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Managing Tree Wounding and Stem Decay in Oregon Forests

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Contents

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Tree wounding can lead to decay in roots, stems, and branches of trees. Wood decay is caused by various species of fungi that enter trees through wounds or small branches.

Decay fungi usually do not kill trees, and small amounts of decay will not affect tree growth significantly. However, decay can greatly diminish the value of forest products. The amount of decay in a tree determines how damaging the fungi are to the tree's value. In addition, significantly decayed trees are structurally weakened and likely to break during windstorms or harvesting operations. Decayed trees near buildings or developed recreation areas can become serious hazards.

On the positive side, decay of living trees is a natural forest process that recycles nutrients and creates important wildlife habitat as standing trees and as downed logs on land and in streams. Also, some species of decay fungi are edible and serve as a food source for wildlife and humans.

This publication is for woodland owners and managers interested in identifying and managing decay in living trees. It is intended to help identify the common decay fungi, find ways to reduce damage, and understand the important ecologic role of decay fungi. This guide is a companion to *The Ecology, Identification, and Management of Forest Root Diseases in Oregon*, EC 1512. Other related publications are listed on page 3.

Ecologic roles of decay and decay fungi

Living trees

The positive roles of stem decays in living trees and forests in Oregon are numerous and important in forest function. The living, decayed tree provides habitat for cavity-nesting birds that require a certain degree of wood decay in order to excavate for nesting. The pileated woodpecker, for example, requires rotten larch or ponderosa pine, and perhaps other tree species, for its cavities. Secondary cavity-nesting birds—those that cannot excavate—depend on the primary cavity-nesters such as woodpeckers to

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make nest sites. The northern spotted owl, perhaps other owls, and several species of mammals such as martens and squirrels use cavities vacated by the primary cavity-nesters. Several species of birds and mammals use large decay columns and hollows created by the Indian paint fungus *(Echinodontium tinctorium)* in grand fir as roosting sites and hiding cover.

Artificially infecting live trees with fungi to promote decay and create habitat for cavity-nesting birds has been successful in Oregon (Table 2, page 10). The concept is that living trees with internal decay should stand longer and provide useful habitat longer than decayed, dead trees.

Stem decays can lead to the tree's death if the stem breaks at or below the living crown; therefore decay may be important in creating small gaps in the forest canopy. These openings change the light, moisture, and temperature in the forest and thus change the habitat for plants and animals. Plants and animals that require more light are favored by these openings. Many animals and birds require dead standing trees (snags) and downed trees for their habitat. Large downed trees are also important elements in habitat for fish and other animals in rivers and streams.

Facts about stem decays in living trees

- Amount of decay increases with frequency of tree wounding. Wounds provide entry points for spores to start new infections, and wounds activate dormant infections.
- Amount of decay increases with wound size, depth, and age. Also, basal wounds have more decay than upper-stem wounds, tree age and size being constant.
- Amount of decay increases with tree age.
- Live trees compartmentalize decay; i.e., they wall off the infected area so that decay columns will not exceed the diameter of the tree at the time of the wound unless additional wounding takes place.
- Amount of decay is greatest in nonresinous tree species such as true firs, hemlocks, and hardwoods. Resinous species such as pines, Douglas-firs, and larch are more resistant to decay.
- Tree genetics influence the amount of decay. Some trees in a species are more resistant to decay than others, all other factors being equal.
- Decay may be caused by a single fungal species, but infections by two or more species are common.
- Volume of decay is less in trees that have been thinned and/or fertilized than in trees in unmanaged stands. Trees with increased space and nutrients grow clear wood volume more rapidly.

Dead trees

The role of decay fungi in dead trees or their broken tops and branches is also important in forest function. Some stem-decay fungi such as the Indian paint fungus or red ring rot caused by *Phellinus pini* are adapted to grow in living trees; those fungi are replaced, after the trees die, by other fungi more adapted to decaying the wood of dead trees. Other fungi such as the pouch fungus *(Cryptoporus volvatus)* and the red-belt conk *(Fomitopsis pinicola)*, which infect living trees that are being killed by other agents, continue to decay wood well after the tree has died. These fungi are important in recycling nutrients to the soil, and the trees they decay provide critical habitat for a variety of plants and animals. For example, ants require decaying logs for habitat, and ants are an important food for many bird species. Ants also are important predators of larvae of defoliating insects such as the western spruce budworm.

Economic losses from tree wounding and decay

Tree wounds and subsequent infection by decay fungi result in a variety of economic losses. Tree wounds, even without decayed wood, can lead to a variety of defects that lower the economic value of the tree's wood. These defects include:

- Discoloration or stain in the wood
- Frost cracks (long bark cracks that penetrate the wood)
- Ring shake (wood that separates at annual rings)
- Pitch rings (resin that accumulates at annual rings), and
- Cankers (dead sunken areas on trunks)

For further information

Common Tree Diseases of British Columbia. Allen, E., D. Morrison, and G. Wallis. 1996. Victoria, BC: Natural Resources Canada/ Canadian Forest Service. 178 pages. Color photos. No charge.

Trees and Logs Important to Wildlife in the Interior Columbia River Basin. Bull, E.L., C.G. Parks, and T.R. Torgersen. 1997. General Technical Report PNW-GTR-391. Portland, OR: USDA Forest Service. 55 pages. Color photos. No charge.

Pruning to Enhance Tree and Stand Value, EC 1457. Emmingham, W. and S. Fitzgerald. 1995. Corvallis: Oregon State University Extension. 12 pages. $1.50

Forest Disease Ecology and Management in Oregon, Manual 9. Filip, G.M., A. Kanaskie, and A. Campbell III. 1995. Corvallis: Oregon State University Extension. 64 pages. Black and white photos. $14.50

Harvesting and Marketing Edible Wild Mushrooms, EC 1496. Filip, G.M. Reprinted 1998. Corvallis: Oregon State University Extension. 4 pages. $1.00

Designated Skid Trails Minimize Soil Compaction, EC 1110. Garland, J.S. Reprinted 1997. Corvallis: Oregon State University Extension. 8 pages. $1.50

Long-range Planning for Developed Sites in the Pacific Northwest: The Context of Hazard Tree Management. Harvey, R.D., Jr. and P.F. Hessburg, Sr. 1992. FPM-TP039-92. Portland, OR: USDA Forest Service, Pacific Northwest Region. 106 pages. Color photos. No charge.

Diseases of Pacific Coast Conifers. Scharpf, R.F., technical coordinator. 1993. Agricultural Handbook 521. Washington, DC: USDA Forest Service. 199 pages. Color photos. No charge.

A New Tree Biology: Facts, Photos, and Philosophies on Trees and Their Problems and Proper Care. Shigo, A.L. 1986. Shigo and Trees, Associates, 4 Denbow Road, Durham, NH 03824. 595 pages. Black and white photos. $65.00

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Figure 8.—Conk of *Ganoderma applanatum,* the artist's conk, a common decayer of hardwoods and some conifers in Oregon.

Figure 9.—Conk of the red-belt fungus, *Fomitopsis pinicola,* a common decayer of dead wood and slash.

Figure 10.—Conk of the pouch fungus, *Cryptoporus volvatus,* which causes a gray sap rot of killed trees.