 26,000 residences.

Our Nation has over a billion "burnable" acres of vegetated landscapes, most of them naturally adapted to periodic wildland fire.

Worse, more than a hundred people died in wildfire entrapments, often while fleeing their homes. Over the last few decades, the western fire season has grown at least 2-1/2 months longer, and we have seen the frequency, size, and severity of wildfires increase. Primary drivers are climate change, drought, hazardous fuel buildups, and the spread of homes and communities into fire-prone landscapes.

In fact, large parts of the West are in a "new normal of fire activity," where a full suite of environmental, social, political, financial, and cultural factors drive outcomes in the wildland fire environment. The wildland fire system we have today is so incredibly complex

that no single entity can do it alone—not the Forest Service, not the States, not any given fire department. We are all in this wildland fire system together.

A decade ago, the entire wildland fire community came together to draft a common vision for improving our wildland fire system. The Forest Service worked with State and other partners to develop a truly shared approach called the National Cohesive Wildland Fire Management Strategy. Our approach has three national goals:

- Restoring and maintaining resilient landscapes;
- Creating fire-adapted communities; and
- Responding safely and effectively to wildfires, with decisions based on risk analysis for all ownerships.

The Cohesive Strategy is part of being good neighbors, a national priority for the Forest Service. Being good neighbors takes active management—using every tool and authority we have to improve the health of America's forests. The tools we have include timber sales, targeted grazing, herbicides in some cases, stewardship contracts, prescribed fire, and managed unplanned ignitions. Our tools also include fire prevention programs, community wildfire protection plans, and Firewise practices for homes and communities to reduce the risk of catastrophic wildfire.

The authorities we have include the appropriate use of environmental assessment and decision making—using sound science and data to make sound decisions. In 2018, Congress gave the Forest Service new authorities to improve the condition of America's forests. For example, we now have expanded stewardship contracting authority for up to 20 years. The Nation needs market solutions to remove small-diameter trees for forest health, and our 20-year contracting authority will attract the needed investments in biomass and smallwood processing.

We also have expanded Good Neighbor Authority with States and Tribes. Through our Good Neighbor Authority, we can pool resources for

all kinds of fuels and forest health treatments on Federal lands and adjacent lands as well as for projects related to wildlife habitat, soil and water, and data collection. We now have 166 good neighbor agreements on 56 national forests in 36 States.

We are using our tools and authorities to improve forest conditions. In 2018, the Forest Service treated nearly 3.5 million acres through timber sales and prescribed fire, the highest levels ever. We sold 3.2 billion board feet of timber—the most in 20 years, creating jobs through a sustainable flow of forest products.

SHARED STEWARDSHIP

But it still isn't enough, so we simply can't go on doing business as usual.

Another priority for the Forest Service is promoting shared stewardship by increasing partnerships. We need

The Cohesive Strategy is part of being good neighbors, a national priority for the Forest Service.

others to help us make a difference across shared landscapes, so we are committed to working with partners and landowners to accomplish work on the Nation's forests in the spirit of shared stewardship. We believe that joining together across shared landscapes and around shared values is critical for the future of conservation.

The reason is this: the scale of our work has to match the scale of the risks and the problems we face. For example, salmon face risks ranging from the oceans to

headwater streams—and all points in between. If we want to have salmon, we need to mitigate the risks by working with partners at the appropriate scale.

We now have an opportunity to match the scale of our work to the scale of the fire risks we face as well. In the past, our projects to mitigate fire risk have been randomly scattered across landscapes because no one was able to get their arms around the problem of fire risk. If a severe fire came, the project usually worked: the fire dropped from the canopy to the forest floor, where firefighters could control it before it burned into homes and communities. But we had no good way of assessing the full scale of the risk and placing our treatments accordingly.

Now we have new tools for understanding a whole range of conditions at landscape scales. Today's megafires can travel for many miles

Truckload of small-diameter ponderosa pine from the Kaibab National Forest in Arizona, loaded in December 2018. The logs are from a 1,342-acre treatment area, part of the broader Four Forest Restoration Initiative to treat more than 2.4 million acres of ponderosa pine through a stewardship contract. The treatments open the stand structure of ponderosa pine, allowing fire to return to the land. Photo: Lance Cheung, USDA.



to threaten homes, communities, and other values. The entire area at risk is called a fireshed, and scientists can now map entire firesheds, including all the Federal, State, private, and other landownerships that collectively make up an individual fireshed. We can also map the contribution to fire risk from each parcel of land, and we can

We now have an opportunity to match the scale of our work to the scale of the fire risks we face through shared stewardship

use that information to forecast what might happen if we put various kinds of treatments here or there. Through scenario investment planning, we can place the right treatments at the right scale in the right place.

We can use the same approach for other kinds of threats, like invasive species. Through planning at the right scale based on the outcomes that stakeholders agree on for shared landscapes, we can place treatments of any kind in a cost-effective way to achieve shared goals. The Forest Service is proposing to apply the new technology through shared stewardship, with the States taking the lead. The States will convene partners to set broad priorities across shared landscapes for the outcomes that stakeholders want. Then we will use our new planning technology to come to agreements with communities and stakeholders on the right tools to use at the right time in the right places at the right scale.

