

Green Tree Awareness

Potential Green Tree Hazards



Lodgepole pine stand heavily infested with *Arceuthobium americanum* (USFS R-2)

Objective

To be able to recognize the signs and symptoms of poor tree or stand health, that could indicate root diseases or other problems that will at some point in time result in tree failure. In addition, you should be able to identify structural characteristics found on green trees that could also lead to a hazard concern.

We are looking for the clues that an individual tree or stand displays that would tell us we need to be aware of potential green tree hazard conditions.

Awareness

Very basic - you don't need to know the scientific names of diseases, insects, fungi, rots or parasites.

The intent is to provide you with enough information so that when you come across something in the woods, you are able recognize it (at least be aware that it is something that may be a concern) and understand the potential hazard.

Tree Basics

Any environmental or mechanical condition that causes stress on a tree will weaken the tree defenses and reduce the tree's ability to successfully ward off diseases and insect attacks.

Drought and overstocked stands are main environmental stresses on a tree. Items such as severed roots are an example of a mechanically induced stress. When a tree is stressed, it does certain things to re-allocate its resources to allow itself to survive, all at the expense of other tree functions. What we see are the visible indicators that tell us something is not right with the tree.

Tree Basics (cont.)

Any one of the signs or symptoms we will see in the slide show or a combination of signs and symptoms suggest problems within the tree.

The key is that they are all inter-related.

The discussion in the slide show will be broken into areas on a tree the common defect is found on a tree. We will start with the roots of a tree since root defects are most commonly associated with tree failures.

General areas on green tree where common defect occurs

Root Defects (root disease signs and symptoms, environmental and mechanical factors)

Butt, Stem, and Bole Defects (decay in general, heart and sap rots, mistletoe swellings, cracks & splits, defective limbs)

Structural Characteristics (dead tops, broken tops, forks, leaning trees)

Root Defects

- Root defects cause severe damage to the root anchor resulting in loss of tree vigor, tree death and failure.
- Main source of root defects are root diseases.
- Root diseases can usually be identified by the signs and symptoms a tree exhibits that indicate to us that the tree is not healthy. Sometimes a tree may be affected by root disease but show no visible symptoms.
- Root defects can also be caused by environmental and mechanical factors resulting in tree failure.

Signs and Symptoms of Root Diseases

Loss of Needles & Thinning Crowns

Loss of needles and thinning crowns are two visible indicators that a tree is not healthy and could have some sort of root problem.

Be aware also that other problems have the same signs and symptoms. It is the additional visual clues that will point you to a determination of what the actual problem is.



Figure 62. Crown symptoms of ROOT DISEASE. Crown thins from the lower branches first to the upper branches last, and from the innermost leaves first to the outermost buds last.

Discoloration of Tree Crown

Trees that have been weakened by root defects will lose their ability to fight off attacks by insects, particularly bark beetles. The bark beetles attacks, if successful, will girdle the tree causing the crown to discolor as the tree dies.



Figure 61. ROOT DISEASE crown symptoms with bark beetles attacking diseased trees.

Bark Beetle Attacks

The most common bark beetles attacks we will see are from the Douglas-Fir and Mt. Pine Beetles. These beetles will attack trees with root defects as well as trees weakened by fire, drought and overstocked conditions. When you see beetle attacks it is important to look for the other clues that will point you towards a root defect determination.

Douglas-Fir Beetle



Figure 40. Red-brown boring dust is evidence of successful attack by DOUGLAS-FIR BEETLE.

Mountain Pine Beetle



Figure 38. Pitch tubes are usually evident at MOUNTAIN PINE BEETLE attack sites.

Dying Branches Within Crowns

Dead branches within the crowns of trees are another visual indicator that the tree could have root problems.

As tree health declines, the tree can no longer support all of its crown, so branches begin to die off.



Figure 60. ROOT DISEASE POCKET
with brush invading. Note
the snags and thin-crowned
trees.

Stress Cone Crop



Stress cone crop on infected Douglas-fir (IDL)

Stress cone crops on trees are another sign that the tree may have root problems.

As tree health continues to decline, the tree decides that it has one last chance to reproduce. The result is a stress cone crop. If you see a cone crop on a tree that does not look healthy, it is most likely a stress cone crop.

Basil Resin Flow

Another sign of root problems is a 'bleeding' of the tree at its base.



Figure 64. Fresh and older, dark resinous at the base of an **ARMILLARIA ROOTROT**-infected Douglas-fir.



Figure 21

Mushrooms at Base of Tree

Mushroom found at the base of trees are a classic sign of root diseases.



Large group of *Armillariella mellea* mushrooms at base of dead tree (USFS, R-2)

Butt Rots



Figure 20

Butt rots found in adjacent trees is one more root disease sign.

Tree roots are intertwined and can become grafted. This results in diseases being passed along from one tree to another through the tree roots. Butt rots and root defects are the main causes of tree failures.

Wind Throw/Blow Down

When you see this, you know there is a root disease problem. Trees are usually blown over, not snapped out.



Figure 22

Wind Throw

When you see trees
blown over with no
root system attached,
What do you have?

