Forestry Note:

Recovering From Wildfire

A Guide for Oklahoma Forest Owners

Wildfire! What Do I Do Now?

Wildfire is the disaster many forest owners fear. If you are reading this, it has probably happened to you or someone close to you. Fire may have burned all or part of your property, and you're left wondering "What should I do now?"

Soon after the fire is out, it's time to start making some decisions. Although it may appear that the worst has happened, there are things an owner can do to protect their property from further impact, to recoup some of the loss, and to restore damaged forests and woodlands to a healthy condition.

This publication discusses some issues property owners should consider following a wildfire, including:

- How to protect valuable property from erosion damage;
- Where to go for help and financial assistance;
- How to remove or salvage trees that were lost or damaged;
- How to claim a casualty loss on tax returns; and
- How to recover from wildfire damage.

Assessing Resource Damage

One of the keys to wildfire recovery is damage assessment. Actions to be taken, such as erosion control and replanting, will depend heavily on the amount of damage caused by the wildfire. Soon after the fire, it is important to determine the intensity of the fire as it burned across the property.

Wildfires can be very destructive. However, most fires actually burn at low intensity on much of the affected area, with only occasional pockets of moderate to high-intensity burn. On occasion, fires do burn at high intensity over large areas, especially under extreme conditions of high temperature, low relative humidity, dry vegetation, low soil moisture, and/or strong winds. Low-intensity fires can produce benefits to plant communities that evolved with fire as part of the natural system. These fires reduce underbrush, thin out young, closely-spaced trees, improve wildlife forage, and reduce fuel levels; thereby, lessening the chance for future high-intensity wildfires.

Low-intensity fires may damage or destroy small trees, but generally do not burn the entire forest canopy. Most leaves or needles remain on trees, even though some may be singed and the lower branches may be scorched. The ground is still partially covered by old needles, leaves, and decaying wood. In most cases, these fires are beneficial to maintaining a healthy forest.

Moderate-intensity fires burn into the forest canopy and consume the needles and leaves from many trees, but not all. They also consume a portion of the ground cover. Because moderate-intensity fires typically leave the biggest and most vigorous trees alive, some forest cover will remain.

High-intensity fires consume 50% to 100% of the forest canopy and everything on the forest floor. The resulting ash is white or gray and the soil loses its protection from rainfall and erosion. Depending on soil type, fire intensity, and vegetation burned, a water-repellent or hydrophobic layer may form near the soil surface that will decrease water absorption and increase runoff and soil erosion—especially in the first rains following the fire.

Mapping

On a map of the property, record the burn intensity of the areas affected by the fire. Even if most of the area burned at low intensity, there may be 'hot spots' with greater destruction that are important to note on the burn map. Also, forested land may endure these impacts even if the fire never actually burns the trees. The property map should also show bulldozer lines and areas where trees were felled. This map can then be used to plan for forest rehabilitation or to help plan a future prescribed burning program.

Soil Erosion

Soil erosion is the most damaging, long-term resource impact that occurs after wildfire. Erosion robs land of soil and the ability to grow vigorous trees. A healthy forest functions to keep soil in place. The forest canopy intercepts raindrops and reduces soil impact. Precipitation that passes through the canopy is intercepted by the litter layer that covers the forest floor. Together, the canopy and litter layer protect the soil by keeping the rain from fracturing soil particles. Without this protection, loose soil particles can wash down bare slopes and enter stream channels, reducing water quality and altering or degrading aquatic habitat.

In addition to protecting soil from the force of rain, the litter layer helps the soil absorb rainwater. Without a litter layer, rains will likely cause runoff that reaches stream channels faster, which may increase the possibility of flooding. Burned forest land is at increased risk for soil erosion if:

- The forest litter layer has burned off, exposing bare soil;
- The forest canopy has burned away, reducing rainfall interception;
- The fire was of high intensity causing damaged soil to repel water;
- Slopes are steep;
- Rain falls in large amounts quickly;
- The soil texture is highly erodible;
- The land is directly down-slope from other unprotected or burned areas.

Erosion Control Measures

During the first two or three years after a fire, a number of measures can be taken to lower the probability of soil erosion and protect the land's productivity and water quality. The goal of these methods is to cover the soil surface to protect it from raindrop impact, to improve the soil's ability to absorb water, and to reduce the volume and speed of overland water flow.