Why should the States take the lead? Each State has a forest action plan that can serve to coordinate fuels and forest health treatments across planning areas that span jurisdictional boundaries. The States are also uniquely positioned to convene stakeholders across firesheds to evaluate the wildland fire environment, agree on cross-jurisdictional planning



Good Neighborhood Authority agreement signed by the Forest Service and the State of Montana on July 18, 2016, on Chessman Reservoir near Helena, MT. The agreement allows Montana to collaborate with the Forest Service on Federal projects to improve forest conditions. Left to right: Montana Governor Steve Bullock, Montana Department of Natural Resources and Conservation Director John Tubbs, former USDA Under Secretary Robert Bonnie, and Northern Regional Forester Leanne Marten. Photo: USDA Forest Service.

areas, use scenario planning tools to assess fire risks and alternatives for managing the risk, and set priorities for investments that will bring the most bang for the buck.

SHARED STEWARDSHIP CAPACITY

Our capacity for shared stewardship comes from decades of cross-boundary and collaborative work with partners of all kinds, in part through our State and Private Forestry and Research and Development organizations. We have also gained experience in working through partnerships on landscape-scale restoration projects, using tools like thinning and prescribed fire across landscapes in multiple ownerships. That has given us the experience we need to lay the foundations for new partnerships with stakeholders across shared landscapes to achieve common

goals. Not least, the National Cohesive Wildland Fire Management Strategy gives the entire wildland fire community a common basis for working together toward the same goals.

The stars are aligned. The Forest Service has signed a memorandum of understanding on shared stewardship with the Western Governors Association. We have also signed shared stewardship agreements with Idaho, Utah, and Washington, with more agreements to come. We are confident that shared stewardship will form the basis for a new stage of cross-boundary collaboration to restore healthy, resilient forested landscapes and to protect homes and communities from the ravages of wildfire for the benefit of generations to come. ■



A visitor lays a wreath at a marker for a fallen firefighter in Mann Gulch. Photo: USDA Forest Service.

Mann Gulch Revisited

Hutch Brown

The Mann Gulch Fire on August 5, 1949, marked a milestone in the history of wildland fire management in the United States. Thirteen of 16 firefighters assigned to a small wildfire on a remote Montana ridge perished when the fire blew up. Twelve of them were smokejumpers from the Missoula Smokejumper Base. It was the worst tragedy in smokejumper history.

Although Mann Gulch has been thoroughly studied (Maclean 1992; Maclean 2003; Matthew 2007;

Rothermel 1993; Rothermel and Brown 2000; Turner 1999a, 1999b; USDA Forest Service 1949; WFLDP, n.d.), it holds a special place in the lore of wildland firefighting. The fire inspired a deeply moving song (James Keelaghan's "Cold Missouri Waters," first recorded in 1998) and a rare feature film (*Red Skies of Montana*, released in 1952) (Pyne 2000).

Following the 70th anniversary of Mann Gulch, the tragedy is worth another look, if only in tribute to the 13 firefighters who gave their lives in service to their Nation—and to the 3 firefighters who survived.

GATES OF THE MOUNTAINS

Lightning ignited multiple fires on August 4, 1949, in the Big Belt

Mountains of western Montana. In 1805, members of the Lewis and Clark Expedition, traveling up the Missouri River after leaving the Great Plains, camped in the mouth of a gulch just upriver from Mann Gulch. Captain Meriwether Lewis, inspired by the water gaps cut by the Missouri River through limestone cliffs a thousand feet high, christened the area Gates of the Mountains.

In 1949, Mann Gulch was on the Canyon Ferry Ranger District of the Helena National Forest. The gulch was in an area designated by the Forest Service as "wild," now the Gates of the Mountains Wilderness Area. Accordingly, the area was (and is) roadless and little traversed. Visitors enjoyed its spectacular beauty from boats on the Missouri River, and some people



Mann Gulch (center) on the Missouri River, with part of Meriwether Gulch visible at upper right. Steep limestone ridges are cut by gulches that are dry for most of the year. The fire ignited on the ridge at lower right, and smokejumpers landed around the bend in Mann Gulch, near its head. The fire blew up after spot fires ignited in the mouth of Mann Gulch. Driven by upcanyon winds, the fire front swept through all of Mann Gulch and spilled over into a neighboring gulch (center left). Photo: USDA Forest Service.

Hutch Brown is the editor of Fire Management Today and a program specialist for the Forest Service, Office of Communication, Washington Office, Washington, DC.

With the fuels tinder dry, lightning ignited a fire on a ridge overlooking Mann Gulch.

camped or picnicked in the dry gulches between parallel ridges. The Helena National Forest maintained a picnic area in Meriwether Gulch, on the east side of the river just south of Mann Gulch. A seasonal worker was posted in the Forest Service's Meriwether cabin to maintain the picnic area and patrol for fires.

Like other gulches in the area, Mann Gulch is bordered by steep ridges

capped by limestone rimrock at elevations more than a thousand feet above the mouth of the gulch. The upper slopes are lined with stones from the eroding rimrock. The north-facing slopes support mixed-conifer forest, whereas the drier south-facing slopes are covered by grasses and forbs, with scattered shrubs and ponderosa pines. The landscapes are adapted to wildland fire; high-severity grass fires return to the

south-facing slopes at intervals of up to 25 years (Turner 1999b).

