

# Wildland Fire in National Parks

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*“By forces seemingly antagonistic and destructive Nature accomplishes her beneficent designs — now a flood of fire...again in the fullness of time an outburst of organic life...”*

—John Muir

**FIRE!** The word brings to mind wildlife fleeing flames, a house ablaze, or a barren, charred landscape. Or we might recall the pleasure of watching logs burning in a fireplace or a roaring campfire. Over time humans have viewed fire as both friend and foe. Ancient Greeks, American Indians, and farmers generally considered fire a friend and partner. The Greeks respected fire as a gift from the gods. American Indians used fire to clear forests for easier travel, to elude or fight enemies, and to create habitat attractive to wildlife. European immigrants cleared land with fire. Today farmers use fire to replenish nutrients in the soil to benefit their crops.

Fire was seen as an enemy around 1900 when wildfires, often associated with poor land management practices, destroyed several Ameri-

can towns. The public demanded that all fires be suppressed. Yet, despite the best of efforts and the latest technology, fires cannot always be stopped, and scientists now know it is not always beneficial to stop them. To suppress all fire does not preserve natural landscapes; it changes them unnaturally.

Today, government policies reflect both a commitment to public safety and the understanding that fire must be returned to its natural role in protected natural areas. Park managers still suppress fires that threaten lives and property. Now they also ignite fires to recreate or restore a healthy natural environment. Managing fire supports the National Park Service’s mission to preserve the scenery and wildlife of parks unimpaired for future generations.



Karen Wattermaker

American Indians used fire to clear forests, create desirable habitats for game animals, and recycle nutrients into the soil to improve crops.

Illustration by Antonia Hadrick

## What is Fire?

Fire is the combination of heat, oxygen, fuel, and an ignition source. Fuels include grasses, needles, leaves, brush, and trees. Natural ignition sources include lightning and volcanoes. Fires also can be started by human carelessness and arson.



Illustration by Bob Tope

Where and how quickly a fire moves depends on the terrain, weather, and type of fuel. Hillside fires preheat grasses and shrubs on slopes above, so a fire may burn 16 times faster up-hill than on flat ground. Like sheets of paper, grasses burn quickly—up to several miles per hour under extreme conditions. Thick and large fuels, such

as logs, may take hours or even days to burn completely.

While windswept flames can leap into the crowns of trees and burn entire trees in seconds, many fires merely creep along the ground slowly burning brush and forest litter.

## Fire’s Natural Role in the Ecosystem

**Life After Fire** The diversity of plant and animal life you enjoy in national parks partly results from fire. What may look at first like devastation soon becomes a panorama of new life. Fire initiates critical natural processes by breaking down organic matter into soil nutrients. Soil, rejuvenated with nitrogen from ash, provides a fertile seedbed for plants. With less competition and more sunlight, seedlings grow quickly.

By burning intensely in some areas and cooler in others, fire can create a puzzle-like mosaic of diverse habitats for plants and animals. Hawks

and other birds of prey hunt along the edges of burned areas and find cover in unburned areas. Deer feed on nutritious, succulent new shoots of grasses and shrubs that appear after fire.

Some plants cannot reproduce without fire. Cones of jack and lodgepole pines in northern U.S. forests are sealed with pitch. Fire must melt the pitch to release the seeds. Fire breaks open the outside coating of mountain lilac seeds and stimulates germination in southern California chaparral. Without fire, seeds can lie dormant in the soil for decades. Aspen, birch, and willow sprout from their roots after a fire.

**What Happens to Wildlife in a Fire?** Wild animals deal with fire remarkably well. Birds fly out of the fire area, large animals leave immediate danger, some

animals escape to ponds or streams, and rodents return to their burrows. Usually few animals are killed by fire.



Natural processes provide nutrients for plants through fire. Fire releases minerals stored in forest litter and dead trees. Rain moves minerals back into the soil.

Illustration by Bob Tope

## Major Ecosystems

The National Park Service protects a variety of ecosystems. This map highlights a selection of vegetation types and representative park sites.

**Boreal forest**  
Spruce, pine, and fir dominate northern areas to tree line. Large, intense fires recur every 25 to 150 years.

**Chaparral**  
Mixed shrubs and low trees grow in dense masses. Explosive fires scour the hillsides bare every 12 to 50 years.

**Ponderosa pine**  
Spacious forests of trees hundreds of years old. Frequent fires (5 to 25 years) clear ground but seldom kill large trees.

**Lodgepole pine**  
Dominant tree in the park, this pine grows in dense stands. Sections burn wholly every 200 to 400 years.