The soil can be covered with a type of mulch and planted with seedlings or grass. Species that sprout quickly and have a dense, fibrous root system are best. For large areas, where covering the soil with plant material is not economically feasible, try to control the water flow and dispersal of sediment. This can be accomplished by erecting barriers that slow and re-direct the water, reducing its erosive power before reaching a stream (Figure 1). A combination of erosion-control measures is recommended.

Spreading slash. Tree limbs and branches can be spread on the exposed soil to reduce raindrop impact. If branches are cut small enough (slashed) to come in direct contact with the soil, they will also help disperse overland water flow and reduce runoff and erosion.

Straw mulching. Spread straw at 2 tons per acre (about 100 pounds per 1,000 square feet). An average 74-pound bale will cover about 800 square feet. On steep slopes, 'punch in' the straw with a long, narrow-bladed shovel such as a transplanting spade or tile spade. The result should look like the tufts of a toothbrush. The straw should be certified as 'noxious-weed free.' Hydro-mulching uses a machine to blow a slurry of straw, newspaper, or other fiber onto the soil. This technique is used by highway departments to stabilize road cuts but is probably not feasible unless large areas must be covered, funds are readily available, and there is convenient truck access.

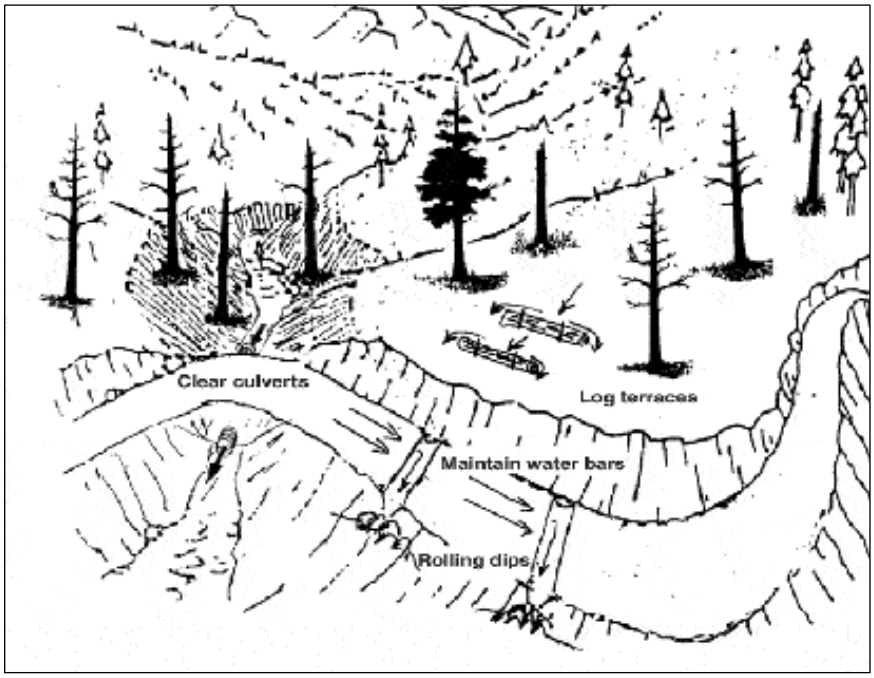

Figure 1. Graphic illustrating various erosion control measures

Seeding. Grass seed will sprout quickly and put down roots to hold the soil. Depending on the pre-fire vegetation, fire intensity, and soil disturbance, there may be enough grass and herbaceous plant seed in the soil already to provide cover.

Soil disturbance from fire suppression or salvage logging will probably remove or bury the native seed and additional seed must be planted. Although native plants are often preferable, they can be much more expensive and difficult to obtain—especially for large tracts. Priority areas for seeding include steep, erodible slopes and in streamside management zones. However, because slopes are more vulnerable to soil erosion, it is likely that seed unprotected by soil or mulch will wash down the slope during the first rains before it germinates. This is likely if the first rains are heavy, and the fire was intense enough to make the soil water-repellent. Covering seed with a mulch or landscape fabric, especially on the most vulnerable slopes, will significantly improve germination and stabilization of the soil.