FIRE START

On August 4, 1949, the fuels were tinder dry, and lightning ignited a fire in conifers on the ridge separating Mann Gulch from Meriwether Gulch (fig. 1). Unnoticed at first, the fire was finally detected on the morning of August 5, a day with record-breaking heat. When he learned of the smoke from a passing tourist boat (Turner 1999b), the fire guard posted in Meriwether Gulch went up to the ridge to launch a single-handed initial attack. He left a note tacked to his cabin door: "Gone to the fire. Be back at 3 PM, Jim."

At about the same time—late morning—the district ranger learned of the fire from a lookout tower. He promptly scouted the fire by airplane and reported it to be burning 6 to 8 acres (2.4–3.2 ha) on the ridge between Mann Gulch and Meriwether Gulch (fig. 1). After conferring with the forest supervisor in Helena, he planned to assemble a fire crew at the mouth of Mann Gulch.

He also ordered a smokejumper crew from the Missoula Smokejumper Base. He expected the smokejumpers to drop into Mann Gulch, then join his crew at the mouth of the gulch to fight the fire from below (Maclean 1992).

By late afternoon, the district ranger was ferrying in firefighters by boat when he noticed that the fire was

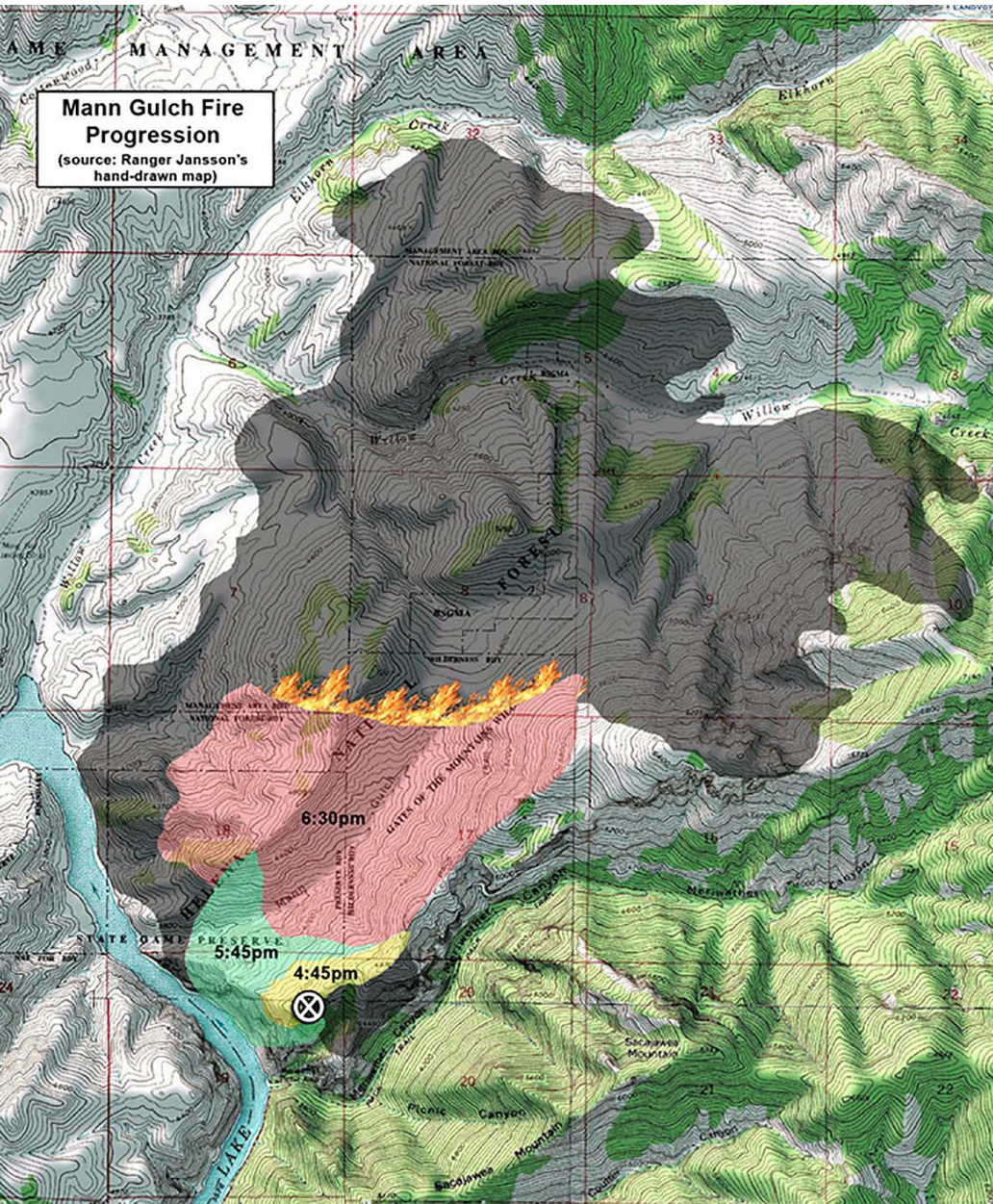


Figure 1—Progression of the Mann Gulch Fire on August 5, 1949. The fire started on the ridge (X) overlooking the Missouri River (blue) between Mann Gulch and Meriwether Gulch. The initial fire spread was along the ridge to the northwest (yellow), with slopover into Mann Gulch; later, the slopover extended into Meriwether Gulch (green/dark gray). Winds blew embers across the mouth of Mann Gulch (green), starting spot fires and initiating rapid fire spread in Mann Gulch and the gulch to the north (green/red). The fire went on to burn more than 4,000 acres (1,600 ha) (dark gray). Source: USDA Forest Service.

