



UI Extension Forestry Information Series

Fire 11

Salvage Logging after a Wildfire

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Forest ecosystems are extremely resilient and in the Inland Northwest are supremely adapted to disturbance by fire. By living in fire-based ecosystems, we become part of those ecosystems and influence the landscape by the activities we do in and around forestlands. In this light, the time after a burn can be excellent time to achieve specific management objectives for a particular piece of ground. Perhaps a change in the species composition to one more suitable for the site would be appropriate, or increasing wildlife habitat, controlling noxious weeds, and improving forest health conditions.

From a management perspective,

- *damages* are defined as the unfavorable effects of fire-caused changes that make management objectives difficult to achieve or unobtainable.
- *benefits* are the favorable effects of fire-caused changes and are factors that contribute to the realization of management objectives.

All effects must be looked at with reference to the overall short- and long-term management objectives of any particular piece of ground. The effects of fire in an ecosystem that is being managed for wilderness or habitat objectives may be viewed differently from those being managed primarily for timber production.

Salvage logging

One of the first decisions you will have to make after your forestland has experienced a wildfire is if you want to harvest your dead and dying trees.

Standing dead trees (called snags) serve a multitude of purposes, the primary one being habitat for many woodland species of birds and mammals and as reserve nutrients as they fall to the forest floor over the coming years. Down trees provide nutrients and organic material to forest soils and also provide

habitat for insects that are, in turn, valuable food sources for a wide variety of animals. But acres of standing dead trees can be too much of a good thing.

Salvage cuts are often initiated after a disturbance (fire, wind, insect or disease kill) to recover the value of damaged trees and remove hazard trees. Salvage operations are usually not done unless the material taken out will at least pay the expense of



Salvage cuts should be done ASAP after a burn - by year three much or all of the value has been lost. Photo by © Karen Wattenmaker Photography

the operation. But economics and safety are not the sole factors in deciding to salvage log - forest health considerations also play a role in the decision to harvest post-fire stands. Increased bark beetle populations may occur in fire-damaged trees, which then serve as reservoirs for future generations of beetles to spread into adjacent healthy stands. Standing dead and dying timber is also fuel and can increase future fire risks.

Do the math, look at your land and your management objectives and make the decision. Salvage cuts should be done as soon as possible after a burn - by year three much or all of the value is lost.

Bark beetles

Nothing loves a stressed tree more than a bark beetle - unless it's thousands and thousands of bark beetles. Several conditions must exist for bark beetles to take advantage of fire-damaged hosts and because all the conditions must be met for an outbreak to develop, beetle epidemics following wildfires are a possibility, not a given.

First, there must be a sufficient supply of undamaged inner bark (*phloem*) in fire-damaged trees to sustain new and growing beetle populations. If the phloem has been heated until dry and darkened, beetles can neither feed nor deposit eggs in it.

Second, fires must occur at a time of year when beetles are in the adult stage and can quickly infest susceptible trees. And third, because bark beetles are not very strong flyers, there must be a population of beetles within a reasonable distance to take advantage of weakened trees that become available.



Nothing loves a stressed tree more than a bark beetle - unless it's thousands and thousands of bark beetles. Photo courtesy of the UI Extension Forestry Archives.

If all of the above criteria are met and a bark beetle population does move in or increase in size, amounts of damage will vary with the severity of the burn. In areas that were lightly burned, the amount of bark beetle attraction depends mostly on the amount of root collar damage. Most thick-barked species, such as mature Douglas-fir, western larch, and ponderosa pine, will have low mortality and not attract beetles unless smoldering duff significantly damaged roots or root collars. On the other hand, thin-barked species such as true firs can tolerate little damage at ground level without significant stress, making them much more susceptible to bark beetle attack. In areas that have experienced a light burn, look for trees that have little apparent bole or crown damage, but may be completely girdled at the root collar.

Trees in areas that have experienced moderately severe burns are at the greatest risk of bark beetle infestation. The degree to which mature Douglas-fir is attacked will again depend on the amount of damage to the root collar, though it has been found that bole scorch on more than half of the tree's circumference will likely produce a strong attraction for Douglas-fir beetles. Thick stands of ponderosa pine, lodgepole pine, Engelmann spruce, and subalpine fir will be stressed enough to almost certainly be attacked by bark beetles or woodborers.