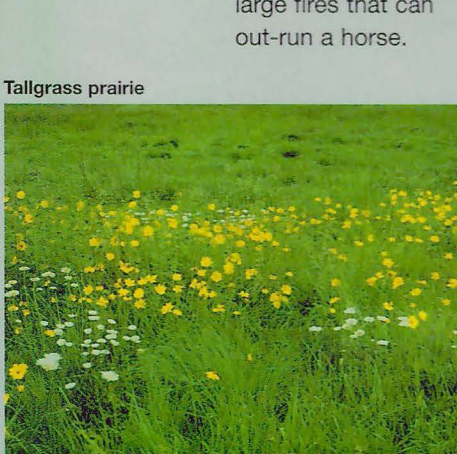
**Tallgrass prairie**  
Surviving flames better than invasive brush, the grass is renewed by frequent large fires that can out-run a horse.

**Wetlands**  
Saw grass needs fire to kill competing vegetation. Small patches burn to the waterline every 1 to 25 years.

**Appalachian mixed forest**  
Conifers and deciduous trees mingle in shifting ratios as determined by climate and a mosaic of rare fires.

**Longleaf and loblolly pines**  
Southern pines grow in grassy park-like stands. Mild surface fires clear debris every 3 to 5 years.

**Potential Natural Vegetation**  
Broadleaf Forest  
Needleleaf Forest  
Mixed Forest  
Forest & Grassland  
Grassland  
Grassland & Shrub  
Shrub



Maria Mino





Fire crews (above) extinguish unwanted fires and manage prescribed fires. Firefighters often use a Pulaski (right), a tool that is part ax and part hoe.

Danise Wegand

Managing Wildland Fire

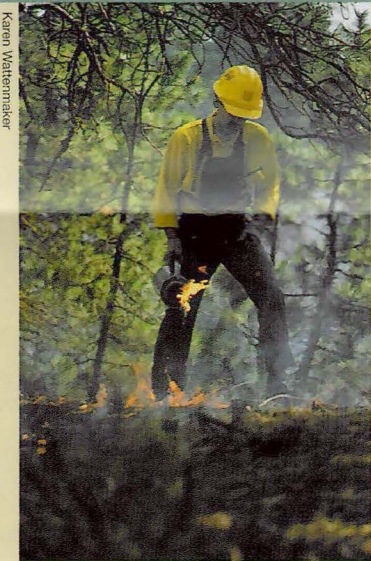
Wildland fire has great potential to change park landscapes more often than volcanoes, earthquakes, or even floods. Such forces of change are completely natural. Many plants and animals cannot survive without the cycles of fire or flooding to which they are adapted. If all fire is suppressed, fuel builds up and makes bigger fires inevitable. Under certain conditions, large, hot fires can threaten public safety, devastate property,

damage natural and cultural resources, and be expensive—and dangerous—to fight.

National Park Service policy stresses managing fire, not simply suppressing it. This means planning for the inevitable and promoting the use of fire as a land management tool. The goal is to restore fire's role as a dynamic and necessary natural process.

Prescribed Fire

Prescribed fire is one of the most important tools used to manage fire today. A scientific prescription for the fire, prepared in advance, describes its objectives, fuels, size, and the precise environmental conditions under which it will burn. If it moves outside the predetermined area, the fire may be suppressed. The fire may be designed to create a mosaic of diverse habitats for plants and animals, to help an endangered species recover, or to reduce fuels and thereby prevent a destructive fire.



A firefighter uses a driptorch, a can filled with diesel fuel and gasoline, to ignite a prescribed fire.

growth. Fuel buildups sometimes must be cut and removed by hand. By burning away accumulated fuels and protecting specific sites, planned fires make landscapes safer for future natural fires.

Prescribed fire also can be the most cost-effective way to maintain such historic scenes as the open grasslands

Specific buildings, cultural resources, critical natural resources, and habitat can be protected by burning key areas in advance, thereby removing fuels from the path of a future unwanted fire. Grasses, needles, leaves, brush, and fallen trees can build up and burn so intensely that the fire may destroy the seeds in the soil and hinder new

of the Revolutionary War era at Saratoga National Historical Park in New York, oak-prairie savanna of the Civil War era at Wilson's Creek National Battlefield in Missouri, and vistas of the Nez Perce War of 1877 at Big Hole National Battlefield in Montana.

How Do Parks Prepare For Fires?

**Planning for the Inevitable** In each park with the potential for fire, land managers develop a fire management plan. This planning involves the public and other agencies and weighs public safety needs with natural and cultural resource concerns. All decisions about fires will be based on the plan, whether the response is to suppress or to allow fire to play its natural role.