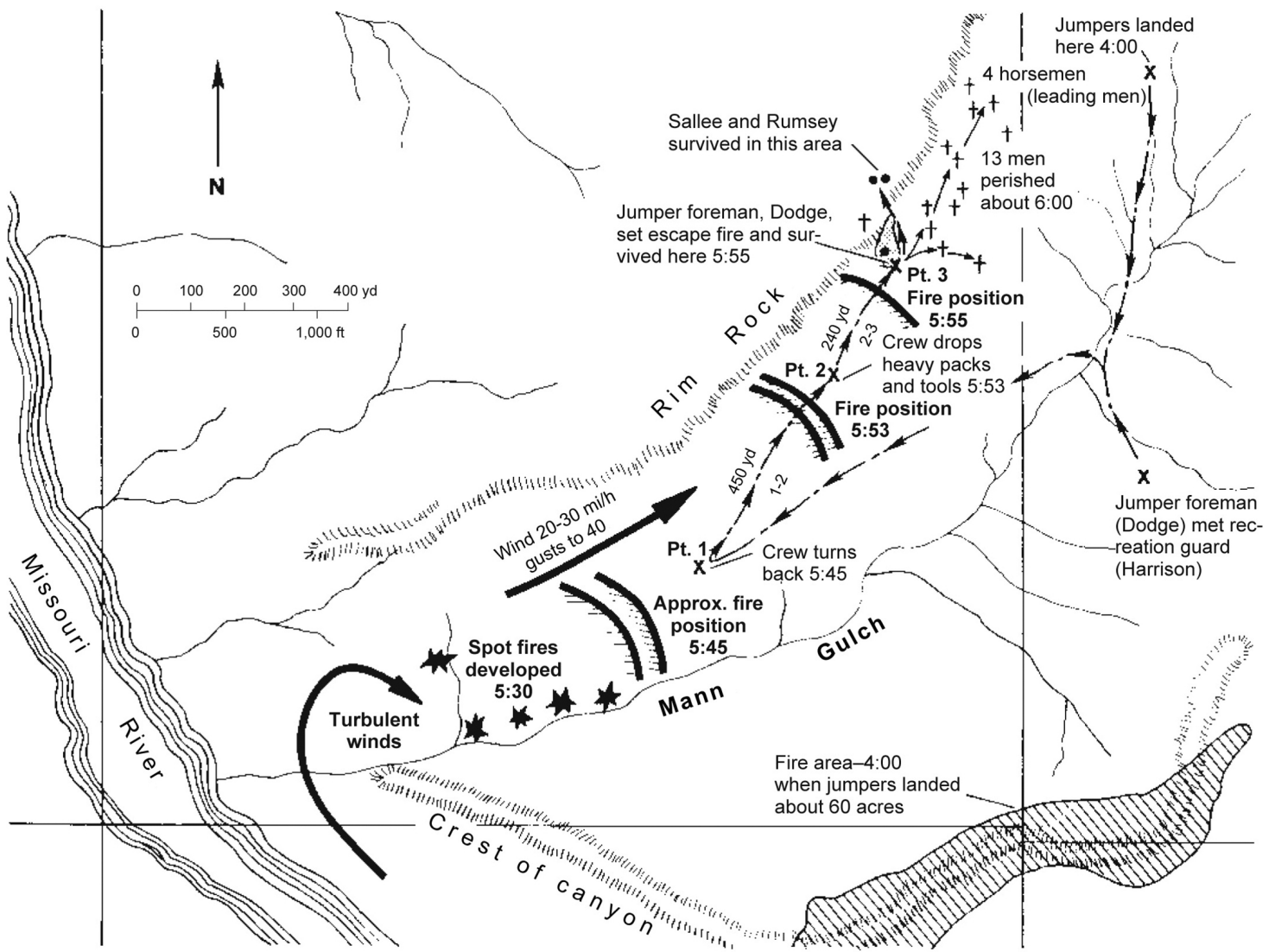


Figure 2—Course of the Mann Gulch tragedy. When the smokejumpers landed near the head of Mann Gulch (X, upper right), the fire was actively burning on the ridge overlooking the gulch (hatched area, lower right). The crew headed down into the gulch, and the crew foreman then went upslope to meet the fire guard from Meriwether Gulch (X, center right). The crew then headed toward the mouth of Mann Gulch along the middle of the south-facing slope. When the foreman saw the spot fires created by turbulent winds, he ordered the crew to turn back (X, Pt. 1). Chased by the wind-driven fire front (black bars), the crew headed upslope, angling toward the ridge, until the foreman ordered the firefighters to drop their gear (X, Pt. 2). The firefighters ran upslope to a point where the foreman lit his escape fire and survived (X, Pt. 3). Two smokejumpers made it across the ridge and survived. Thirteen firefighters were caught by the flames (crosses); two lived until the next day. Source: USDA Forest Service (Rothermel 1993).

