RECOGNIZING TREE HAZARDS
A Photographic Guide for Homeowners

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RECOGNIZING TREE HAZARDS

A Photographic Guide for Homeowners

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Each year in California, many trees fall or break apart, causing property damage, personal injuries, and power outages. Although some tree failures are not predictable and cannot be prevented, many failures can be prevented. You can take measures to minimize tree failures on your property. Simply by inspecting trees for common structural defects, many potential failures can be corrected before they cause damage or injury.

This guide helps you recognize defects that commonly lead to tree failure. It is intended for those who have little or no training in tree biology or tree care. Seven of the most common structural tree defects are illustrated. These defects often result in failures such as uprootings, trunk breaks, and branch breaks. With this guide in hand, you should be able to conduct a basic inspection to determine if a tree is a hazard, that is, a tree that has significant defects that are likely to lead to failure and possibly cause injury or damage.

A hazardous tree has significant structural defects that are likely to lead to failure and possibly cause injury or damage.

Trees should be inspected on a regular basis. It is best to make inspections prior to stormy weather and immediately afterward. By doing so, you can identify structural defects that may result in failure during a storm and eliminate defects that result from a storm. Make your inspection from the ground. Do not climb the tree or use a ladder to improve your viewing perspective. Binoculars may be helpful. If a closer inspection is needed, consult an arborist who has the equipment and training to conduct the inspection safely. Be aware of power lines in the vicinity of the tree. Your utility company can answer questions about potential hazards regarding power lines. Large trees have a greater hazard potential than small trees! They should be inspected more frequently and in greater detail.

If you determine that a tree is hazardous, keep people, pets, and vehicles out of the area until the hazardous condition has been corrected. Also, look to see what would be damaged if the tree fails and determine if it can be safely moved from the area.

The defects shown here are not the only defects that may exist in a tree. This guide shows common ones that may be recognized from a ground inspection by an untrained person. Other defects that could result in failure may exist. If you have concerns or questions regarding an inspection, contact an arborist for assistance. Information on selecting an arborist is included on page 10.

Unhealthy trees may not be hazardous

It is important to understand the difference between unhealthy trees and hazardous trees. Tree health refers to the physiological condition of the tree and the presence or absence of disease or other pests. Hazardous trees are trees that are structurally unsound; they possess defects that may lead to failure and result in damage or injury.

Healthy trees may be sound or hazardous. There are many cases where healthy trees fall over or break apart. Do not conclude that a tree is structurally sound simply because the leaves are green and the canopy is full. The tree in **photo 1** was healthy (green foliage, dense canopy) but it was structurally weak and failed in a windstorm.

Unhealthy trees may be sound or hazardous. Do not decide that a tree is hazardous because the leaf color is poor or the tree looks sick. The tree in **photo 2** is unhealthy (poor color, sparse canopy) but it may not be structurally weak.


1


2

This tree has a structural defect. Can you identify it? See **photo 10** on page 5.

Let's begin!

Take the guide outside with you. Inspect healthy and unhealthy trees for the following seven defects:

1. ***Lean***
2. ***Multiple trunks***
3. ***Weakly attached branches***
4. ***Cavities and decay***
5. ***Cracks in trunks and branches***
6. ***Hanging or broken branches (hangers)***
7. ***Dead branches (deadwood)***

First, stand back and look at the whole tree. Systematically inspect it for the defects in the order presented. This will help ensure that you will not overlook key problems.

Remember, it takes an arborist to correct most of these defects, especially if the tree is large!


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1. Lean

Inspect your tree and determine whether the vertical axis of the tree has changed. Trees that have recently moved from the vertical position are called leaners. This is a very serious condition that requires immediate attention. Leaners can be thought of as trees that are in the process of falling over—they simply haven't gone all the way. They are imminent hazards because they could fall at any time. If your tree was vertical (axis at a right angle to the ground) but has moved from the vertical position as in **photos 3 and 4**, it's a leaner.

Leaners require immediate action!


4

Sometimes you will see that the ground is lifted on the side of the tree opposite to the lean and the roots may be exposed, as in **photos 5 and 6**.

Typically, leaners result from a loss of anchorage—the root system is not providing the structural strength needed to hold the tree in an upright position. Avoid activities around your tree that may cause root loss, such as digging trenches, excavating, changing the grade, or compacting the soil. Root cutting during trenching (**photo 7**) or other excavations leads to a loss of anchorage. Soil erosion has caused the large tree shown in **photo 8** to lose anchorage and fall into the creek.

Note that many trees do not grow vertically. The large tree shown in **photo 9** is not a leaner—it's just not growing vertically. Unless there has been a recent change in the vertical position of the tree's trunk, it is not a leaner.

You may encounter old leaners, trees that have managed to stay standing despite considerable loss of anchorage in the past. These are less likely to be hazardous in the dry season but require careful watching when there is rain, wind, or saturated soil.

