



## Wildland Fires

### Background

## MASTERS OF DISASTER®

# Wildland Fires

Fire prevention and preparedness education can lessen the adverse effects of wildland fire on young people and their families. Use these materials to make sure the safety messages get home.

More people today are making their homes in wildland-urban interfaces, the areas where development meets or encroaches on wildlands.

Wildlands are natural areas, such as forests, woods, fields of grass and other undisturbed, natural areas. The danger of fire is very real in wildlands, especially in mountainous areas, and as the number of homes and other structures increases, so does the threat to people and property.

### *Masters of Disaster Connections*

Refer to the following modules in the *Masters of Disaster* series to learn more about a particular topic and to reinforce the objectives of the lesson.

*Masters of Disaster's Fire Prevention and Safety* lessons offer important suggestions for fire safety and tips to prevent all fires.

An essential part of preparing for any disaster is to be ready with plans, supplies and practice. *Masters of Disaster's Be Disaster Safe* inspires young people by teaching them to prepare for all hazards.

The lessons of *In the Aftermath* focus on recovery for the individual, school and community after any disaster occurs.

### Wildland Fire Science

Wildland fire is any unplanned fire burning in a wildland area. The most common type of wildland fire, surface fire, burns along the forest floor. Ground fire, which is usually started by lightning, burns along and/or below the forest floor along the dense root systems of trees. Crown fire jumps from treetop to treetop and spreads quickly, aided by the wind. In all types of fire, the wind can carry burning embers or debris ahead of the main fire, a phenomenon called "spotting," and if they land on other fuels, they can start new fires.

### Wildland Fire Triangles

All fires start with ignition, which is a chemical reaction that occurs when sufficient levels of fuel, heat and oxygen exist simultaneously. Each component must be present to sustain a fire; remove one component and the fire dies out. Every year, weather conditions—prolonged high temperatures, wind and dryness—combine to produce an optimal environment for wildland fire. Dry debris on the ground (fuel) is ignited by lightning or careless humans (heat), and the resultant fire is supported by the atmosphere (oxygen).



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Another triangle that relates to wildland fires is the fire behavior triangle. One side is fuel, discussed above. The second side is weather, and the third is topography (terrain). Weather (wind, temperature and humidity) greatly affect wildland fires. Strong winds may push the flames toward new fuel sources. Winds can transfer embers, sparks or ash to start spot fires. Blowing winds can also dry fuel in moist areas, allowing fires to burn more readily. Wildland fires can even generate their own winds. As the air above the flames is heated, it rises, and the movement supplies fresh air (oxygen) to the fire. As warm air rises during the day, air currents travel up slopes; as night falls and the ground cools, air currents flow down slopes.

The temperature of fuel also plays a part in how quickly or slowly fuel reaches its ignition point and burns. Fires in the shade burn less quickly than those in the sun.

Moisture or humidity dampens fuel and slows the spread of flames. Humidity is greater at night, so fires often slow in the evening.

Topography also has a major effect on the spread of wildland fire. The contours, elevation and slope of an area influence temperature and wind conditions. Barriers within the landscape, such as boulders, rocks, cliffs and bodies of water, help determine how a wildland fire spreads. Elevation affects the wind and moisture in an area. The steepness of a slope is directly related to the speed with which a fire spreads. If a fire begins at the bottom of a steep slope, the fuel above the fire is preheated by the flames below. Therefore, when the flames reach the higher areas, the fuel catches fire more quickly.

### Wildland Fire History

Fires are a natural part of the ecosystem, and they have always burned regularly in the wild, cleaning out excess vegetation, insects and diseases, and generating a rebirth of forests, prairies and other wildlands. Without fire, plants and animals requiring nutrients and vegetation from other parts of the ecological cycle disappear. Some locales depend on fire to promote vegetative and wildlife diversity, to help maintain wilderness and wildland areas and to eliminate the heavy fuel accumulations that can lead to a catastrophic wildland fire. Many plants have adapted in ways that protect them as a species from the effects of wildland fire, and some plants are even strengthened by fire. Nearly every ecosystem in the country has some type of fire-dependent plant.

Native Americans traditionally used fire to clear the land, but early European settlers resisted this process, resulting in the buildup of dangerous amounts of wildland fuel. In the mid-nineteenth century, the population in the United States rose dramatically as immigration increased, and as a result people began encroaching more and more on wildlands (wildland-urban interface). This mix of humans and fuel-filled wildlands led to wildland fires in the late 1880s that were so widespread and so devastating they were called “The Great Barbeque.” By 1905, the Forest Service was created within the U.S.