Fifteen smokejumpers landed near the head of the gulch and collected their gear.

slopping over onto the Meriwether side of the ridge (fig. 1, green). He abandoned the idea of controlling the fire in Mann Gulch in favor of protecting the superior scenic values

in Meriwether Gulch (Maclean 1992). He tried to radio the smokejumpers in Mann Gulch, wanting them to cross the ridge to join his crew on the Meriwether side of the divide.

But the smokejumpers' only radio had broken during their jump into Mann Gulch. When his radio attempts failed, the district ranger sent his crew up the ridge to attack the fire in Meriwether Gulch. Then he took the boat downriver to Mann Gulch to look for the smokejumpers. He arrived at about 5 p.m.

INTO THE FIRE

About 2 hours earlier, a C-47 transport plane with a crew of smokejumpers from the Missoula jump base was circling over the area of the fire. The spotter and the crew foreman sized up the fire from the air, estimating it at 50 to 60 acres (20–24 ha) (fig. 2). Driven by winds from the river, the fire was burning mostly northeast along the ridge but was backing down into Mann Gulch in timber on the upper third of the ridge.

The foreman planned on looping around the fire to anchor fireline along the river, with the river itself as a safety zone.

The spotter and crew foreman were both experienced firefighters, and both judged the risk to the smokejumper crew to be minimal (Maclean 1992). Initial crowning on the day before had burned itself out on the ridge, and the fire was now moving entirely along the ground, with no visible spotting or torching.

By 4:12 p.m., 15 smokejumpers had landed near the head of Mann Gulch and collected their gear, depositing it in a cargo assembly area near the dry bottom of the gulch (fig. 2). Despite the loss of his radio, the foreman was confident that his elite smokejumper crew could control the fire, even without help from the other firefighters he expected to find on the fire.

The foreman planned on looping around the fire from below to anchor fireline along the river, with the river itself as a safety zone. Evening was approaching, and he expected the winds to die down, with less fire activity overnight. Working through the night, the smokejumpers would corral the fire from its flanks, controlling it by 10 a.m. the next morning.

After letting the firefighters eat in the cargo assembly area, the foreman led them down Mann Gulch toward the river. Hailed by the Meriwether fire guard, the foreman left the crew and went partway up the north-facing slope to meet the guard (fig. 2). Dismissing the idea of fighting the fire at its head on the ridge, he led the guard down to join the smokejumpers.

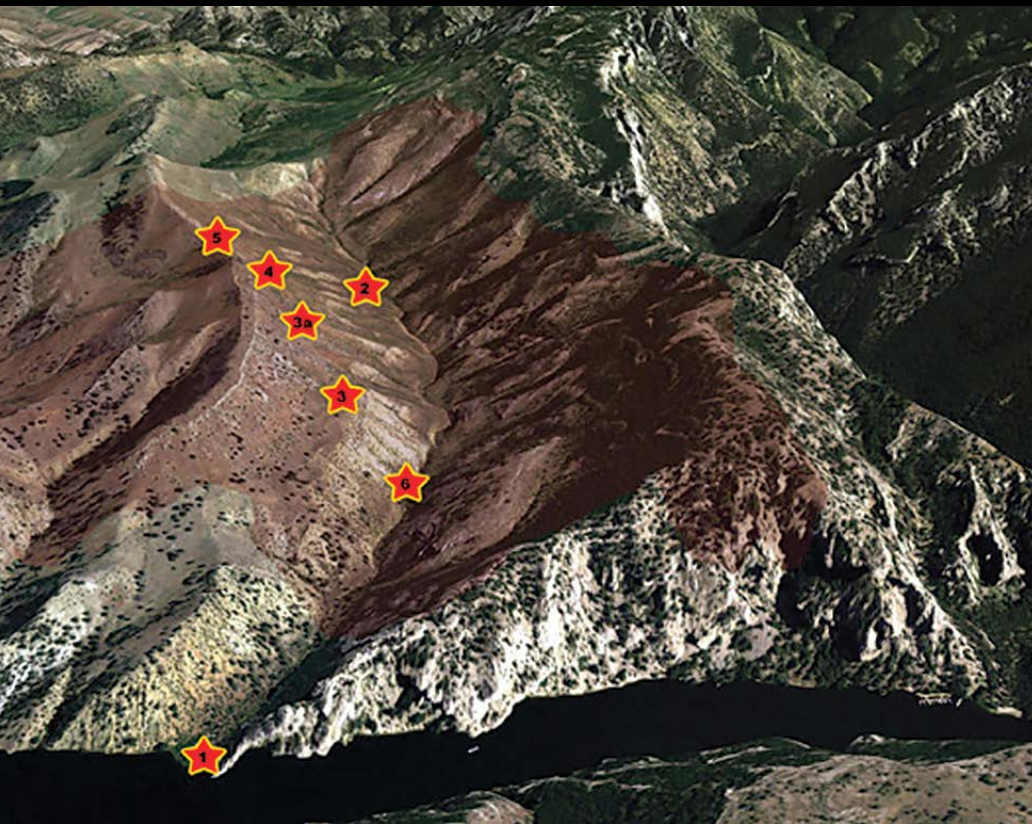
The foreman decided to take the fire guard the short distance back to the cargo assembly area for a bite to eat. He told the assistant foreman not to wait but rather to lead the crew on toward the mouth of the gulch. However, he