Few severely burned trees will be infested by bark beetles or woodborers. Severe heating and charring destroys and dries the phloem, leaving unsuitable habitat for invading insects. Even most woodborers that feed in the sapwood require relatively fresh phloem for newly hatched larvae. Look for severely burned trees that have lost all of their foliage, as they will tend to have a higher moisture content than those with attached dead foliage. This can be a controlling influence on bark beetle populations - studies have shown survival of beetle larvae is higher in standing trees with foliage than without.

Fungi

As fungal spores cannot penetrate bark, insect infestations that take place after a burn often provide entry points for fungi. It is important to detect decay in fire-killed timber early, as it takes very little loss of cell wall material to significantly decrease wood strength. While insect damage and stain lower log value, decay reduces strength properties, which render the wood useless from a structural standpoint and thus decreases log volume.



Blue stain fungus is one of the first signs of degradation in log quality. Photo by Sandy Kegley, USDA Forest Service, Bugwood.org.

Fungi require certain levels of temperature, moisture, and oxygen to become established and thrive. When the moisture content of wood falls below 15 percent, fungi become inactive. Some species of fungi do not die at this point, but go dormant and become active again when conditions become favorable. Excessive moisture decreases oxygen supplies, and when wood is completely saturated, oxygen levels are not sufficient to sustain fungal growth. On dry sites, deterioration often occurs on the lower bole where moisture conditions are more favorable. On wet sites, moisture conditions will be more favorable higher up in the stem.

In the first year after a fire, stain is the most important form of deterioration. Blue stain in the sapwood of trees is one of the first signs of degradation in log quality, and when conditions are favorable for blue stain fungi they are also favorable for other fungi. Stains in softwoods cause little damage to the wood structurally, but do cause loss in grade because of appearance.

Other Forms of Deterioration

Moisture and temperature also contribute to weather checking. Weather checking generally happens in the top log (top eight feet) of larger trees where there is less volume to be lost. Smaller trees and those with thin bark are more susceptible to weather checking, and checking will be more extensive on hot, dry, or windy slopes. Checking can provide an entryway for fungi.

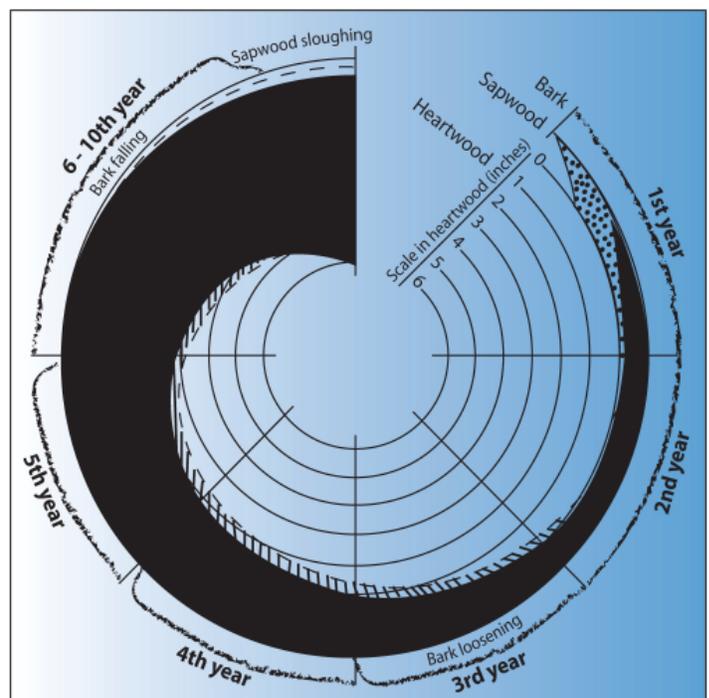
Breakage in felling is another form of degrade that results in volume or value loss. Fire-killed trees tend

to have more breakage than green trees. A decrease in pulp chip volume due to char and decay is another source of loss due to fire.

Rates of Deterioration

Insect damage is generally classified as limited deterioration with the resulting wood products, such as lumber or veneer, being lower in grade but still usable. Stain is also classified as limited deterioration but has a major economic impact by lowering the value of products graded for appearance. The presence of decay fungi results in a classification of general deterioration with a resulting loss in volume. Each stand and each tree is unique, but some generalizations have been made:

- blue stain will appear in susceptible trees within the first year;
- by the second year, some of the heartwood will be decayed; sapwood decay will be increasing;
- after three years the sapwood of most softwoods has deteriorated beyond use for structural timber products.



For more information on how to assess and manage your forest land after a wildfire, contact Yvonne Barkley at yvonnec@uidaho.edu and request the free publication "After the Burn: Assessing and Managing Your Forestland After a Wildfire".