Department of Agriculture, and fire suppression became official government policy. The exclusion of fire from ecosystems has led to a century’s worth of fuel buildup. When that fuel is ignited, the resulting fire burns so hot that the beneficial post-burn effects are lost, transforming ecosystems that were once dependent on fire to regulate their growth. As a result, such ecosystems are



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less diverse; are laden with overgrowth and dead plants; and have given rise to species that do not adapt to fire. The land management practice of reintroducing fire into the ecosystem in a controlled setting, called “controlled fire” or “prescribed burn,” helps restore the natural balance. Controlled fires are used only in circumstances under which the flames and heat can be controlled; these include specific weather conditions, certain locations and available firefighting personnel.

### The Consequences of Wildland Fires

Wildland fires leave problems behind them, even after the last ember is extinguished. Burned vegetation cannot soften the impact of heavy rain, and the fire’s heat creates a layer of soil just below the surface that is hydrophobic, or water-repellent. These conditions can cause dangerous flash floods in downstream canyons. In addition, the conditions after a fire can result in erosion and debris flows—also known as mudslides—in hilly and mountainous areas, which can threaten the homes below and change the ecological balance of the locale. The increased risk of flash floods and mudslides continues for three to five years after a wildland fire, posing grave threats to residents and visitors whenever rain falls on the burned mountains or hills.

The consistency of a debris flow, which is a liquefied or muddy landslide, ranges from watery mud to thick, rocky mud that can carry large items such as boulders, trees and cars. Flows from many different sources can combine in channels, greatly increasing their destructive power as they flow downhill and through channels and growing in volume with the addition of water, sand, mud, boulders, trees and other materials. When the flows reach flatter ground, the debris spreads over a broad area, sometimes accumulating in thick deposits that can wreak havoc in developed areas.

### Where Wildland Fires Occur

Although we hear most about wildland fires in the western states—California, Washington, New Mexico, Oregon, Colorado and Montana—wildland fires can occur in any state. In 1947, 16 lives were lost and over 200,000 acres were burned in Maine, and in 1963, 100 homes were burned on Staten Island. In 1998, fires burned 200,000 acres in Florida and forced the evacuation of thousands of residents. In 2003, a wildland fire threatened many homes just outside Cleveland. Wildland fires can and do happen anywhere, and everyone must understand how to prevent them and how to be prepared.

### Wildland Fire Safety

Lightning does ignite wildland fires; however, in 2005, humans caused twice as many. A careless match, an unattended campfire, the use of fireworks, the uncontrolled burning of debris or the sparks from equipment—these unplanned but deadly occurrences destroy lives, wildlands and property. With forethought and care, many wildland fires can be prevented.

Often, needed improvements to roads and water supplies, essential for effective firefighting, have not kept pace with development. The loss of property to wildland fires has been substantial, but so, too, has been the loss of lives—the



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lives of firefighters as well as the lives of others in the community.

The number of wildland fires is increasing, in part because of past management policies; increasingly dry, hot weather; changing weather patterns; and human residential and recreational encroachment into wildlands. Some regions are more susceptible to wildland fires than others; however, no area of the country is immune to the dangers of wildland fire.

### Wildland Fire Safety Checklist

#### Practice Wildfire Safety

People start most wildfires. Find out how you can promote and practice wildfire safety.

- Contact your local fire department, health department or forestry office for information on fire laws. Make sure that fire vehicles can get to your home. Clearly mark all driveway entrances and display your name and address.
- Report hazardous conditions that could cause a wildfire, and report smoke or fire in wildlands immediately.
- Teach children about fire safety. Keep matches out of their reach.
- Post fire emergency telephone numbers.
- Plan several escape routes away from your home by car and on foot.
- Talk to your neighbors about wildfire safety. Plan how the neighborhood could work together after a wildfire. Make a list of your neighbors' skills, such as medical or technical. Consider how you could help neighbors who have special needs, such as elderly or disabled persons. Make plans to take care of children who may be on their own if parents can't get home.

#### Protect Your Home

- Regularly clean the roof and gutters.
- Inspect chimneys at least twice a year. Clean them at least once a year. Keep the dampers in good working order. Equip chimneys and stovepipes with a spark arrester that meets the requirements of National Fire Protection Association Code 211. (Contact your local fire department for exact specifications.)
- Use one-half-inch mesh screen beneath porches, decks, floor areas and the home itself. Also, screen openings to floors, the roof and the attic.
- Install a smoke detector on each level of your home, especially near bedrooms; test monthly and change the batteries at least once every year.
- Teach each family member how to use the fire extinguisher (ABC type) and show him or her where it's kept.
- Keep a ladder that will reach the roof.
- Consider installing protective shutters or heavy fire-resistant drapes.
- Keep handy household items that can be used as fire tools: a rake, ax, handsaw or chainsaw, bucket and shovel.