Answer:
Root disease/defects



Scattered Root Disease Mortality

Across the landscape, root disease can be seen as individual dead trees within a stand or as.....



Figure 59. Scattered ROOTDISEASE mortality.

Classic Root Rot Pockets Across Landscape

The classic root rot pocket starts out as a small circular infection. As the disease progresses, it enlarges the circular pattern with dead trees around the outer edge with disease resistant species growing back in the middle of the pocket.



Figure 58. Aerial photograph of ROOT DISEASE POCKETS. Ringworm pattern in an otherwise uniform canopy.

Root Damage Environmental Factors

(Can also contribute to root failures)

Seasonal High Water Tables

Water acts as the erosion agent for trees along its edge during periods of high water run off.

Roots become undermined due to the action of the water eroding away the bank edge.



Figure 25

Soil Erosion

Anything that causes soil erosion can cause tree roots to become exposed, resulting in loss of tree anchor strength.

Loss of tree anchor strength by any means, will cause a tree to fail - to fall or be blown over.

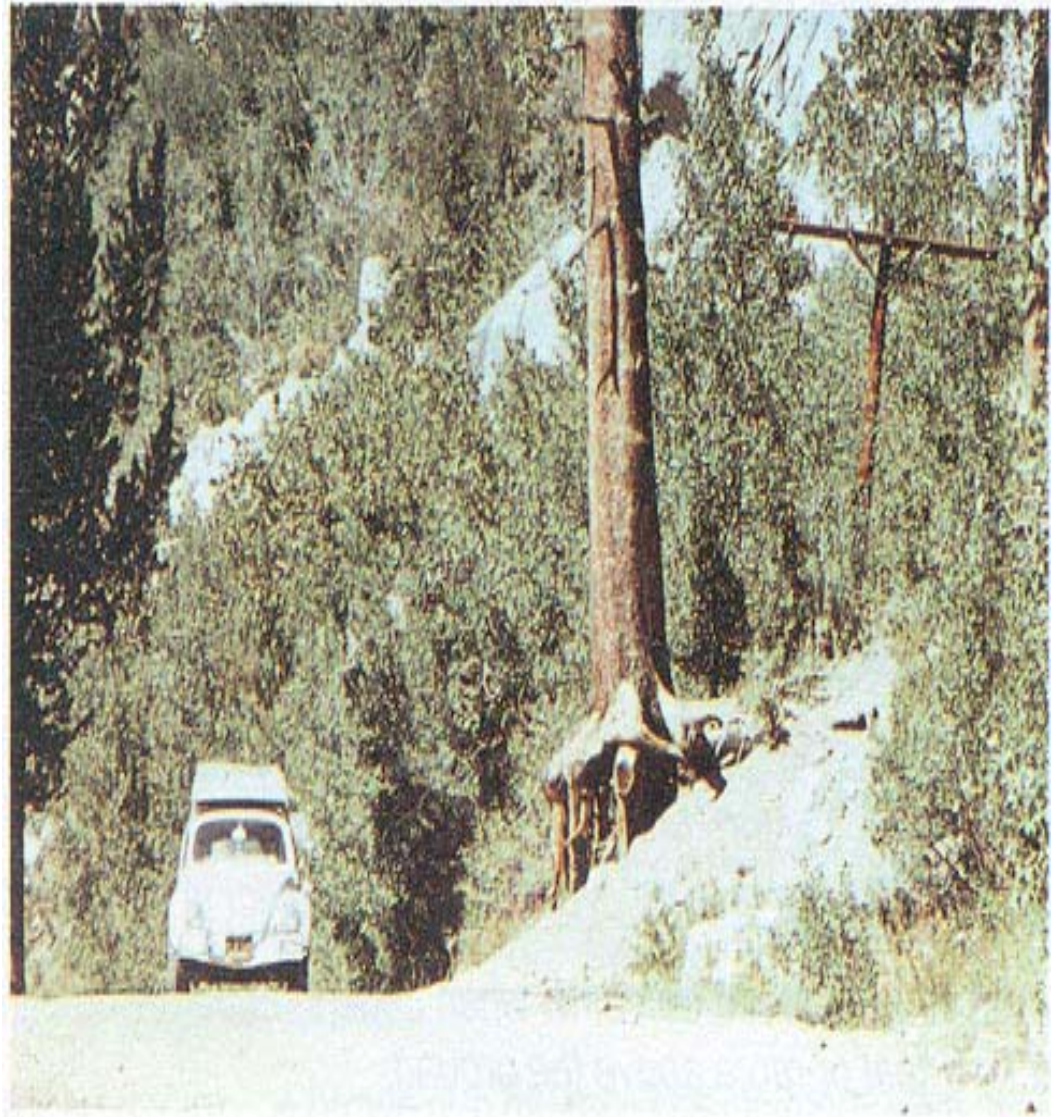
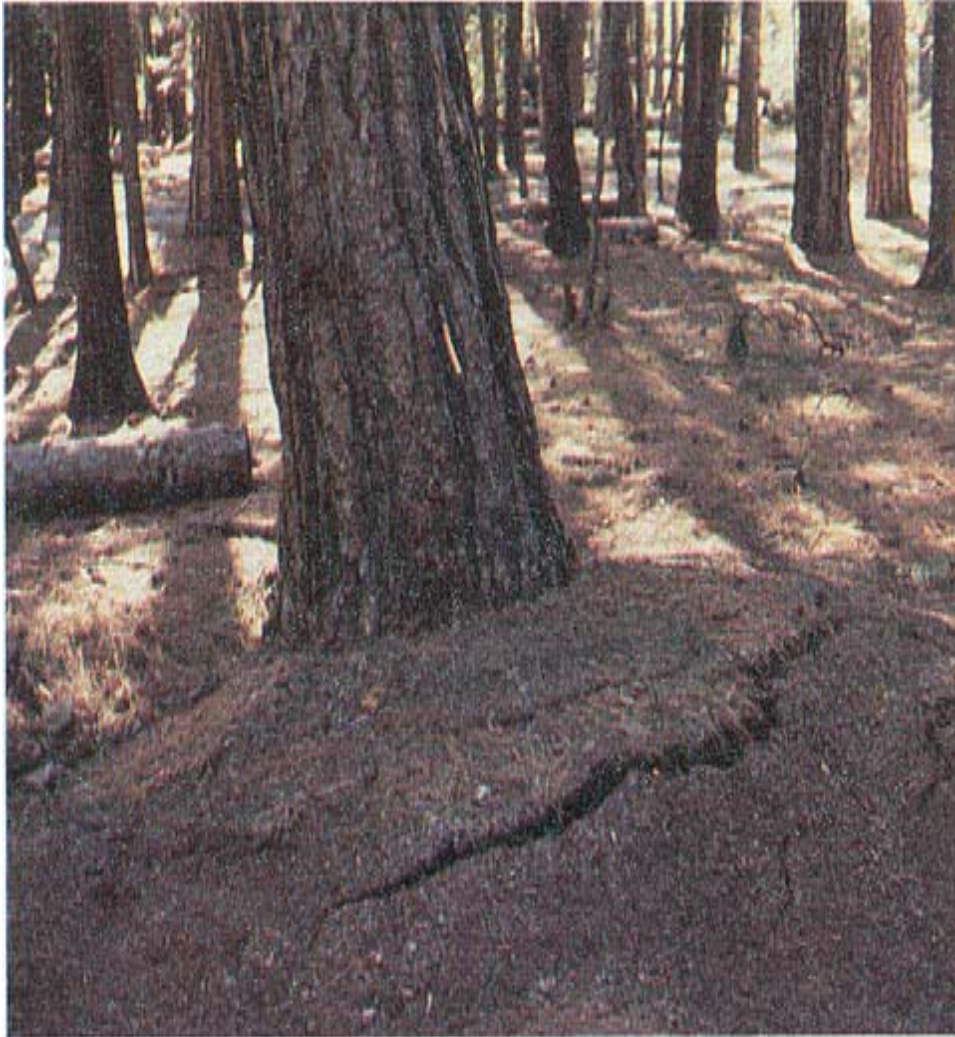