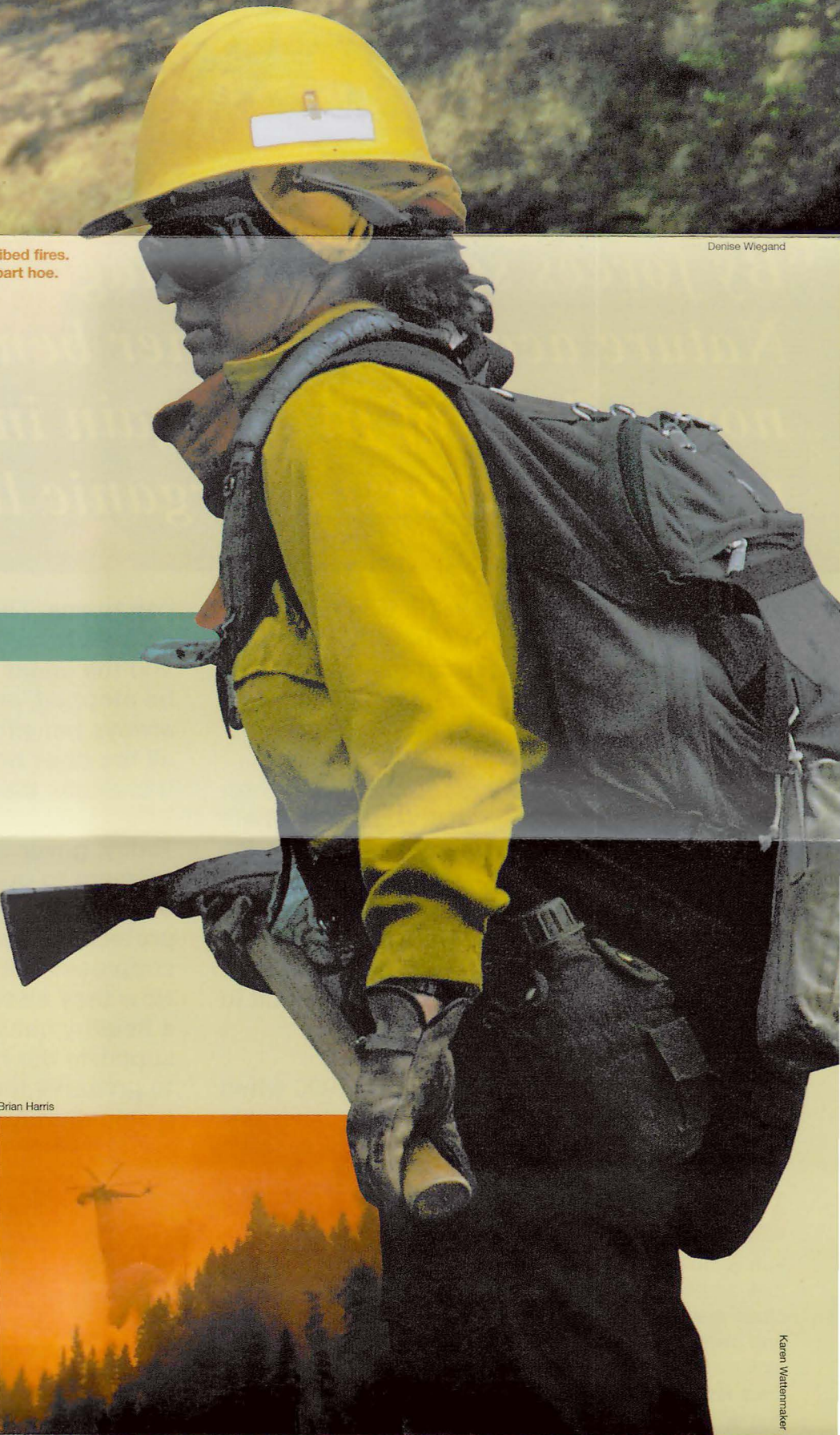
Because fires may cross national park boundaries, park managers work with private individuals and federal, state, local, and tribal agencies in developing fire policy goals. No single agency has the human resources or equipment to manage fire alone. Shared planning and staffing are essential.

**Firefighters** Before their first assignment, wildland firefighters must meet rigorous physical requirements and complete extensive training emphasizing safety. Qualifications also are based on field experience. Many firefighters receive specialized training and experience in the management of firefighting operations, such as coordinating crews,

aircraft, and fire engines, forecasting weather, or analyzing fire behavior.

**Firefighting Tools** Firefighters use tools ranging from shovels to helicopters and airplanes that drop chemical fire retardants or water. With shovels firefighters extinguish flames by mixing dirt with burning material or scraping the ground free of fuels. The *Pulaski*, named for a famous firefighter, is used as an ax or a hoe to cut and remove fuels. Other equipment includes flame-retardant clothing, water pumps, chainsaws, and two-way radios.

