New facts, not old fears

RESTORING BALANCE

TO WILDLAND FIRE POLICY

A Backgrounder From The Wilderness Society

> ***In truth, only a small minority of wildland fires actually burn on our national forests.***

FOR AS LONG as there have been forests, there have been wildland fires. Wildland fire is as natural and necessary as sunshine or rain to a healthy forest.

Yet, with each new year, images of forest fires whip up old fears faster than hot winds can fan new flames. These old fears — that all wildland fires threaten human life and property — blind us to new facts, new realities, and new strategies for more effective fire management.

For decades, our national policy of **fire exclusion** dictated that when a wildland fire broke out, we tried to put it out, no matter where it burned. Today, we are better at fire suppression, but this has led to unintended consequences: significant disruption of the natural cycle of forests and wildland fire. Decades of this policy, years of drought, increased development near wildland areas, and past forestry practices, have made fire management much more complicated for policymakers, legislators, and firefighters. This has also made fire management much more expensive for American taxpayers.

THIS PAGE: INCREASED DEVELOPMENT NEAR OR IN WILDLAND AREAS MEANS PROTECTING HOMES AND COMMUNITIES MUST BE FIRE MANAGEMENT'S FIRST PRIORITY. *(PHOTO: NIFC)*

FACING PAGE: FIRE CREW CUTTING A FIRE LINE IN ADVANCE OF WILDLAND FIRE. FIRE SUPPRESSION SHOULD CONTINUE TO PLAY AN IMPORTANT — BUT NOT EXCLUSIVE — ROLE IN FIRE MANAGEMENT. *(PHOTO: TOM BEAN)*

Finding a better balance

WITHOUT EXCEPTION, THE first priority of fire management should be keeping American families safe and protecting communities. This will always require world-class firefighting programs and firefighters. However, effective fire management means finding a better balance between suppressing wildland fires, protecting communities, and allowing wildland fire to resume its natural role in forest ecology — *all* are essential to reducing the long-term risk to life and property.

For example, some believe that dramatically increasing logging on our national forests will solve the wildland fire problem. In truth, only a small minority of wildland fires actually burn on our national forests — and most fires burn on non-federal land. During the period from 1997 to 2000, only 22.2% of the acres burned by wildland fire were on our national forests; in the same period, 38.4% of the acres burned were on state, tribal, or private land. (The balance occurred on other federal land.) [1]

This highlights a key fact: Wildland fires do not discriminate on the basis of land ownership, so fire management success now depends upon a new level of cooperation between local, state, and federal governments.

Fact, not fear, is essential to informed leadership on wildland fire issues. The following overview highlights the critical aspects of fire behavior, the basics of fire ecology, the important changes in fire policy, the importance of restoring wildland fire's natural role in ecosystems, and how communities can better protect themselves from the risk of wildfire.

What is fire?

FIRE HAS OCCURRED on Earth for at least 400 million years. Why? Life made it possible. Life in the sea released oxygen into the atmosphere. Life on land created and left behind matter that could burn. When oxygen and this matter were put together in the right conditions, a spark of lightning caused them to combust and created fire. Millions of years later, humans harnessed the power of combustion and fire, and today we use fossil-fuel fire (from oil, natural gas, coal, etc.) to run cars, computers, and many other tools of the modern world.

When many people think of forest fires, they think first of destruction. In truth, wildland fires play a vital role in keeping forest ecosystems healthy. **Fire ecology** explores this role of wildland fire in forest ecosystems. First, though, it is important to understand the basics of how wildland fires burn, or what's called **fire behavior**.

Why fire behaves the way it does

ALL FIRES REQUIRE the presence of the same three elements: oxygen (in the air), flammable matter, and heat — what is known as the **fire triangle**. Remove any one element or "side" of the triangle, and fire cannot take place. Beyond the fire triangle, three additional factors determine the intensity of each wildland fire and how it will spread: **fuels, weather, and topography**.