Upper end of Mann Gulch, looking down canyon from near the smokejumper cargo assembly area. Note the grassy fuels on the south-facing slope and postfire recovery of coniferous forest on the north-facing slope. Photo: Wildland Fire Leadership Development Program.



Investigators on the south-facing slope of Mann Gulch following the tragedy, near the point where the crew foreman ignited his escape fire. Note the steep terrain and treacherous footing. Photo: USDA Forest Service.



Mann Gulch, showing stations (stops) on the Mann Gulch Staff Ride. 1 = Mouth of the gulch, where the spot fires started. 2 = Bench where the Meriwether fire guard joined the smokejumper crew. 3 = Turnaround point for the fire crew when spot fires below cut the firefighters off from the river. 3a = Point where the crew foreman ordered the firefighters to drop their gear. 4 = Point where the foreman lit his escape fire. 5 = Top of the ridge, where two firefighters survived after crossing through the rimrock. 6 = Memorial site for researcher Harry T. Gisborne, who died of a heart attack in November 1949 while investigating the Mann Gulch Fire. Source: Wildland Fire Leadership Development Program.

Realizing that they were cut off from the river, the foreman ordered the firefighters to turn around.

ordered the crew to angle uphill along the south-facing slope (fig. 2). The foreman had seen dense coniferous regeneration on the north-facing slope following a previous fire, and he called it a “death trap” (Maclean 1992). He thought the lighter fuels on the south-facing slope were safer, so he told the assistant foreman to move the crew uphill. The firefighters headed down the gulch toward the river at about midslope, keeping an eye on the opposite ridge, where the fire was actively burning.

WILDFIRE BLOWUP

While eating in the cargo assembly area, the foreman noticed smoke boiling over

what appeared to be the mouth of the gulch around the bend. Together with the fire guard, he hurried to rejoin the smokejumpers, finding them strung out in two groups along the south-facing slope. Pulling the crew together into a single column, he retook the lead.

Mounting a rise, the foreman saw that unforeseen winds had blown the fire across Mann Gulch, igniting spot fires in the path of the crew (fig. 2). Realizing that they were now cut off from the river, the foreman turned the firefighters around. At about 5:45 p.m., he started leading the crew back up the south-facing slope, angling uphill towards the seeming safety of the ridge.

Upcanyon winds of 20 to 30 miles per hour (32–48 km/h) drove the spot fires together into a crown fire that started chasing after the firefighters. As the crowning fire left the dense trees near the mouth of the gulch and entered lighter fuels upslope, it picked up speed. The higher the crew retreated up the gulch, the steeper and rockier the slope became, the flashier the fuels, the stronger the winds, and the faster the rate of fire spread (Rothermel 1993).

With the fire gaining on the crew, the foreman ordered the firefighters to drop their gear (fig. 2). The roar of the fire behind them was now deafening, with smoke filling the skies and flames seeming to envelope the crew on both sides. The firefighters fled upslope toward the ridge, trying to outpace wind-driven flames that were racing uphill through the flashy fuels faster than anyone could run (Rothermel 1993).

Realizing that the fire would soon overtake them, the foreman stopped to touch a match to waist-high grass (fig. 2). He called on the others to join him in the growing circle of black, but no one did. The firefighters could barely hear him over the roar of the fire, and they failed to understand what he was doing. “We thought he must have gone nuts,” one survivor told Maclean (1992). Most continued to race upcanyon, where the fire caught them within minutes.

Shielded from the upcanyon winds by a convection current from the main fire, the escape fire set by the foreman burned straight uphill. Four smokejumpers followed it up to the ridge. The vertical rimrock, up to 12 feet (3.7 m) high, blocked the way, but two firefighters made it through a gap in the rock, then found safety on the other side in a patch of scree. They survived, as did the foreman—his escape fire worked.

The other two smokejumpers who had run straight upslope were caught by the main fire below the rimrock. One succumbed to the fire, but the other, though badly burned, made it through the rimrock and was rescued during the night after the foreman and another survivor went for help. A second smokejumper, also badly burned,

Mann Gulch led to reforms in training for firefighters, including the 10 Standard Fire Orders adopted in 1957.

lived as well. Transported by boat to a hospital, they both survived the night, only to die from their burns the next day.

The remaining smokejumpers, overwhelmed by the main fire after racing past the escape fire, died on the south-facing slope of Mann Gulch (fig. 2). So did the Meriwether fire guard. The hands of his watch, frozen in place by heat, showed 5:56 p.m.

From the time the firefighters turned around until the end of their tragic uphill race, about 10 minutes had elapsed. Less than 2 hours had passed since the smokejumpers first landed in Mann Gulch.