Periodically measuring the angle formed by the trunk and soil line or keeping a photographic record can be helpful if you suspect that a lean is developing.


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2. Multiple trunks

Some trees develop more than one trunk. Arborists call this condition codominant stems. Frequently, codominant stems are weakly attached and are prone to splitting apart. This condition is of particular concern in large trees, such as the one shown in **photo 10**.

For trees with codominant stems, inspect the point where the trunks meet. Trunks with splits (**photos 11 and 12**) have a high potential for failure. They may separate in the next windstorm or sooner.


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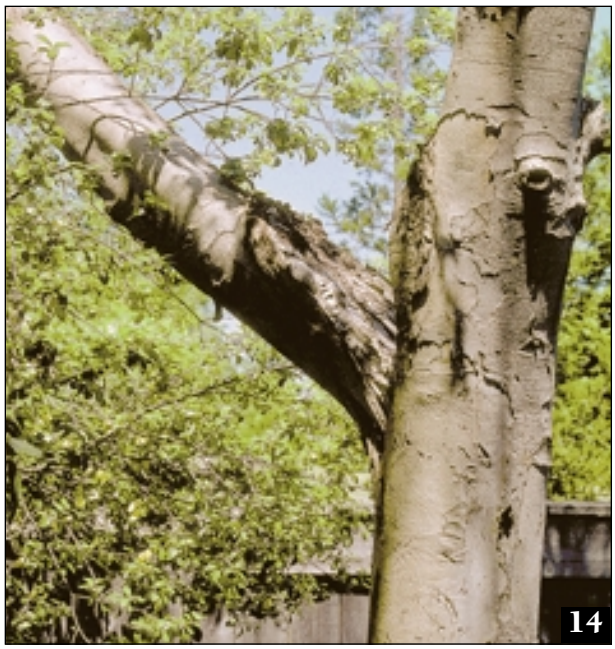
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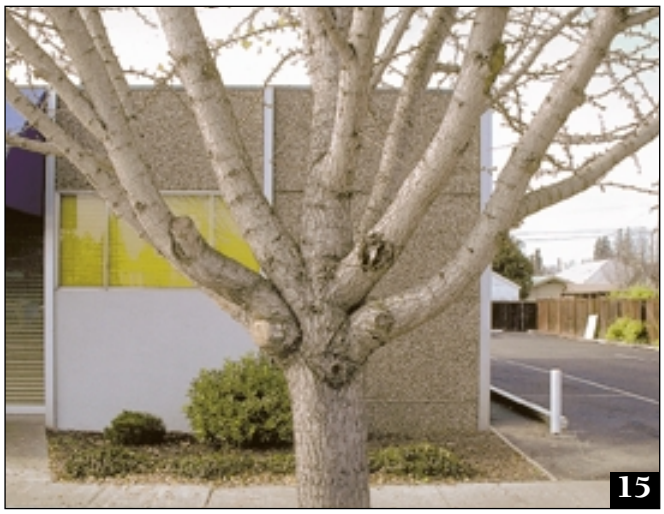
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16

3. Weakly attached branches

Inspect large branches (greater than 3 inches or 7.5 cm in diameter) at the point where they attach to the trunk. If a split exists (**photo 13**) failure potential is high and action is needed. Often the branch will need to be removed.

Weakly attached branches (**photo 14**) sometimes separate partially from the trunk before falling off.

Trees with many branches arising from the same point on the trunk (**photo 15**) are weak and potentially hazardous.

The tree in **photo 16** had four branches arising from the same point. One of them broke off in a storm. The remaining branches are weakly attached and have a high potential for failure.

4. Cavities, large decay pockets, and other evidence of decay

Inspect the trunk and large branches for cavities (**photo 17**) or large decay pockets (**photo 18**). Both cavities and decay pockets represent structural weaknesses that can increase failure potential.

The location as well as the size of these defects is important. If cavities or decay occur at a point where loads are great (e.g., where branches meet or at the base of the trunk), they may be of more concern than when they occur elsewhere. Note the arrows in **photos 17** (cavity at base of tree) and **18** (decay pocket where branches meet).

If a cavity or decay pocket is sufficiently large and is at a key location, the tree may have a high failure potential. Exactly how likely the tree is to fail is difficult to assess in many cases, however. Some trees with large cavities stand for many years, while others represent imminent failures.

Mushrooms (**photo 19**) and conks (bracket-like growths) growing on the bark of trees (**photo 20**) or on exposed roots indicate root rot or wood decay. They are the fruiting bodies of decay-causing fungi.

It is very important to have your tree inspected by an arborist if you find cavities or decay. Other factors, such as tree size and weight distribution, should be considered when determining whether the tree is a hazard. Do not make hasty decisions based simply on the presence of decay or a cavity. Also, do not attempt to clean out or seal a cavity or decay pocket. In many cases, you will be doing the tree more harm than good.