Fuels are the flammable material that fire feeds on. A *fuel load* is the amount of fuel in a given area. *Surface fuels* or *ground fuels* are found on the forest floor. They include "flashy fuels" — such as dry grass, pine needles, and dry leaves —

> ***Three factors determine the intensity of each wildland fire: fuels, weather, and topography.***

ABOVE: YELLOWSTONE NATIONAL PARK TWO YEARS AFTER THE 1988 FIRE REVEALS A TYPICAL "BURN MOSAIC" PATTERN: THE SEVERITY OF WILDLAND FIRE IS RARELY THE SAME EVEN IN THE SAME AFFECTED AREA. *(PHOTO: MICHAEL QUINTON)*

"Forest ecosystems have evolved with and adapted to the natural recurrence of wildland fire.

as well as logs and branches. Surface fuels are highly flammable — they burn fast and spread fire rapidly. *Ladder fuels* consist of thin or small-diameter trees that, when on fire, can carry flames up into the crowns of larger trees. *Crown fuels* consist of the tops of trees, collectively known as the "canopy."

Weather — described as *temperature, wind, and moisture* — is the most important factor in fire behavior. Warmer air *temperatures* (read: heat) mean fuels are more likely to ignite, burn faster, and spread rapidly. This is why wildfires burn hottest in the afternoon, when the mercury rises highest. *Wind* supplies the oxygen and pushes the fire along. Strong winds can create small fires out in front of a large fire by blowing embers ahead of the main fire (*spot fires*). The less *moisture* (from rainfall and humidity), the more combustible the fuel and the hotter and more intense the fire. Once you understand the role of temperature and moisture in fire behavior, you can see why **drought** has had such a huge impact on where large fires take place — particularly in the past few years. Drought can make a wildland more fire-prone as it dries out surface fuels and reduces the amount of moisture in living trees as well.

Topography, or the lay of the land, can either aid or hinder the spread of a wildland fire. *Slope* is the most important factor: Fires usually travel faster uphill than downhill, and the steeper the slope, the faster the fire travels.

Wildland fire regimes: normal or natural versus altered

MANY FOREST ECOSYSTEMS — especially those in the western United States — have evolved with and adapted to the natural recurrence of wildland fire. A **fire regime** refers to this historic natural pattern of fire in a specific ecosystem, like that of Yellowstone National Park or Sequoia National Forest. It describes what kinds of fires are likely to occur and how often, as well as where, when, and how intense the fires will burn. Fire experts study fire regimes to predict the potential for fire, as well as the course and impact of fires once they occur. Natural or "normal" fire regimes can be altered in many ways by people — e.g., through forestry practices, community development near wildland areas, and fire suppression practices. The consequences for forest ecosystems as well as community protection can be severe.

Types of wildland fire and their severity

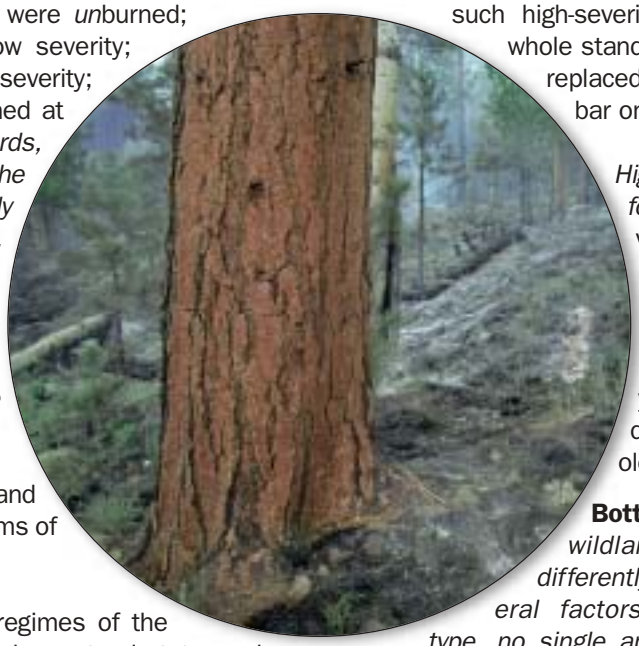
EACH FIRE REGIME includes certain **fire types**. Two fire types basic to many wildland fire regimes are surface fires and crown fires. *Surface fires*, also called "ground fires," feed off of surface fuels, and cause little damage to the ecosystem. In fact, they most often benefit the ecosystem; by reducing surface fuels, they reduce the future fire risk. *Crown fires* burn in the uppermost canopy of trees. They depend on strong winds and dry ladder fuels, which make them the most intense and most difficult fires to control. Some crown fires are actually part of a normal fire regime; others are the result of changed fire regimes and an unnatural buildup of fuels.