AFTERMATH

Following the tragedy, responders used crosses to mark the sites where the fallen firefighters were found. The crosses became permanent fixtures as part of a

Mann Gulch memorial. (The cross for a smokejumper who was Jewish was later replaced with a Star of David.)

A sign at the mouth of Mann Gulch commemorates the tragedy, as do markers at the Meriwether Picnic Area just upriver. Visitors come by boat to honor the fallen firefighters and lay wreaths in Mann Gulch on occasions such as the 50th anniversary of the Mann Gulch Fire in 1999 (Dombeck 2000). On August 5, 2019, visitors marked the 70th anniversary of the fire by watching the transport plane that carried the smokejumpers drop wreaths into the Missouri River.

Mann Gulch has become a site for wildland fire managers to learn lessons from the fire. The Wildland Fire Leadership Development Program has organized a series of staff rides at the sites of major tragedy fires across the

Rimrock at the top of the ridge in Mann Gulch, near where four firefighters sought to escape the fire by crossing the ridge. Note the formidable obstacle, the steepness of the hill, and the flashy grass fuels. Photo: Wildland Fire Leadership Development Program.



country. The program has a valuable set of training materials for the Mann Gulch Staff Ride on its website (WFLDP, n.d.).

One of the materials is the Forest Service's accident investigation report, released soon after the fire by a Board of Review named by Forest Service Chief Lyle Watts (USDA Forest Service 1949). The board found "the need for intensified study and training in fire behavior" because of the unexpected wind shifts that drove the fire across the mouth of Mann Gulch (fig. 2), causing the deadly blowup. In response, Forest Service scientists began extensive research on fire behavior, contributing to the establishment of the Missoula Fire Sciences Laboratory in 1960. According to Turner (1999b), the Mann Gulch tragedy also led the Forest Service to establish technology and development centers for firefighting equipment in Missoula, MT, and San Dimas, CA.

The Board of Review also recognized a need to train firefighters on "how to recognize dangerous conditions" (USDA Forest Service 1949). Mann Gulch became 1 of 16 tragedy fires from 1937 to 1956 that led to reforms in training for firefighters (Brauneis 2002), including the 10 Standard Fire Orders adopted in 1957.

In addition, Mann Gulch might have contributed to Paul Gleason's formulation of LCES (Lookouts, Communications, Escape Routes, and Safety Zones) (Gleason 1991). The Mann Gulch crew lacked lookouts, escape routes, and safety zones, and its only radio was broken. Had the radio worked, the district ranger would have ordered the foreman to lead his crew over the ridge into the relative safety of Meriwether Gulch, which was largely spared by the fire (fig. 2).

The Board of Review found "evidence of confusion" in the crew's failure "to heed Dodge's [the foreman's] efforts to get men to go into the escape fire area. One firefighter refused to obey the foreman and cried, "I'm getting out of here!" After that, "each individual followed either his own instincts ... or

the example of those ahead of him” who were speeding uphill (USDA Forest Service 1949). Crew cohesion collapsed.

The problem, the Board of Review noted, was the practice “of rotating jumpers and the varying size of the crews,” which made it “difficult to maintain close acquaintanceship between leaders and jumpers.” At the time, smokejumpers were assigned to fires on a rotating basis, so the composition of crews was random.

Some of the smokejumpers on the Mann Gulch Fire were fast friends, but not all had worked together before, and most barely knew the crew foreman (Turner 1999b). Maclean (1992) noted “in this organizational scheme of things the possibility of calamity in a crisis.” The Board of Review recommended finding ways of improving crew cohesion “as one means of establishing confidence in the leaders, so essential in emergencies.”

COMMON DENOMINATORS

Since the 1990s, Forest Service employees and leaders have taken further steps to improve the agency’s safety record (USDA Forest Service 2018a), resulting in a declining number of fatalities since 2010. Yet wildland firefighter entrapments have persisted (NIFC 2018), despite the safety measures, safety training, and personal protective equipment adopted by the wildland fire

In Memoriam: Firefighters on the Mann Gulch Fire

VICTIMS:

- Robert J. Bennett, age 22 (from Paris, TN)
- Eldon E. Diettert, age 19 (from Moscow, ID)
- James O. Harrison, Helena National Forest fire guard, age 20 (from Missoula, MT)
- William J. Hellman, age 24 (from Kalispell, MT)
- Philip R. McVey, age 22 (from Babb, MT)
- David R. Navon, age 28 (from Modesto, CA)
- Leonard L. Piper, age 23 (from Blairsville, PA)
- Stanley J. Reba, age 25 (from Brooklyn, NY)
- Marvin L. Sherman, age 21 (from Missoula, MT)
- Joseph B. Sylvia, age 24 (from Plymouth, MA)
- Henry J. Thol, Jr., age 19 (from Kalispell, MT)
- Newton R. Thompson, age 23 (from Alhambra, CA)
- Silas R. Thompson, age 21 (from Charlotte, NC)

SURVIVORS:

- R. Wagner (Wag) Dodge, Missoula smokejumper foreman, age 33 at the time of the fire. Dodge died 5 years after the fire from Hodgkin’s disease.
- Walter B. Rumsey, age 21 at time of the fire, from Larned, KS. Rumsey died in an airplane crash in 1980, age 52.
- Robert W. Sallee, youngest man on the crew, age 17 at time of the fire, from Willow Creek, MT. Last survivor of the smokejumpers, Sallee died on May 29, 2014.