Figure 26

Loosened Or Cracked Roots From High Winds



Roots that are cracked or loosened also result in loss of root anchor strength.

Trees in this condition are vulnerable to blow down.

Figure 28

Root Damage Mechanical Factors

(Can also contribute to root failure)

Excavation,
Road Building,
Reconstruction...

Result in loss of
tree anchor
strength.

Need I say more?



Figure 26

Compaction

Compaction is most commonly found in heavily used recreation sites;

Compaction changes the soil condition such that air spaces are compressed and water does not percolate normally through the soil.

This changes the way tree roots are able to function and survive. Damage to tree roots can cause tree failure.

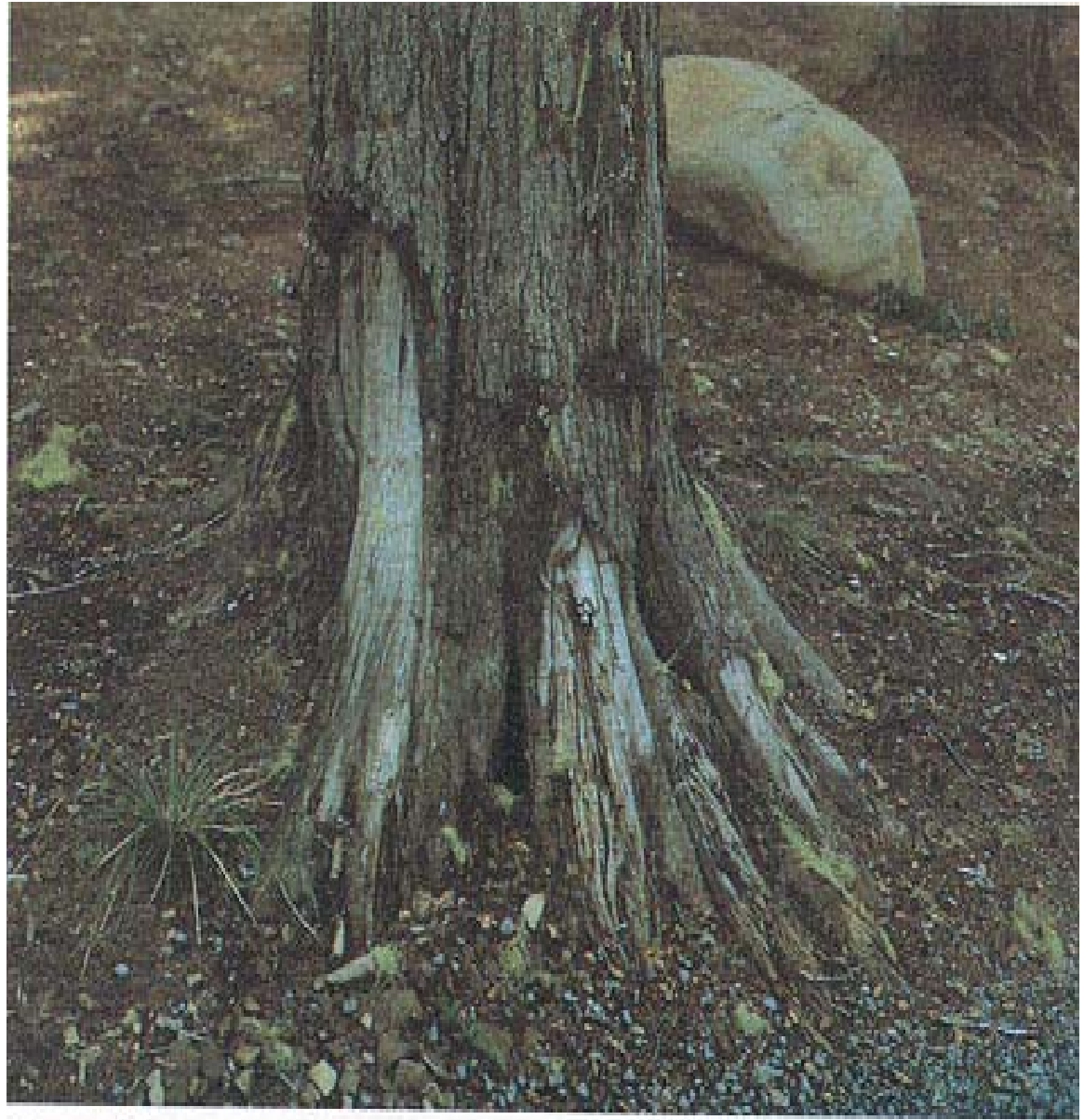


Figure 29

What you have just seen in the slide show are signs, symptoms and damages to tree roots that would indicate a tree has root disease or other root structural problems. Any one of these, or a combination of these, can have damaging effects on a tree and its roots, resulting in tree failure i.e., the green tree hazard.

It is important to also note that trees can also be influenced by root problems yet not show any visible signs. But, you can make an educated guess based on an individual tree's health or stand health condition that would lead you to believe there may be a hazard due to root problems and damages.

Butt, Bole, Stem Decays

(decay in general, heart and sap rots, mistletoe swellings,
cracks and splits, defective limbs)

General Basics of Decay

- *Fungus that develops within a tree is the cause of wood decay.
- *Fungi enter living tree through trunk wounds, dead twigs, broken branches or roots.
- *Fungus develops with no visible signs of defect and it may eventually produce conks which produce spores capable of spreading decay to other trees.
- *Two types of decay occur within a tree, brown rot and white rot.