Prescribed fires or prescribed burns are intentionally set by managers under certain weather and fuel conditions to achieve a desired effect on the vegetation. They can be used to reduce fuels or to kill or renew vegetation.

Fire types determine the **fire severity** or the impact of a fire on vegetation and soils. Severity is the product of several factors, including the heat of the fire and the sensitivity of the vegetation to fire. *Low-severity fires* kill very few trees. *Moderate-severity fires* may kill some trees. *High-severity fires* send flames up into the tree canopy, creating crown fires, which can kill larger trees and damage soil structure.

The severity of an individual wildland fire is rarely the same throughout a burned area. In fact, wildland fires typically result in a **burn mosaic** pattern: a patchwork of totally burned, partially burned, and unburned sections.

For example, the gross perimeter of the 2002 McNally Fire in the Sequoia National Forest encompassed 150,670 acres. Of this total: 33,368 acres were *un*burned; 43,811 acres burned at low severity; 60,973 acres at moderate severity; and only 12,518 acres burned at high severity.[2] *In other words, less than nine percent of the land affected by the McNally Fire was a high-severity burn. These facts contrast greatly with images broadcast during that fire of a catastrophic inferno, as well as reports that 150,670 acres were "destroyed."*



Fire experts predict the risk and severity of wildland fire in terms of **fire condition classes**.

Class 1 – Low Risk: Fire regimes of the ecosystem are in their normal or natural state, and they pose little risk to the ecosystem. In some forest types, conditions may be appropriate for prescribed fire.

Class 2 – Moderate Risk: Normal fire regimes have been altered because of less frequent fires. Fire poses a moderate risk of destroying trees and other components of the ecosystem. To restore natural conditions, prescribed fire or other treatment may be necessary.

Class 3 – High Risk: Normal fire regimes have been altered dramatically. Fire poses a high risk of destroying trees and other components of the ecosystem. To restore natural conditions, prescribed fire or other treatment may be necessary.

Wildland fires affect forest types uniquely

Forest type is another factor that determines the unique behavior of each wildland fire. Each of North America's many different forest types experiences fire uniquely and each has a unique fire regime. Forest types and their normal fire regimes include:

Ponderosa pine forests, like those found in Grand Canyon National Park in Arizona, were once open forests with large trees hundreds of years old. Normal fire regimes consist of frequent low-severity fires (every 5 to 25 years) that clear the ground, but seldom kill large trees.

Lodgepole pine forests, typical of Yellowstone National Park and Idaho, Montana, and Wyoming, grow in dense stands and experience high-severity fire every 100 to 400 years, burning large sections of forests. Lodgepole pines have adapted to fire by producing seed cones that open only after exposure to such high-severity fires; thereafter, whole stands of burnt trees are replaced naturally. [See sidebar on page 6.]

High-elevation and *wet forests* typically burn very infrequently. For example, Douglas-fir forests in the Pacific Northwest will often go several hundred years between fires, developing complex, old-growth structure.