Managers predict fire behavior using computer models that are based on research of how fuels, weather, and topography affect fires. Models help estimate how fast and far a fire may travel and how big it might become under different conditions.



Brian Harris

Helicopter dropping fire retardant.

Karen Williamson

Protecting Your Parks

Smoke from fires near cities or subdivisions is seen readily, but how are fires detected in isolated areas? Many parks once hired people to watch for fires from lookout towers in remote areas. Today air patrols have replaced most towers. Park visitors, neighbors, and private or commercial aircraft also report fires.

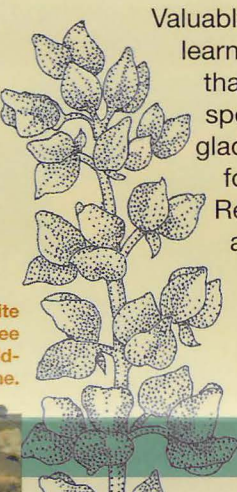
Once a fire is detected, park managers promptly decide on a strategy based on the fire management plan and on current weather conditions. They aggressively extinguish fires that threaten lives, property, or critical natural and cultural resources.

Less than two percent of fires now escape initial suppression and demand more control efforts. Specially trained interagency teams direct suppression efforts on large fires. Personnel and equipment from federal, state, local and tribal agencies can be mobilized quickly and efficiently like a military operation. Fire bases resembling small cities may be established to provide 2,000 to 3,000 firefighters with showers, meals, and medical facilities.

Visit a recently burned site in the springtime to see beautiful displays of wildflowers such as lupine.

What Happens if all Fires Are Suppressed?

**Research** Scientists have studied the effects of fire in national parks since the early 1950s. Research continues in several parks, including Everglades National Park in Florida, Dinosaur National Monument in Colorado, and Yosemite National Park in California.



Valuable lessons have been learned. Scientists found that 33 native plant species in the Everglades depend on fire for long-term survival. Restoration research at Dinosaur National Monument increased native grasslands with the prescribed burning of unnatural

concentrations of sagebrush at critical growth stages.

Research in Yosemite National Park showed that white fir trees act as ladders that fire can climb to the crowns of giant sequoia trees. Naturally-occurring ground fires formerly killed many white fir trees. This natural process is now replicated by prescribed fires that protect the giant sequoia groves.

**Monitoring Fire's Effects** The National Park Service requires that fire's long-term effects on plants be monitored in all prescribed fire programs. Technicians carefully compare vegetation growing before and after a prescribed fire in study plots where

subtle ecological changes can be measured. At Saguaro National Park in Arizona, monitors learned that prescribed fires can enhance the habitat of the endangered Mexican spotted owl.

**Rehabilitation of Burned Areas** Wildland fire and firefighting activities sometimes cause damage requiring rehabilitation. After a fire at Point Reyes National Seashore in California, steep areas were mulched to reduce erosion, and non-native plants were surveyed and removed. At Mesa Verde National Park in Colorado, archeological sites were mapped and stabilized after a fire.

**Smoke Impacts** Large, unplanned fires can produce a lot of smoke, but prescribed fires are carefully planned

to minimize the effects of smoke on the public. The National Park Service works closely with state and local air-quality agencies to reduce such impacts. Sometimes prescribed fires prevent larger fires later that would produce significantly more smoke.

**Be Careful With Fire** It is still important for you to be careful with fire in national parks and other natural areas. Fires caused by carelessness or arson can have tragic consequences for the public, firefighters, wildlife, forests, streams, and air quality. Please be careful with campfires, matches, cigarettes, and vehicle exhaust systems.

Learn About Fire in the National Parks

When you visit a national park, ask a ranger if you could do one or more of the following:

- ◆ Attend a ranger-led fire ecology hike
- ◆ Explore a self-guided fire ecology trail if one is available
- ◆ Take a wildflower walk or view wildlife in a recently burned area
- ◆ See a prescribed fire in progress from a safe distance
- ◆ Read other materials about local fire ecology

For more information: Contact a national park fire or resource management office. You may also visit the following world wide web sites:

National Park Service  
Fire Management Program Center:  
<http://fire.nifc.nps.gov/>

The threat of unwanted fire must be taken seriously. Homeowners can take steps to mitigate the danger. Firewise Home Page:  
<http://www.firewise.org/>

To learn more about your national parks visit the National Park Service Home Page: <http://www.nps.gov/>



Banister National Monument (above); illustration by Marietta Day (right)

Employees from various agencies form teams to manage a wildland fire.