Brown Rot - cracks into cubical blocks

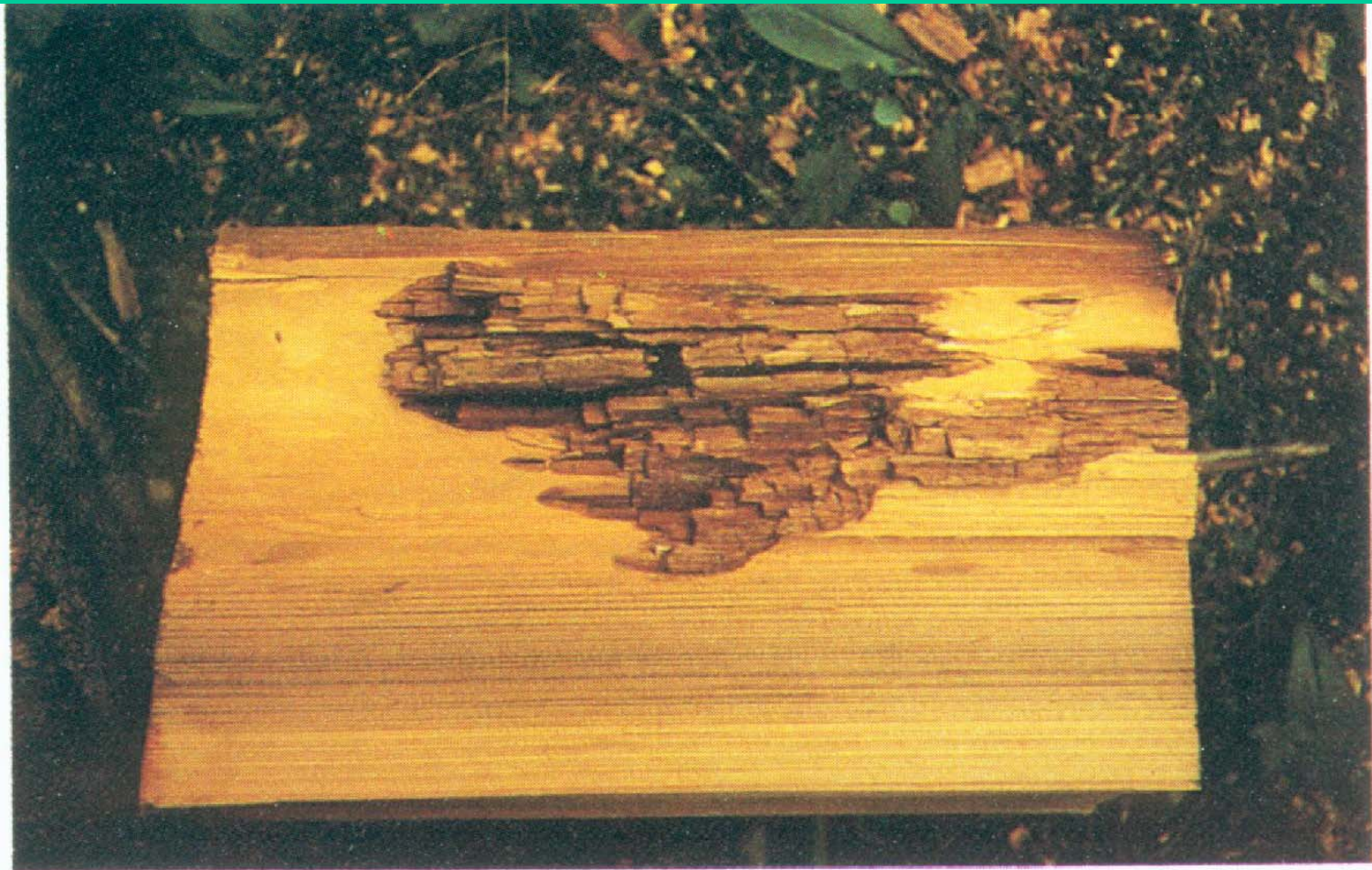


Figure 5. CEDAR BROWN POCKET ROT occurs in isolated large pockets of brown cubical decay.

Brown rot example



Figure 4. CEDAR BROWN POCKET ROT in western redcedar log decays large pockets.

White Rot - leave a bleached residue in late stages of decay



Figure 7-13—
White pocket rot of Douglas-fir caused by the red ring rot fungus (Phellinus pini).

Decays cannot start until heartwood is formed.

Young trees are usually free of decay and losses increase with advancing age.

There may be fruiting bodies on the trees such as conks. Presence of conks on some trees is a reliable indicator of the amount of rot/cull to be expected in a tree.

Conversely, the absence of conks does not mean the tree is free from decay. Sometimes the conks do not appear until the tree has died.

Heart and Sap Rots

Conks and staining are the visible indicators of heart and sap rots.

Conks will be located higher up on the bole of the tree.

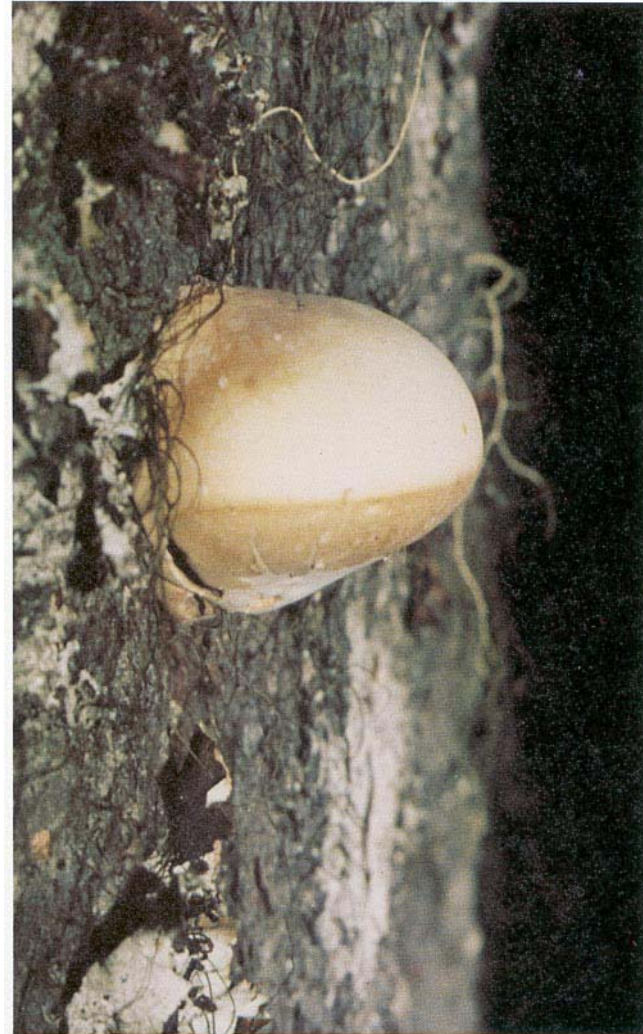
Even though the decay can be classed as heart rot or sap rot, the fungi that cause the decay are capable of attacking both types of wood.