Bottom line: *Because wildland fire behaves differently depending on several factors, including forest type, no single approach to wildland fire management — thinning or other fuel treatments — can universally reduce the risk of wildland fire.*

The vital link between fire and healthy forests

The forest types described above are just a few of the many examples of how North American forest ecosystems have adapted over the eons to the natural recurrence of wildland fire. As these forests evolved, fire became as natural and necessary to their health and function as sunshine and rain. Forest animals and vegetation have adapted to natural cycles of renewal as shaped by each forest's unique fire regime, just as they have to weather patterns,

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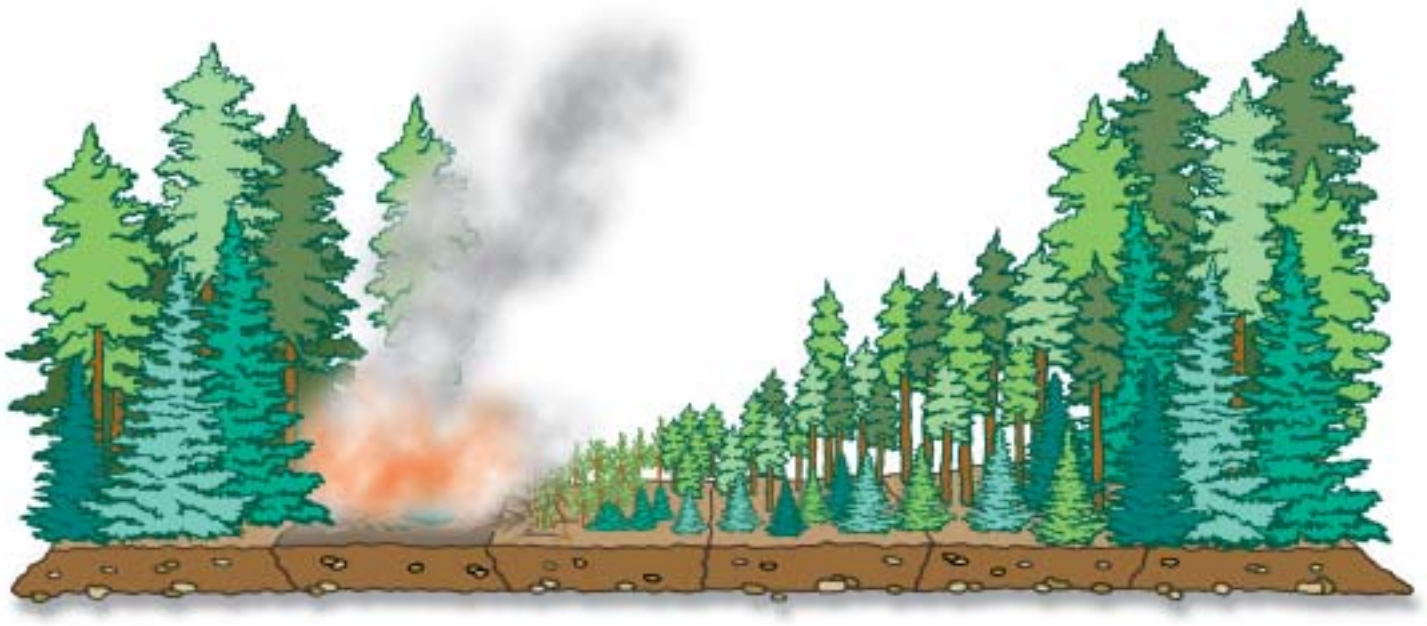
No single approach to fire management can universally reduce the risk of wildland fire.

LEFT: SURFACE FIRES NATURALLY "CLEANSE" THE FOREST FLOOR OF DEBRIS WITHOUT KILLING LARGE TREES. *(PHOTO: THE WILDERNESS SOCIETY)*

FOREST ELEVATION		ELEVATION ZONE	TYPE OF FOREST	SEVERITY OF NATURAL FIRE REGIME	HISTORIC PATTERN OF FIRE
11,500 feet		High elevation, cold moist climate	Lodgpole pine, aspen, Engelmann spruce-subalpine fir	High severity — all or most trees are destroyed	Average one fire every 100 to 400 years
8,000 feet		Mid elevation, transitional climate	Mixed conifers, including many varieties of pine and firs	Mixed severity — patches of trees may be killed	Wide variety of regimes, with fire recurrence ranging from 20 to 150 years
5,000 feet		Low elevation, dry climate	Ponderosa pine and pinyon-juniper	Low severity — fire clears the ground but seldom kills large trees	Average one fire every 5 to 25 years

Different Forests Experience Wildland Fires Differently

Because forest types and their natural fire regimes differ greatly, there can be no single solution to wildland fire management.