Some fungi use wood as a food source. The process of wood digestion by fungi is called decay. As it progresses, the wood is weakened and failure becomes more likely.


18


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5. Trunk and branch cracks

Inspect the trunk and large branches for cracks (**photos 21 and 22**). Cracks can be longitudinal (with the grain) or transverse (across the grain). If a crack is found, determine whether it extends into the wood or is confined to the bark. Insert a pencil or similar object into the crack and measure its depth. Generally, if the crack is more than 3 inches (7.5 cm) deep, it is likely to extend into the wood. Bark thickness varies on trees, however, and in some cases a crack that is 2 inches (5 cm) deep may extend into the wood. Look into the crack and see if you can determine the thickness of the bark and whether the crack extends into the wood.

Cracks confined to the bark are typically not a problem. If the crack extends into the wood, then there is reason for concern. Deep cracks indicate that a separation of the wood within a trunk or branch has occurred and the tree has become structurally weakened. If you find a crack, it is best to contact an arborist to have it inspected. In some cases, pruning can reduce the potential hazard by lightening the load on the branch or trunk. In other cases, more extensive measures may be needed.

The branch shown in **photo 23** probably failed as a result of a longitudinal crack in the wood.


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23

6. Hanging or broken branches (hangers)

Hangers are branches that are broken but have not fallen from the tree. In some cases they are still partially attached to the tree and are hanging down (**photo 24**) or they may have separated completely and are lodged in the canopy. In either case, they are likely to fall. Hangers should be removed as soon as possible.

Inspect the canopy for broken branches. Look closely because they can be hard to find, especially in large trees. Inspect for branches that are hanging down from a break point. Also, look for branches that have broken off completely and are resting on other branches.


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7. Dead branches (deadwood)

Branches that have died (**photo 25**) will eventually fall off. Small branches (less than 2 inches or 5 cm in diameter) usually are not of concern, but larger dead branches can cause damage when they fall.

Inspect your tree for dead branches. For trees that lose their leaves in the winter (maple, ash, poplar, etc.), this is best done when they are in full-leaf (late spring through early fall). Evergreen trees (pine, cypress, eucalyptus, etc.) can be inspected for deadwood at any time.

Stand back from the tree and carefully look around the canopy, particularly near the top. If you find deadwood, plan to have it removed. In most cases, this does not have to be done immediately, but it should not be ignored.


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Summary

- Conduct careful, regular inspections of your trees for all seven defects listed in this guide.
- Do not climb the tree. Conduct inspections from the ground or a safe viewing area.
- Look closely for power lines in the vicinity of your tree. If you suspect a hazardous condition, notify your utility company immediately.
- If you determine that a tree is hazardous, look to see if anything would be damaged if the tree fails and decide whether it can be safely moved from the area. Keep people, pets, and vehicles away.
- Do not attempt to remove large branches or trunk sections on your own.
- Consult an arborist when you need advice or work done on your trees.

Obtaining professional advice and services

The best assurance of getting quality advice or tree work is by hiring an arborist certified by the International Society of Arboriculture (ISA) or a consulting arborist who is a member of the American Society of Consulting Arborists (ASCA). The ISA certification program and ASCA membership require a written proficiency exam and continuing education.

Certification does not guarantee quality performance. It is only a means of helping you select an arborist who has a demonstrated level of knowledge and technical proficiency. Some noncertified arborists can also provide competent services. It is up to you to determine if a particular arborist or tree company, certified or not, can provide the services you desire. Verify that your arborist is insured and check his or her references. Tree care services are usually listed under "Tree" in the Yellow Pages of the phone book.

Further information

Publications

How to Recognize and Prevent Hazard Trees. J. Fazio, ed. Tree City USA Bulletin #15. Nebraska City, NE: National Arbor Day Foundation, 1998.

The Integrated Management of Trees, Shrubs, and Vines in the Landscape. R. W. Harris. Englewood Cliffs: Prentice Hall, 1992.

A Photographic Guide to the Assessment of Hazardous Trees in Urban Areas. N. Matheny and J. Clark. ISA Publication P1213. Urbana, IL: ISA Publications, 1991.

Recognizing Hazard Trees. ISA Publication B1619. Urbana, IL: ISA Publications, n.d.

Trees Under Power Lines: A Homeowner's Guide. L. R. Costello, A. M. Berry, and F. J. Chan. Oakland: DANR Publication 21470, 1989.

Websites

California Tree Failure Report Program
http://groups.ucanr.org/treefail

International Society of Arboriculture
http://www.isa-arbor.com/

Western Chapter, International Society of Arboriculture
http://www.wcisa.net

Trees that are structurally strong have a low failure potential, require less maintenance, and are more likely to be long-lived.

London plane (*Platanus acerifolia*)
Davis, CA