Left: Marker for smokejumper William J. Hellman. Photo: USDA Forest Service.

Right: Fallen firefighters, Mann Gulch Fire, August 5, 1949. Source: USDA Forest Service.



Mann Gulch has become a site for wildland fire managers to learn lessons from the fire.

community in the 70 years since the Mann Gulch Fire.

An accident like Mann Gulch might not happen today, so long as firefighters follow the 10 Standard Fire Orders (or LCES) and remain mindful of risk, including the 18 Situations That Shout “Watch Out.” Experts have studied exposure to risk on the fireline in terms of “common denominators on tragedy fires” (Holmstrom 2016; Mangan 2007; Sutton 2011; Wilson and Sorenson 1978). Wilson and Sorenson (1978) noted such common denominators as relatively light fuels and unexpected wind shifts. Holmstrom (2016) stressed human-related common denominators, such as miscommunication, conflict on the fireline, and transitions between fire crews.

The Mann Gulch tragedy was attributable, in part, to some of these same common denominators, including miscommunication and the danger of flashy fine fuels. According to Maclean (1992), grassland fires in western Montana have proven far deadlier than forest fires, in part because they move so much faster in high winds, creating much greater exposure to risk of entrapment.

However, the most fundamental common denominator on tragedy fires is the decision to suppress a wildland fire in the first place.

Why were smokejumpers even in Mann Gulch? The fire went on to burn about 4,300 acres (1,740 ha) of wildlands adapted to such fires (fig. 1). It ignited naturally on the edge of a designated wild (now wilderness) area, and it never threatened anything important. Ironically, the only values in Mann Gulch worth protecting from fire were the lives of the people deliberately put in harm’s way.

Yet the fateful decision to place smokejumpers in Mann Gulch was

automatic. In 1935, the Forest Service had adopted a policy of putting out all wildland fires by 10 a.m. on the morning after they were first reported. Under the 10 A.M. Policy, the Canyon Ferry district ranger and Helena National Forest supervisor had no choice but to place firefighters in Mann Gulch or Meriwether Gulch to suppress the growing fire. Indeed, the district ranger scouted the fire himself late on the afternoon of August 5, noting the developing firewhirls as the fire began to blow up (Maclean 1992). Searching for the smokejumper crew from the mouth of Mann Gulch, he barely escaped his own deadly entrapment.

The most fundamental common denominator on tragedy fires is the decision to suppress a wildland fire in the first place.

The single greatest common denominator for entrapments is the presence of firefighters on a particular fireground. That raises a policy question: Why and under what circumstances do fire managers try to control wildland fires?

A CHANGING POLICY

In 1949, the answer was clear. The Forest Service was waging a war against wildfire using former military personnel as well as military techniques and technologies (Pyne 1982). Most of the firefighters on the Mann Gulch Fire were veterans of World War II, and at least one was a former paratrooper. The plane that carried them was a C-47 military transport that had seen action in Europe. The agency was using battle-tested techniques and technologies to drive fire from the woods.

By the 1970s, Forest Service policy was changing (Pyne 2015). In 1978, the agency replaced fire exclusion

with a flexible policy of “appropriate suppression action,” which could range from fully suppressing a fire to confining a fire in a certain place under certain conditions. Depending on the circumstances, local land managers could now monitor a lightning-ignited wildland fire like the one in Mann Gulch and use it for ecological benefits. Evolving policy iterations directed that wildland fire will, “as nearly as possible, be allowed to function in its natural ecological role” (FEC 2009; NWCG 2001; WFLC 2003).

The Helena National Forest, in its 1986 land and resource management (“forest”) plan, specified that unplanned ignitions in the Gates of the Mountains Wilderness Area that are “burning within established prescriptions and fulfilling desired objectives may be managed as prescribed fires” (USDA

Forest Service 1986). The draft forest plan revision from 2018 provides that natural ignitions can often be managed “without a full suppression response,” even in nonwilderness areas (USDA Forest Service 2018b). Moreover, the draft revision warns that “it is critical to only implement actions that can be successful while taking into account actual values at risk with the least exposure necessary.”

Accordingly, the Mann Gulch Fire might hold a safety lesson for the Forest Service along the lines of the agency’s Life First engagements (USDA Forest Service 2018b). In 2019, in the spirit of Life First, Forest Service Chief Vicki Christiansen directed fire personnel to “commit responders to operations where and when we understand the risks responders may face and where they can be most successful” (Christiansen 2019). The guidance for responders is “to ‘stop, think and talk’ before ‘acting.’”

Under some circumstances, suppressing a wildland fire rather than managing it for resource benefits—if line officers have the decision space necessary, which they might not under their forest plans—can expose responders to poorly understood risk under conditions that make success improbable, as in Mann Gulch. The Helena National Forest’s draft forest plan revision from 2018 would give line officers the latitude they need to make judicious risk-based wildland fire management decisions, rendering a repeat of the Mann Gulch tragedy less likely.

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