Contour log terraces. During heavy rainstorms, log terraces provide a barrier to runoff. Dead trees are felled, limbed, and placed on the contour perpendicular to the direction of the slope. Logs are placed in an alternating fashion so the runoff no longer has a steep downward path to follow. The water is forced to run between logs, reducing runoff velocity and giving water time to soak into the soil.

If terracing is necessary, small logs should be used. Logs should be 6 to 8 inches in diameter (smaller logs can be used) and 10 to 30 feet long. The logs should be bedded into the soil for the entire log length and firmly backfilled with soil so water cannot undercut the terrace. Secure the logs from rolling by driving stakes on the downhill side. Start terracing from the top of the slope because it is easier to see how the water could flow downhill from this vantage point.

Straw wattles. Straw wattles are long tubes of plastic netting packed with excelsior, straw, or other biodegradable material. Wattles are used in a similar fashion to log terraces. Unlike logs, the wattle is flexible enough to bend to the contour of the slope. This type of erosion-control device is a 'special order' item. Although somewhat common in the western states, it is rarely used in Oklahoma and may be difficult to find.

Silt fences. Landscape fabrics, made of woven wire and fabric filter cloth, are also used to control erosion. However, they can be expensive when compared to straw or natural mulches. Silt fences that trap sediment from runoff should be used in areas where runoff is dispersed over broad flat areas. Silt fences are not suitable for concentrated flows occurring in small rills or gullies. Silt fences are fabricated from materials available at hardware stores, lumberyards, or nurseries.

Straw bale check dams. Straw bales placed in small drainages act as a dam – collecting sediments from upslope and slowing the velocity of water. Bales are carefully placed in rows with overlapping joints—much as one might build a brick wall. Some excavation is necessary to ensure bales form a good seal. Two rows (or walls) of bales are required and should be imbedded at least six inches below the soil surface. As with straw mulching, straw bales should be certified 'weed free' to avoid spreading invasive plants.

Road Protection

The road system is another element of the forested landscape that may need extra protection after a fire. The fire has most likely destroyed vegetation and ground litter that previously intercepted and slowed water runoff. In addition, the soil may have developed a water-repellent layer that increases runoff. The drainage system of roads in a burned area may not be adequate to handle the increased runoff, debris, and sediment after a fire.

Roads and trails can also act as conduits for the increased surface flow and may need extra attention to slow water movement. Install waterbars and rolling dips to divert runoff from roads onto the forest floor to prevent formation of gullies. Waterbars are mounds of soil, rock, or bedded logs that serve as 'speed bumps' on closed or minimally used roads and trails. Rolling dips are broader changes in grade that readily allow vehicle passage. Both waterbars and rolling dips are angled slightly down slope to the outlet side and divert runoff to a more stable vegetated slope or rock apron. Soil conditions and the road grade will dictate spacing.

To protect the road system, as well as downstream water quality, consider taking the following actions. Work with experienced professionals to insure proper design and installation.

To protect the road system:

- Armor culvert inlets or bridge abutments.
- Patrol roads during significant rain events and clean out clogged ditches and culverts.

To slow and divert water:

- Construct cross-drains or waterbars for limited-use roads.
- Remove berms on the outside edge of the road's driving surface to allow water to disperse.

To trap sediment and debris:

- Install sediment traps below culverts to prevent sediment from leaving the site.
- Install trash guards at culvert inlets to block woody debris from plugging the culvert.

To increase drainage:

- Restore proper road contours.
- Increase frequency of water turnouts and install larger culverts in special cases.

Assessing Tree Damage

After assessing fire intensity and addressing erosion threats, it is time to plan for rehabilitation of the site. One challenge in long-term planning is estimating which fire-damaged trees may die. Trees in an area affected by a low-intensity fire may still die if they sustained enough damage. Understanding how fire damages trees and causes mortality can make this guess an educated one (Figures 2a & 2b).

A conifer's (e.g., pine and juniper) ability to withstand fire damage is based on the bark thickness, root depth, needle length, bud size, and degree of scorch. They are limited in their ability to reestablish themselves after a fire. Unlike some deciduous trees and shrubs, the root systems of conifers (except shortleaf pine) do not regenerate from new vegetative stems or 'sucker sprouts' after the top is killed.

Figure 2a. Tree survival is greater where fire temperatures are low and roots do not receive intense heat.