300-400 YEAR-OLD FOREST | WILDLAND FIRE | 0-60 YEARS POST-FIRE | 60-150 YEARS POST-FIRE | 150-300 YEARS POST-FIRE | 300-400 YEARS POST-FIRE

ILLUSTRATION: ROZ DAVIS

The Natural Cycle of Fire and Renewal in the Forest

Yellowstone's lodgepole pine forests have a 100-to-400-year cycle, which ends with fire. After the fire, ground cover and lodgepole seedlings sprout on the forest floor, creating thousands of new trees. The lodgepole pines thin themselves out over centuries, eventually yielding to spruce and fir trees.

(PHOTO: RICK WILKING ©REUTERS NEWMEDIA INC./CORBIS)

Is Your Home Fire-Wise?

As more people choose to live near and in wildland areas, the potential for wildland fire to affect our homes increases — as does the need to target more resources toward community protection. But the primary responsibility for protecting a home falls on the homeowner. The two most important actions homeowners must take are: 1) creating a ***defensible space*** *around their homes, including reducing fuel potential [see page 9]; and 2) using non-flammable building materials, especially for roofs, in home construction.*

Above: *Unprepared homes in the aftermath of a wildland fire. Here, the fire crept along the ground, feeding on surface fuels where there should have been defensible space, leaving trees standing but homes destroyed.*

Below: *With a well-prepared defensible space, a home can survive wildland fire — even while neighboring homes are destroyed.*

(PHOTO: ©DAVID ZAITZ)

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flooding, and seasonal changes. Fire benefits these ecosystems from the canopy on down to the forest floor. Nature uses fire to cleanse itself of debris and transform dead and dying material into nutrients, to control insect populations, and to provide living conditions for wildlife. A few examples:

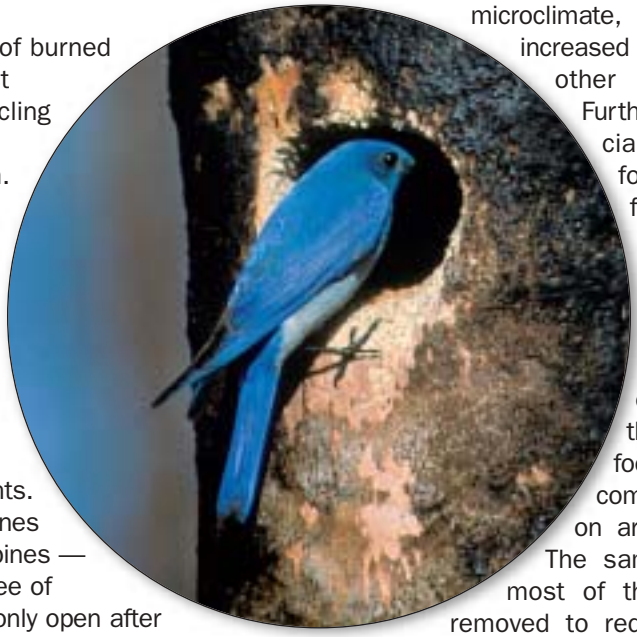
- Burned trees play an essential role in a healthy forest ecosystem. Standing dead trees (snags) and fallen logs provide critical habitat for the prey species of many forest carnivores and birds of prey.

- Cavity nesting birds thrive in post-fire forests, which contain snags that provide nesting spots for woodpeckers, northern goshawk, and boreal owls, among others.

- The slow decay of burned trees adds to forest productivity by recycling soil nutrients and rejuvenating growth.

- Fires eliminate smaller brush and saplings that can hinder growth of the forests' large, fire-resistant trees.

- Fires sprout seeds of native plants. For example, the cones of many lodgepole pines — the characteristic tree of Yellowstone — will only open after exposure to fire.



