



Taking Care of Residential Trees after Wildfire

JoAnne Skelly

Extension Educator, Carson City/Storey County

Introduction

Wildfire can affect trees in residential landscapes in a variety of ways. They can be completely or partially consumed, scorched and dried out, or merely singed. Many trees can recover after fire, depending on the intensity and duration of the burn and extent of dehydration. After a fire it is important to determine which trees might recuperate and which will need to be removed.

How Fire Damages Trees

Fire directly damages trees in a number of ways:

- Leaf or needle scorch
- Root damage
- Trunk or branch damage
- Inner tissue (cambium) injury
- Bud death

Other less direct impacts include soil dessication or water-repellant (hydrophobic) soils. Trees unable to obtain adequate soil moisture after a fire are less likely to survive. Fire-damaged and water-stressed trees are also more susceptible to bark beetle attacks.

Factors Affecting Tree Survivability after a Fire

Trees vary in how readily they burn and whether they can survive a fire. Fire intensity and length of exposure are important factors in tree response. The growth stage of the tree can influence whether or not it can survive. Trees starting to grow in the spring are more susceptible to fire damage than dormant trees. Young Jeffrey or Ponderosa pine can burn readily under moderate to high fire severity, but as they mature they develop a thicker bark that is more fire-resistant.

Physical spacing can be critical to tree survival. Closely spaced trees are continuous fuels and can conduct flames more readily and with a greater intensity than trees with greater distance between them.

The chemical and physical characteristics of trees influence how they burn and their survival potential. Many evergreen trees are high in oils and waxes and have a greater burn potential than most deciduous trees which have lower oil and wax content. In summer, deciduous trees usually have a higher moisture content than evergreens. Chemical components vary in a plant depending on the time of year and the species. Trees that are more likely to survive a wildfire have an open, loose branching pattern with less total vegetation overall. They also accumulate less plant litter within or underneath them.

Trees that are stressed due to drought, injury, disease, insects, or mistletoe are weak prior to a fire and unlikely to survive after a fire.

Determining Tree Mortality

If the bark has not been completely burned off the trunk, exposing and damaging the cambium, the tree may survive. Cut a quarter-sized or smaller piece of bark off the trunk one-quarter to one-half inch through the bark. If there is a green or white moist cambial layer immediately below the bark, the tree has a good chance of recuperating.

If the trunk is severely burned for more than 50% around the circumference, the tree will probably die, although some thick-barked trees may survive. Where fire burned deeply into part of the trunk, the tree will be unstable and survival is unlikely. These are hazard trees and should be removed.



Severely burned trees will not survive.

To check if burned branches are alive, peel back a bit of bark on twigs. If there is a thin layer underneath the bark that is green or white and moist, the twigs may still be alive. Wait to see if they have spring growth before pruning these branches.

Look for burned roots around the base of the tree and several feet away. Roots are generally 6 inches to 8 inches below the soil surface. Gently unearth the roots at a few locations. Check to make sure they are supple, rather than brittle and dried out. If 50% of roots have been burned, the tree is unstable, may be toppled by wind, and will probably die.

A tree that has lost part or all of its leaves or needles because of heat from a fire may or may not recuperate depending on the species and degree of the fire damage.

Healthy, deciduous trees can be resilient after being partially burned and may produce new leaves and stems, as well as sprouts at the base of the tree. Evergreen trees may also survive if more than 10 percent of their foliage is still green.



Deciduous tree affected by fire likely to survive.

Buds that are still green and moist rather than dry and brittle, or twigs that bend easily rather than break, indicate a tree that will probably live. If the buds are dry and break easily, they are dead. An evergreen tree with less than 50 percent live buds remaining after a fire will probably not survive, but it is difficult to determine what percentage of buds are still viable.



Evergreen trees with less than 10 percent green foliage or less than 50 percent live buds remaining are unlikely to survive.

An evergreen tree that has been damaged by fire may live, but it will be stressed and attract bark beetles. Bark- and wood-boring beetles can cause trees to produce balls of pink to red pitch on the trunk or branches. A tree with boring dust from beetles feeding around one-third or more of the trunk will probably die within a year or two.



A tree with evident boring dust.

An immediate post-fire inspection will not give an absolute answer about whether a tree will live. The definitive answer will occur when, or if, the buds and shoots develop and grow in the spring following the fire. Many trees may recover and grow, so do not hurry to prune every burned limb. Wait and see what recovers. New growth on some trees may be ugly and need corrective pruning. Unsightly growth that can not be corrected with pruning may warrant tree removal.

Care for Fire Damaged Trees

After a fire, it is necessary to water trees as soon as possible. First, determine if the soil will absorb water. Sometimes after a fire, soils can become water-repellant (hydrophobic). To test for hydrophobic soils, pour a cup of water on the soil. If the soil does not absorb it and the water beads up on the surface, scrape off the top inch or two of soil and try again.

If the water still will not penetrate the top couple of inches of soil, rake the ground to loosen the impermeable layer. Mulch the area with a thin layer of weed-free straw after raking to help it absorb water. Twenty percent of the soil should show through the straw when finished. It may be necessary to lightly push the straw into the soil

(crimp) every few feet with a shovel so that it will not blow or wash away.