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#### Before Wildfire Threatens

- Design and landscape your home with wildfire safety in mind.
- Select materials and plants that can help contain fire rather than fuel it.
- Use fire-resistant or non-combustible materials on the roof and exterior structure of the dwelling; or treat wood and combustible material used in roofs, siding, decking or trim with UL-approved fire-retardant chemicals.
- Plant fire-resistant shrubs and trees. For example, hardwood trees are less flammable than pine, evergreen, eucalyptus or fir trees.

#### Create a 30- to 100-Foot Safety Zone Around Your Home.

- Within this area, you can take steps to reduce potential exposure to flames and radiant heat. Homes built in pine forests should have a minimum safety zone of 100 feet. If your home sits on a steep slope, standard protective measures may not suffice. Contact your local fire department or forestry office for additional information.
- Rake leaves, dead limbs and twigs. Clear all flammable vegetation.
- Remove leaves and rubbish from under structures and dispose of them properly.
- Thin a 15-foot space between tree crowns, and remove limbs within 15 feet of the ground.
- Remove dead branches that extend over the roof.
- Prune tree branches and shrubs within 15 feet of a stovepipe or chimney outlet.
- Ask the power company to clear branches from power lines.
- Remove vines from the walls of the home.
- Mow grass regularly.
- Clear a 10-foot area around propane tanks and the barbecue. Place a screen over the grill—use nonflammable material with mesh no coarser than one-quarter inch.
- Regularly dispose of newspapers and rubbish at an approved site. Follow local regulations for burning.
- Place stove, fireplace and grill ashes in a metal bucket, soak in water for two days, then bury the cold ashes in mineral soil (not compost).
- Store gasoline, oily rags and other flammable materials in approved safety cans. Place cans in a safe location away from the base of buildings.
- Stack firewood at least 100 feet away and uphill from your home. Clear combustible material within 20 feet. Use only UL-approved wood-burning devices.

#### Plan Your Water Needs

- Identify and maintain an adequate outside water source such as a small pond, cistern, well, swimming pool or hydrant.
- Keep a garden hose that is long enough to reach any area of the home and other structures on the property.
- Install a freeze-proof exterior outdoor water faucet on at least two sides of the home and near other structures on the property. Install additional faucets at least 50 feet from the home.



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- Consider obtaining a portable gasoline-powered pump in case electrical power is cut off.

### When Wildfire Threatens

- If you are warned that a wildfire is threatening your area, listen to your battery-operated radio for reports and evacuation information. Follow the instructions of local officials.
- Be ready to evacuate. Arrange for transportation and decide where you will go. Make plans to address special needs of family members. Coordinate efforts with your neighbors. Have pet carriers and other supplies at hand. Plan and prepare to evacuate animals.
- Arrange for temporary housing at a friend's or relative's home outside the threatened area.
- Wildland fires can change direction and speed suddenly. In addition to listening to radio and television reports, go outside to look at the fire from time to time. If you believe the fire is too close to your location, evacuate immediately. The fire may move too fast for officials to issue timely evacuation notifications.

### If Advised to Evacuate, Do So Immediately

- Wear protective clothing—sturdy shoes, cotton or woolen clothing, long pants, a shirt with long sleeves, gloves and a handkerchief to protect your face.
- Take your disaster supplies kit.
- Lock your home.
- When you leave, tell someone where you are going.
- Choose a route away from fire hazards. Watch for changes in the speed and direction of fire and smoke.

### After a Wildland Fire

- Use caution and exercise good judgment when re-entering a burned wildland area. Hazards may still exist, including hot spots, which can flare up without warning. Wear sturdy shoes, long pants, long sleeves and gloves.
- Take precautions to avoid inhaling dust particles and other airborne debris, especially from burned home sites. There may be hazardous chemicals in the dust.
- Be careful around burned trees and power poles. They may have lost stability because of fire damage.
- Watch for ash pits and mark them for safety. Ash pits are holes full of hot ashes created by burned trees and stumps.
- Be aware of the potential for flash floods and mudslides or debris flows for at least three years after a fire. If there is even a chance of rain, stay away from canyons below burned hills or mountains. Such canyons are dangerous if it has rained recently.



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**Sources:**

Firewise.org, developed and supported by the National Wildfire Coordinating Group, a consortium of wildland fire agencies that includes the Forest Service, the Department of the Interior, the National Association of State Foresters, the U.S. Fire Administration and the National Fire Protection Association at <http://www.firewise.org>. Accessed September 26, 2006.

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Talking About Disaster: Guide for Standard Messages. Produced by the American Red Cross in cooperation with the Coalition of Organizations for Disaster Education, Washington, D.C., 2007.  
<http://www.redcross.org/disaster/disasterguide>



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