When you see conks on a tree, this indicates rot, which would be a weak spot on the tree and have the potential to become a hazard.

Conks, Indicators of Heart and Sap Rots



Numerous conks of the pouch fungus, *Cryptoporus* (*Polyporus*) *volvatus* on grand fir (USFS, R-4)



Closeup of conk on grand fir (IDL)

Conks, more examples

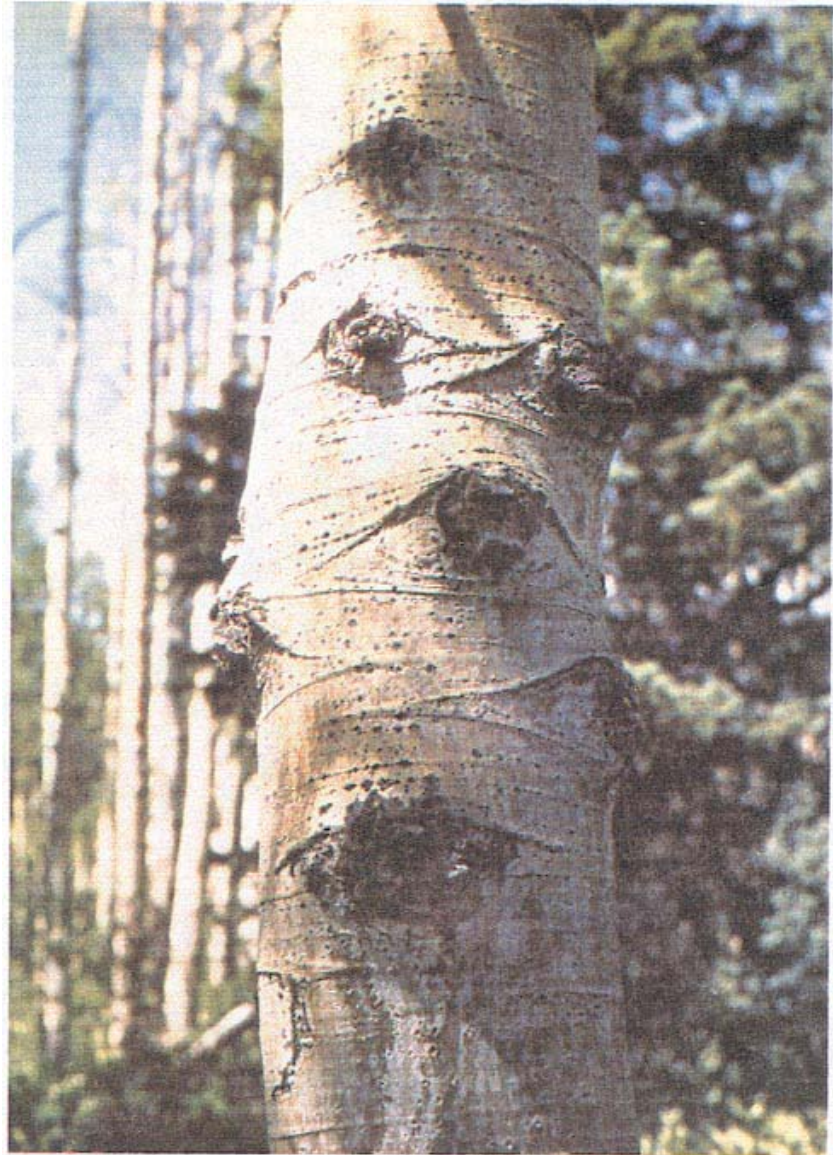


Figure 34



Echinodontium tinctorium on grand fir (USFS, R-4)

Conks, Another example, on Aspen



Phellinus tremulae (= *Fomes igniarius*) conks on aspen
(USFS, R-2)

Mistletoe Swellings

Systemic dwarf mistletoe infections on bole of tree will cause it to swell.

While tree is alive, this is not a problem.

It is when the tree dies that decay by opportunistic fungi weaken the tree.

Any fungi that function as a wound parasite can be found decaying the mistletoe induced bole swelling.

Eventually, breakage occurs - the hazard.



Figure 39

Crack and Splits

Crack and splits on the main stem of the tree are often over-looked and regarded as insignificant. They should be considered as potential green tree hazards.