Severely burned soils, especially those high in organic matter, may take months or over a year to absorb water without corrective measures.

When water will soak into the soil, start irrigating. The goal is to soak the entire area under the dripline of the tree (from the trunk to the branch tips) and a few feet past the dripline, to a depth of 12 inches to 15 inches. Water-absorbing roots are in the top 12 inches to 15 inches of soil. It is not necessary to water more deeply. A soaker hose that slowly oozes water into the soil works well. Place the hose in a circle a few feet away from the tree trunk. After watering for an hour, check the depth of water penetration by digging a small hole in the soil. After it has soaked the necessary 12 inches to 15 inches, move the hose out another two feet to three feet and water that area. Continue to move the hose until the dripline and two to three feet outside the dripline have been watered.

If the trees are irrigated by a drip system, it may have to be expanded to wet a larger area. A few emitters will not be enough to water the entire area under a big tree. Where sprinklers are used, make sure they provide full coverage under the tree and out past the dripline a few feet. Manage the sprinklers with an on/off/on schedule to prevent runoff and soil erosion and to wet the soil slowly, but thoroughly.

Check trees weekly and water when the soil dries to six inches deep, not only in the summer, but also through the fall and winter, unless there is sufficient rain or snow to maintain adequate soil moisture. It is critical to water slowly to allow water to soak in and avoid runoff.

Protect the trunks and large limbs of trees from sunburn until the leaf or needle area (canopy) regrows. Wrap them with a permeable substance such as light-colored cloth, cardboard, or tree wrap, or paint them with a water-based white paint. Do not use oil- or petroleum-based products because they damage plant tissue. Loosen the wrap every few months, so the tree can grow without being strangled (girdled).

Prune off dead, broken, or severely damaged limbs. Wait until fall to prune limbs on damaged pines to avoid attracting bark beetles. Ideally, trees that must be cut down should be removed from the property immediately to avoid beetle infestation.

However, the wood can be left on site, if it is cut into 12-inch lengths and exposed to the drying sun. Split pieces larger than 8 inches in diameter to speed the drying.

Pile the wood in direct sun and cover it with four mil to six mil clear plastic. The smaller the pile, the more effective this is. Avoid tearing the plastic and be sure all edges of the plastic are buried. Leave the pile covered for three months during hot weather, and longer during the cooler times of the year. Heat trapped under the plastic will make the wood unsuitable for beetles. Do not place the pile or firewood under surviving pines. Chipping and pile burning are also satisfactory methods of disposal. Chip all small pruned material or remove it from the property immediately.

Trees Survival Mechanisms

One mechanism trees have to survive after a fire is the ability to resprout. If a tree is top-killed in a fire, it can grow back from roots or stems. These trees provide excellent soil stabilization for fire-affected soils. If irrigated, they may also quickly restore a landscape to its pre-fire appearance. Here are commonly used ornamental and native trees that resprout after fire: aspen, black locust, crabapple, birch, boxelder, cottonwood, Gambel oak, giant sequoia, green ash, hackberry, honey locust, Idaho locust, poplar, maple, swamp white oak, sweetgum, and willow. Not all of these resprouting trees are recommended for use in an urban landscape, but may occur in the natural environment around residences in the wildland interface.



Native deciduous trees resprout after fire.

Other fire survival mechanisms include thick bark, shielded buds, or seed stored in the soil, or in cones which open after exposure to fire.

Additional Considerations

During the clean-up process after a fire, avoid injuring trees undamaged by the fire. Protect trees from potential construction injury by establishing protective zones around individual trees and groups of trees. Do not drive or park equipment or vehicles over root systems. This seriously damages tree roots and stresses trees. Stressed trees are less likely to survive and thrive. At a minimum keep construction related activity outside the dripline of trees.

Conclusion

After a fire, when evaluating what steps to take, think about safety first. Check for unstable trees or tree limbs that may fall. Then, take care of remaining trees and be patient. Many trees can survive a fire. Some plants can be very resilient when irrigated properly and stress factors are reduced.

References

- Chandler, C., P. Cheney, P. Thomas, L. Trabaud, and D. Williams. 1983. *Fire in forestry, Vol. 1: Forest fire behavior and effects*. Wiley Publishers. New York, New York.
- Gomez, T., J. Schalau, and C. Jones. 2002. *Firewise plant materials for 3,000 ft. and higher elevations*. Publication AZ1289 8/2002. University of Arizona College of Agriculture and Life Sciences. Tucson, Arizona.
- Moench, R. and J. Fusaro. 2004. *Soil erosion control after wildfire*. no. 6.308. <http://www.ext.colostate.edu/PUBS/NATRES/06308.html>
- Philpot, C.W. 1970. Influence of mineral content on the pyrolysis of plant materials. *Forest Science*. 16(4): 461-471.
- Skelly, J.A. and J. Christopherson. 2003. *Pinyon pine – management guidelines for common pests*. Publication EB 03-02. University of Nevada Cooperative Extension. Reno, Nevada.
- USDA U.S. Forest Service. 2004. *Ponderosa pine*. R1-04-13.

The University of Nevada, Reno is an Equal Employment Opportunity / Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, and sexual orientation in any program or activity it operates. The University of Nevada employs only United States citizens and aliens lawfully authorized to work in the United States.