RIGHT: CAVITY-NESTING BIRDS, LIKE THIS MALE MOUNTAIN BLUEBIRD, THRIVE IN POST-FIRE FORESTS, WHICH CONTAIN SNAGS THAT PROVIDE NESTING SPOTS. *(PHOTO: ©JEFF HENRY)*

Bottom line: *Wildland fire plays a critical role in the functioning of ecosystems. Allowing wildland fire to resume its natural role in forest ecology will go a long way to reducing the long-term risk of severe, catastrophic fires.*

Key factors affecting recent western wildland fires: fire suppression, past forestry practices, and drought

FIRE SUPPRESSION AND past forestry practices have increased the risk of wildland fire by allowing heavy accumulations of dead vegetation, woody debris, and changes in forest structure (unnaturally large numbers of small trees). On top of these human-caused effects, drought has further increased the risk of fire in recent years.

In some forest types, under normal fire regimes, frequent, low-severity fires reduce the amount of surface and ladder fuels, thereby reducing the chance for catastrophic fires. **Fire suppression** has interrupted those regimes and allowed surface and ladder fuels to accumulate to unnaturally high levels, thereby increasing the risk of high-severity fires.

Past logging practices have also increased the risk of fire by removing large, commercially valuable but fire-resistant trees, while small trees and debris or "slash" left behind from logging could serve as fuel for future fires.

The Sierra Nevada Ecosystem Project — a comprehensive ecological and economic assessment of the Sierra Nevada requested by Congress — determined that "timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity."[3] Furthermore, increasing commercial logging on the national forests is *not* an antidote for wildland fires because commercial timber sales are focused on removing the wrong trees. A 1999 General Accounting Office (GAO) report found that commercial timber sales on the national forests tend to focus on areas with high-value commercial timber rather than on areas with high fire hazards. The same GAO report found that most of the trees that need to be removed to reduce fire risk are small in diameter and have little or no commercial value.[4]

Bottom line: *Fire suppression and logging have changed forest structure and increased forests' susceptibility to severe wildland fires. On top of these human causes, drought has further increased the risk of catastrophic fire. We will always need effective firefighting programs, particularly to protect lives and property; however, we must first understand and accept the essential role of wildland fire in healthy ecosystems and adopt management practices that support it. We must find a way to reintroduce fire back into ecosystems safely.*

Protecting homes and lives: wildland fire and western communities

WESTERN U.S. COMMUNITIES have seen all too frequently the consequences of fire suppression, logging, and drought. Today, as more Americans move into areas in or near wildlands, the need to reduce wildland fire risks to lives,

> ***"More commercial logging on the national forests is not an antidote for wildland fires because commercial timber sales are focused on removing the wrong trees."***

The Evolution of U.S. Wildland Fire Management

FEDERAL POLICIES TOWARDS WILDLAND FIRE have evolved over decades. We have come a long way from the days of Smokey Bear, when all fire was considered evil. Under the policies of the past, every fire was to be extinguished by 10 a.m. the day after the fire was discovered. Those policies of the past have evolved to where there is broad recognition that fire plays a crucial ecological role in wildland ecosystems.

Some recent milestones in the evolution of fire policy are: the Federal Wildland Fire Management Policy and Program Review of 1995, the National Fire Plan of 2001, and the Western Governors' Association Ten-Year Comprehensive Strategy for Wildland Fire. All of these recognize the fundamental ecological role of fire. They all also recognize that effectively managing wildland fire has become a far more challenging and complex endeavor.