Figure 2b. Tree survival is low where leaves, roots, logs, and debris build up around the base of trees. Intense heat is the result, and the cambium layer is destroyed.

Bark: For a conifer to survive, some roots, the cambium of the main trunk and buds must survive. The cambium is the sensitive layer of growing cells that produces the vascular system that conducts water and nutrients throughout the tree. The bark insulates the cambium from the damaging intensity of a fire; the thicker the bark, the better the protection.

Buds: Buds grow at the ends of tree branches and begin forming at the end of spring to provide for next year's growth. The needles of a conifer provide some protection to the buds. Longer needles provide more protection than short ones. A fire can impact the development and survival of the buds. However, new buds may not have been formed prior to an early summer fire. This can reduce the chance for tree survival. The amount of scorched foliage in the tree crown can predict conifer survival. Even with severe scorch, buds may survive and grow the following spring. Do not base survival estimates on scorch or foliage color after a fire—these can be misleading. Buds should be carefully examined – live buds should be firm and the terminal stem should be flexible. The bud or stem should not be dry and break off easily.

Roots: Damage to roots depends, in part, on the nature and overall depth of the root system in the soil profile. The amount and depth of the duff layer (needles, leaves and other litter on the forest floor) can impact a fire's effect and damage to the root system. Fast moving surface fires may not destroy the duff layer and may cause little root damage.

Salvaging Damaged Timber Trees

If the property is sizeable, with forest trees of commercial value, harvesting trees killed as a result of wildfire is a personal decision. This decision will also be affected by the availability of commercial markets for trees in the area. The absence of wood markets can reduce a landowner's options.

Trees sustaining heavy damage from fire will very likely die. Trees which sustain medium damage may survive, but do not always recover their previous vigor. This stress leaves them vulnerable to attack by insects and to future droughts.

Once a tree has died, it loses its commercial value quickly due to decay. The speed at which this occurs depends on the tree species. In addition, dead trees which still contain sound wood may become infected with blue stain fungus. This does not weaken the wood, but decreases the value and grade of lumber made from it. On the other hand, some dead trees are needed for wildlife habitat and cover. Dead trees also return nutrients and organic matter to the soil.

Salvage harvesting provides a number of advantages to property owners. Most importantly, accumulated dead and damaged trees provide fuel for future fires, and their removal reduces the risk that additional fires will burn through the damaged area. Removal also reduces the spread of insects which proliferate in dead and damaged trees. Any income received from salvaged trees can be used to recoup losses and to finance replanting and erosion control measures. While salvage harvesting can produce many benefits, it must be carried out properly to avoid further resource damage. If done improperly, harvesting can increase soil disturbance which can lead to water quality impairment.

Because of these risks, it is important that salvage harvesting be carried out with the help of a professional forester. A private consulting forester under contract can help sell the trees, secure the best price, plan and execute the sale and harvest, and develop a reforestation plan for the land. A professional forester can also help address any state or federal regulations or guidelines that deal with the protection of water quality, riparian areas and wildlife habitat, and prevention of soil erosion. Neighbors and friends who have harvested timber before are also good leads to registered professional foresters. In addition, landowners can search the yellow pages under "Forester, consultant." Other sources of professional foresters working in the area may be found at the following websites:

- Oklahoma Forestry Services – www.forestry.ok.gov
- The Association of Consulting Foresters – www.acf-foresters.com
- Society of American Foresters – http://www.safnet.org/certifiedforester/hirecertifiedforester.cfm

Removal and Replacement of Damaged Landscape Trees and Shrubs

Once tree damage has been assessed, landowners can make decisions as to which trees should be removed. Candidates for removal most certainly include heavily and moderately damaged trees near structures and roads since these hazard trees are likely to fall and cause damage in the near future.

In the case of fire-damaged trees that were prominent in the home landscape prior to fire, it is important to take photographs of the trees that were burned or damaged prior to their removal. This is especially important if property owners do not have any previous photographs of the home and the trees and shrubs that existed prior to the fire. Photographs are useful in documenting losses that may be

covered by insurance or as a casualty loss on income taxes. Prominence of the trees or shrubs in the home landscape, their placement, size, and species are some of the factors that are used by a consulting arborist or appraiser to establish and document tree and shrub losses and values.