The most common cracks and splits are formed by:

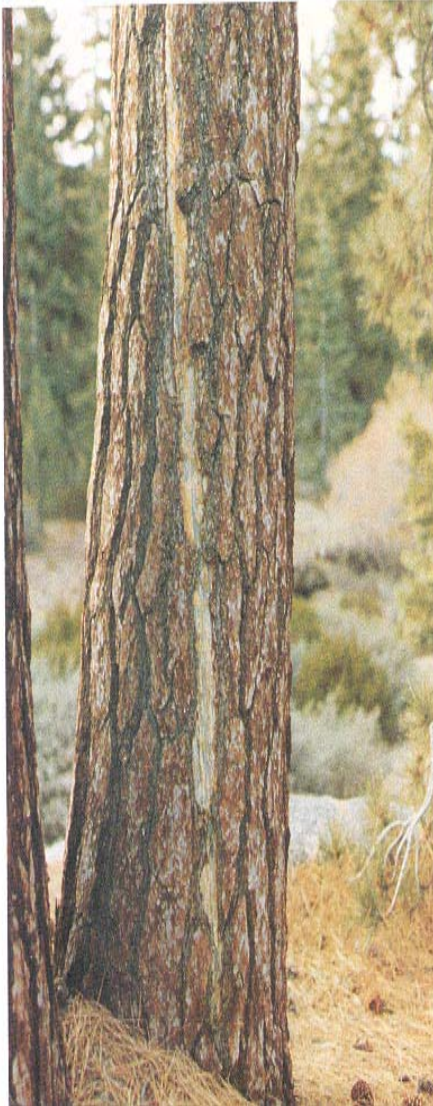
Lightening

Wind Shake

Frost Cracks

Lightening

Figure 1-20—
Lightning injury is typically indicated by a narrow strip of bark removed in a spiral course down the bole.



Lightening strikes create a shallow spiral down a tree. The crack may be several inches wide and go deep into the wood. Often huge chunks may be blown off the tree or the tree top may shatter. These damages have an affect on tree health and vigor by creating wounds where fungi can infect and start the decay process.

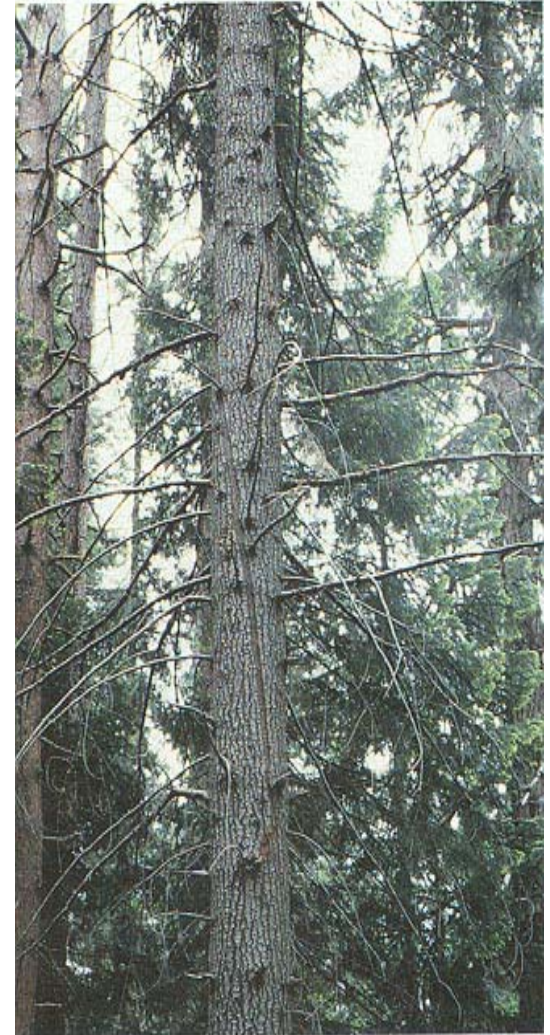


Figure 35

Crack can also be formed by wind shake.



Figure 36

Strong winds at higher elevations are more turbulent and often twist a tree back and forth. The twisting action causes separation to develop along the growth rings. As time goes on these separations breach the bark where they can be observed. Shake can occur on any side of the bole of the tree and may extend from a few feet to upwards of 20 to 30 feet above the ground. Excessive shake indicates partial failure and may also be associated with increasing butt rot.

Frost Cracks

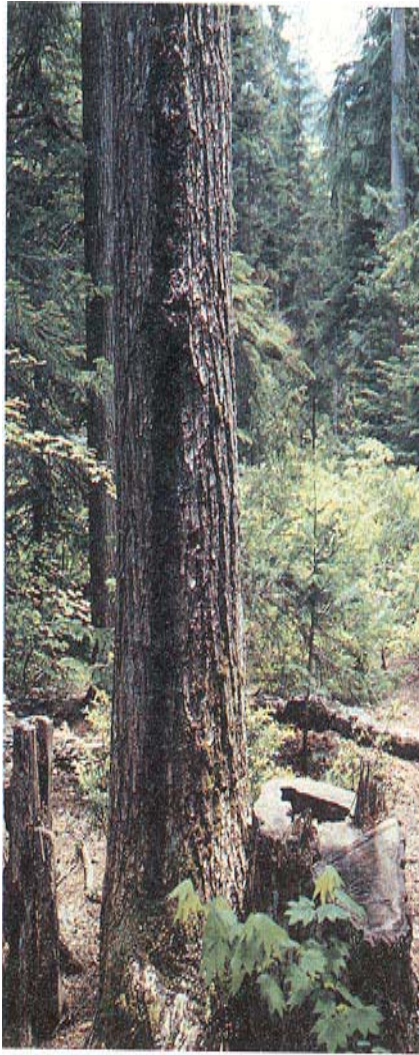


Figure 38

Frost cracks form by the action of extreme cold. The cracks extend from the ground to usually no more than 15 ft. up the bole of the tree. Frost cracks appear on the bark as vertical lines and could be hazard when falling the trees.