As fire management policies continue to evolve, they must build on the experiences of the past, incorporate today's wealth of scientific knowledge, and be able to adapt to future situations. They also must be based on science and sound ecological and economic principles. Wildland fire is a critical natural process that must be restored safely to wildland ecosystems. Prescribed fire is a critically important land management tool. Effective use of prescribed fire should be built upon scientific principles, an understanding of historical fire regimes, and a thorough knowledge of current ecosystem conditions.

homes, and communities becomes even clearer. Moreover, most decision-makers today would agree that must be the top priority. However, in terms of how funding is targeted, community protection is not yet the priority it should be. According to the Forest Service's most recent budget overview, during fiscal year 2002 only 39% of the acres scheduled for fire prevention treatment were in areas near homes and communities. This year, in 2003, only 55% of acres treated will be in areas near homes and communities.[5] Ideally, 85% to 90% of this funding should be targeted at what is called the **community protection zone.**

The **community protection zone** or **wildland-urban interface** describes the area where towns meet the surrounding forest. Generally speaking, this area extends out about a half mile from a community boundary. Lives and property can be saved or lost here depending on how well a community and homeowners prepare for wildland fire.

The most important tools in the community zone include: carefully planned thinning and removal of small-diameter trees that serve as ladder fuels; removal of brush that serves as surface fuel; and further reductions in surface fuels through prescribed burning and other treatments. It is important to note that while forest thinning can reduce the damage to homes, it will never fireproof a forest against all fires.

Homeowners, too, play a critical role in how successful communities prepare for wildland fire risk. Fortunately, fire scientists have shown how we can protect our homes in the event of a wildland fire. The two most important actions homeowners must take are: 1) creating a **defensible space** around their homes; and 2) using non-flammable building materials, especially for roofs, in home construction. Taking these actions will not only allow firefighters to more easily defend the house, they will also increase the chances that the house can survive wildland fire on its own. In fact, houses that are properly prepared for wildland fire often survive completely intact while unprepared neighboring homes are destroyed.

The buffer of defensible space is primarily within 60 to 200 feet of a home. A few simple precautions in this space can significantly diminish the chance of wildland fires spreading to a property, including:

- Cleaning and inspecting the chimney at least once per year.
- Using fire-resistant building materials such as metal or slate when building or remodeling.
- Keeping a garden hose long enough to reach any building or structure on the property.
- Cleaning the roof and gutters regularly.
- Landscaping with less-flammable and fire-resistant plants such as hardwood trees.

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Most people agree that protecting homes and communities is our top priority.

So why isn't that the top priority in the Forest Service's fire treatment budget?

ABOVE: A NEW LODGEPOLE PINE FOREST ARISES AFTER 1988 WILDLAND FIRE IN YELLOWSTONE PARK. STANDING DEAD TREES PROVIDE SHADE AND OTHER BENEFITS ESSENTIAL TO THE SURVIVAL OF THESE SEEDLINGS. (PHOTO: ©JEFF HENRY)

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- Keeping grass mowed and shrubs trimmed, and removing twigs, dead limbs, leaves, and needles regularly.

- Keeping tree limbs at least 15 feet away from a stovepipe or chimney outlet.

- Stacking firewood at least 100 feet away and uphill from the home.

Bottom line: *To make saving homes and lives truly the top priority in Western communities, we must target our work and resources in the community zone.*

NOTES

[1] Archived Daily Incident Management Reports, www.cidi.org/wildfire.

[2] USFS BAER Team Report, McNally Fire.

[3] SNEP Final Report to Congress, Vol. I, p. 62.

[4] General Accounting Office, "Western National Forests." GAO/RCED-99-65, page 43. April 1999.

[5] USDA Forest Service, "FY 2003 President's Budget Overview," page B-13. February 4, 2002.

FOR ADDITIONAL INFORMATION, please contact Jay Watson at (415) 518-2604 and jwatson@tws.org.

***www.wildfirecentral.org** provides the latest information on wildland fire policy and issues, including current wildland fire conditions and links to additional resources.*

THE WILDERNESS SOCIETY

FRONT COVER, TOP: HOME IN ALPINE, CALIFORNIA WAS SAVED FROM WILDLAND FIRE BY FIRE-RESISTANT LANDSCAPING AND BRUSH CLEARANCE. *(PHOTO: ©DAVID ZAITZ)*

FRONT COVER, BOTTOM: TOWER FIREWEED GROWING IN YELLOWSTONE NATIONAL PARK AFTER 1988 FIRES. *(PHOTO: ©JEFF HENRY)*

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