Regenerating Rural Forests

Natural regeneration. Following all but the most intense fires, the established root systems of surviving deciduous trees and shrubs will send up new sprouts the first growing season after the fire. These shoots usually grow quickly, and, if unmanaged, will create brushy undergrowth within a few years. Left alone, the most vigorous of these shoots will eventually attain dominance and grow into one or more main stems around the base of the tree that died. Landowners can hasten this process and improve the health of the forest stand that develops by cutting the weakest and favoring only the most vigorous stems. In addition, fire prevention is very important while these young trees become established.

Tree planting. On sites where evergreen trees were destroyed, or where fire intensity was high, tree planting will likely be needed to re-establish the forest or woodland. A professional forester can advise landowners on the best species to plant, recommended trees per acre, and proper planting techniques.

- The planting season for bare-root seedlings is generally early December through late March.
- Seedling trees and shrubs are available at cost from the Oklahoma Forestry Services' Forest Regeneration Center at Goldsby (405-288-2385) or our website: www.forestry.ok.gov/regeneration.
- Once planted, seedling care is often not practical over a large area. The survival rate for properly planted seedlings on a forest site may average 70 to 75 percent under normal weather conditions.

Tax Implications of Fire Losses

Timber tax considerations. It may be possible to claim forest losses due to wildfire as a casualty loss on the federal income tax return (see the definition of a casualty loss in the next section that addresses landscape tax considerations). The deduction is the smaller of the timber basis or the difference in fair market value of the property before and after the loss. Calculating the amount that can be claimed as a deduction requires sound data on the forest stand that is best collected by a professional forester. In some cases, the expense of collecting the required data may exceed the reduced tax burden.

If the property owner decides to replant burned areas, eligible rural forest landowners may be able to claim a ten percent investment tax credit for planting and reforestation expenses, up to a maximum of $10,000 per year. These expenses are also amortized over a seven-year period. The U.S. Forest Service has published a tax tip on casualty losses and on tax issues associated with forestland. Because tax issues are complicated, landowners should seek assistance from an income tax professional to help evaluate the tax situation and give advice on the most tax-advantageous method for selling timber—accounting for losses and expenses. A wide variety of tax information is available from the timber tax website at www.timbertax.org.

Tax considerations for landscape trees. After a fire, removal and replacement costs of lost landscape trees and shrubs may or may not be covered by homeowners' insurance policies. Thus it is best to first check the coverage thoroughly with an insurance agent. If the insurance policy does not cover such losses, there is another avenue that may be pursued by the property owner — a casualty loss deduction on federal and/or state income-tax returns. A *casualty loss* is a sudden and unanticipated loss resulting from fire, storm, or other natural disaster, and must, by IRS rules, be 10% or greater of the annual gross income before it can be claimed.

Whether for insurance or income tax purposes, documenting costs, losses, and values is best done by engaging the services of a registered consulting arborist who is skilled in establishing monetary values for landscape trees and shrubs using the 'Guide for Plant Appraisals.' The guide is authored by The Council of Tree and Landscape Appraisers and is published by the International Society of Arboriculture. The American Society of Consulting Arborists maintains a list of registered consulting arborists, by state, who specialize in plant appraisal work (www.asca-consultants.org/search/index.html). Property owners must keep in mind—the cost of obtaining these professional services could exceed the amount of any savings on their income taxes.

Sources of Information and Assistance

Oklahoma Forestry Services provides landowners with information, technical assistance, and forestry recommendations statewide. In addition, OFS grows seedling trees and shrubs at the State Forest Regeneration Center that are available for forest conservation projects. Private consultants provide turn-key land management assistance, damage appraisal, and timber sale administration. Information and assistance with erosion control measures is offered by the Natural Resources Conservation Service and local conservation districts. In some cases, there are financial assistance programs available to help landowners with reforestation and other resource conservation practices, but this varies by county.

Owners of lands affected by a wildfire are encouraged to seek professional advice to improve the likelihood that damaged forestlands will recover. Sustaining the state's forests and woodlands for present and future generations will help assure continued enjoyment of the many benefits they provide their owners and the citizens of Oklahoma.

www.forestry.ok.gov

Your Number One Source for Forestry Information in Oklahoma

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