Figure 37

Defective Limbs



The main visual indicator of a defective limb is the 'witches broom'. The brooms are caused by parasites funneling food and water reserves to where it (the parasite) resides in the tree. These branches become very heavy. Heavy snow loads, high winds, or other conditions, can cause the limbs to break and fall.

Defective Limbs



Figure 23

Other defective limbs you may see include: dead branches in a tree, broken or hanging branches that have gotten caught in a tree.

These branches eventually will fall out of the tree - becoming the hazard.



Figure 48

Structural Characteristics

Structural characteristics include:

Dead Tops

Broken Tops

Forks

Leaning trees

Dead Tops

Dead tops on live trees eventually break and fall to the ground. These tops have usually rotted out where the breakage occurs. There is very little sound wood holding the tops in place. Sometimes a gentle bump or jarring may be enough to cause the top to fall.



Figure 48

Broken Tops

Broken top trees may have rot in them below the break. If the upper branches in the remaining portion of the trunk are healthy and vigorous in appearance, additional top failure is unlikely.



Figure 49

Forks



Figure 44

Trees with a high tight fork are less likely to be a hazard than trees with low, wide forks. Winds cause the forks to run against each other, creating weak spots and possibly enough of a wound to become a decay center. Winds can twist or bend the forks causing them to snap off



Figure 43

Leaning Trees

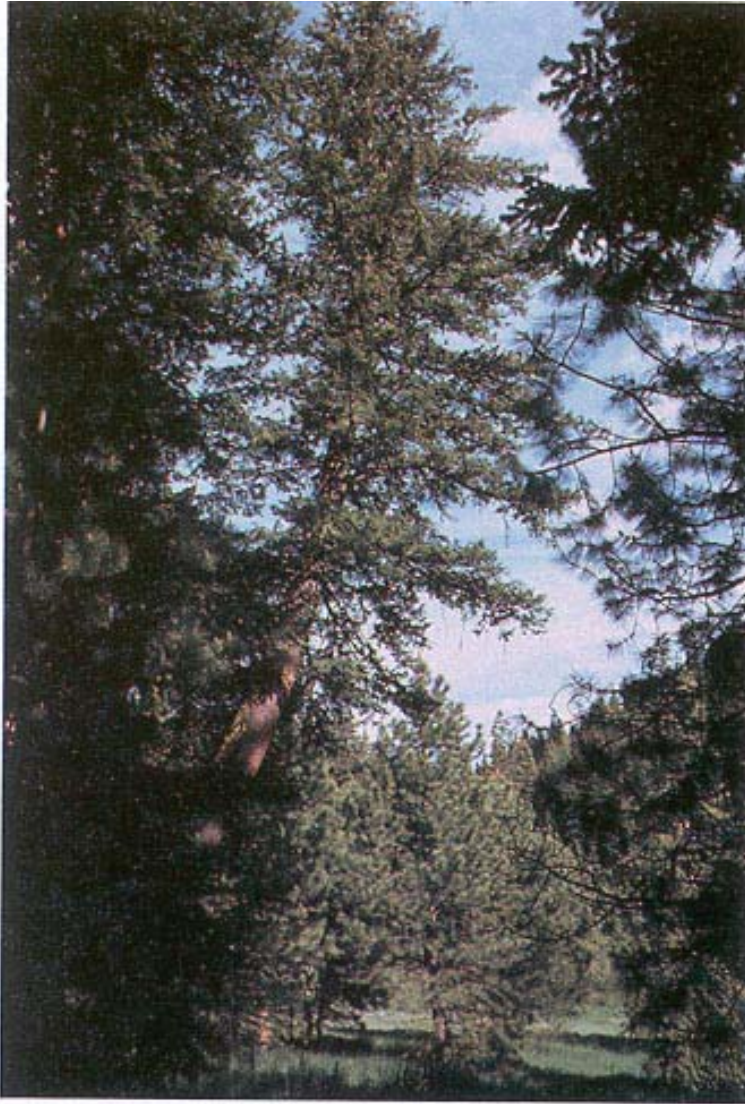


Figure 50

Leaning trees result from root and butt decay and root wrenching during high winds. Long standing leaning trees are those that have leaned over and have subsequently grown a vertical top. These trees have developed compression and tension wood to aid in support. Long standing leaning trees also have developed re-enforced roots systems to compensate for the damage. Unless roots are disturbed or decay is present, potential failure is low.

Leaning Trees

Conversely, recent leaning trees are tilted over their entire length with no evidence of a re-enforced root system. These trees have a high failure potential.



Figure 51



Figure 27

Conclusion

You should be able to recognize basic signs and symptoms of poor tree or stand health that would indicate disease problems and potential for tree failures associated with the root diseases. In addition, you should also be aware of other structural characteristics of trees that have the potential to turn that green tree into a hazard.

The key is to think about what you are seeing in the woods and what that may mean in terms of tree health and vigor, now and in the future life span of the tree/stand.