Backyard Woods
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Identify and Manage Hazardous Defects in Your Trees

4

Prevent personal injury and property damage

In Your Backyard Woods

Trees are key to the enjoyment of your backyard woods. Structurally defective trees; however, can fail and cause personal injury and property damage. A tree with structural defects that are likely to cause failure is considered a "high risk or hazardous tree" if it could strike a target. A target can be a vehicle, building, or a place where people gather such as a bench, picnic table, trail, or fire pit.

Many structural defects that contribute to tree failure can be prevented through proper tree planting and pruning practices. (See Backyard Woods Tip Sheets on Plant Trees and on Prune Your Trees for more information.)

To ensure your family and friends have a safe environment in which to enjoy the beauty and many benefits of your backyard woods, you can learn to recognize hazardous defects in trees and take corrective actions. At the same time, you can increase wildlife habitat, aesthetic value, and recreational opportunities within your backyard woods.

A professional forester or arborist should undertake many of the suggested corrective actions. Because of the natural variability of trees, the severity of their defects, and the different sites on which they grow, evaluating trees for hazardous defects can be a complex process. The following are guidelines, not absolute rules, for recognizing and correcting high-risk tree defects. When in doubt, consult a professional forester or arborist.

Inspecting Trees

Trees that are in high use areas and within striking distance of a target, should be inspected every year and after severe storms. This usually includes all trees within your immediate backyard, and along trails, near picnic areas or fire pits, or campsites within your backyard woods. These inspections will allow you to detect defects and correct them before they pose significant risks to personal safety and property. Tree inspections can be done at any time of year, with or without leaves present. Inspect trees carefully and systematically. Examine all parts of the tree, including the roots, root or trunk flare, main stem, branches, and branch unions. Be sure to examine all sides of the tree. Use binoculars to see high branches. Consider the following factors:

Tree condition

Trees in poor condition may have many dead twigs, dead branches, or small, off-color leaves. Trees in good condition will have full crowns, vigorous branches, and healthy, full-sized leaves; however, green foliage in the crown does not ensure that a tree is safe. Tree trunks and branches can be defective and still support a lush green crown.

Tree species

Certain tree species are prone to specific types of defects. For example, some species of maple and ash in the Northeast often form weak branch unions, and aspen is prone to breakage at a young age (50-70 years) due to a variety of factors, including decay and cankers.

Tree age and size

Trees are living organisms subject to constant stress. Pay particular attention to older trees, which may have accumulated multiple defects and extensive decay.

Defects to Look For

High-risk defects are visible signs that a tree is failing. Look for these seven main types of tree defects: dead wood, cracks, weak branch unions, decay, cankers, root problems, and poor tree form. These seven main types of tree defects are described below. Remember: a tree with defects is not hazardous unless some portion of it is within striking distance of a target.

Dead wood

Dead trees and branches are unpredictable and can break and fall at any time. Dead wood is often dry and brittle and cannot bend in the wind like a living tree or branch. A dead branch and treetop that is already broken off ("hanger" or "widow maker") is especially dangerous.

Act immediately if . . .

- A broken branch or treetop is lodged in a tree.
- A tree is dead.
- A branch is dead and of sufficient size to cause injury. Typically this is a branch larger than 4 inches in diameter, but this can vary with branch height. Even smaller branches, falling from high in the tree, can cause serious personal injury.)

Dead branches can break and fall at any time.

Cracks

A crack is a deep split through the bark, extending into the wood of the tree. Cracks are extremely dangerous because they indicate that the tree is already failing.

Act immediately if . . .

This weak branch union has developed a crack, creating a highly hazardous situation.

•A crack extends deeply into, or completely through the stem.

- Two or more cracks occur in the same general area of the stem.
- A crack is in contact with another defect.
- A branch of sufficient size to cause injury is cracked (typically larger than 4 inches in diameter).

Weak Branch Unions

Weak branch unions are places where branches are not strongly attached to the tree. A weak union occurs when two or more similarly sized, usually upright branches grow so closely together that bark grows between the branches, inside the union. This ingrown bark (included bark) does not have the structural strength of wood, and the union is much weaker than one that does not have included bark. The included bark may also act as a wedge and force the branch union to split apart. Trees with a tendency to form upright branches, such as elm and maple, often produce weak branch unions. Weak branch unions also form after a tree or branch is tipped or topped, that is, when the main stem or a large branch is cut at a right angle to the direction of growth leaving a large branch stub. The stub inevitably decays, providing very poor support for new branches ("epicormic" branches) that usually develop along the cut branch.

A weak branch union with included bark and a crack.

Act immediately if . . .

- A weak branch union occurs on the main stem.
- A weak branch union is associated with a crack, cavity, or other defect.

Decay

Decaying trees can be prone to failure, but the presence of decay alone does not indicate that the tree is hazardous. Advanced decay (wood that is soft, crumbly, or a cavity where the wood is missing) can create a serious hazard. Evidence of fungal activity including mushrooms, conks, and brackets growing on root flares, stems, or branches are indicators of advanced decay.

A tree usually decays from the inside out, eventually forming a cavity, but sound wood is also added to the outside of the tree as it grows. Trees with sound outer wood shells may be relatively safe, but this depends upon the ratio of sound wood to decayed wood, and other defects that might be present. Evaluating the safety of a decaying tree is usually best left to trained arborists.

Act immediately if . . .

- Advanced decay is associated with cracks, weak branch unions, or other defects.

This tree should have been evaluated and removed before it failed. Detectable signs of wood decay were present including a main stem cavity with soft, crumbly wood.

This tree has a severe lean and much of the root system has been recently exposed.

- A branch of sufficient size to cause injury is decayed.
- The thickness of sound wood is less than 1inch for every 6 inches of diameter, at any point on the stem.

Cankers

A canker is a localized area on the stem or branch of a tree, where the bark is sunken or missing. Cankers are caused by wounding or disease. The presence of a canker increases the chance of the stem or branch breaking near the canker. A tree with a canker that encompasses more than half of the tree's circumference may be hazardous even if exposed wood appears sound.

The canker and associated wood decay have seriously weakened the stem of this birch tree.

Act immediately if...

- A canker or multiple cankers affect more than half of the tree's circumference.
- A canker is physically connected to a crack, weak branch union, cavity, or other defect.

Root Problems

Trees with root problems may blow over in windstorms. They may even fall without warning in summer from the weight of the tree's leaves. Many actions can cause root problems such as severing or paving-over roots; raising or lowering the soil depth near the tree; parking or driving vehicles over the roots; or extensive root decay. Soil mounding, twig dieback, dead wood in the crown, and off-color or smaller than normal leaves are symptoms often associated with root problems. Because most defective roots are underground and out of sight, aboveground symptoms may serve as the best warning.

Act immediately if. . .

- A tree is leaning with recent root exposure, soil movement, or soil mounding near the base of the tree.
- More than half of the roots under the tree's crown have been cut or crushed. These trees are dangerous because they do not have adequate structural support from the root system.
- Advanced decay is present in the root flares or "buttress" roots.

Poor Tree Form

Poor tree form is a growth pattern that indicates weakness or structural imbalance. Trees with strange shapes are interesting to look at, but may be structurally defective. Poor tree form often results from many years of damage from storms, unusual growing conditions, improper pruning, topping, and other damage.

A leaning tree may be a hazard. Because not all leaning trees are dangerous, a professional arborist should examine any leaning tree of concern.

Act immediately if . . .

- A tree leans excessively.
- A large branch is out of proportion with the rest of the crown.

This tree has multiple defects present (advanced wood decay with fungal conks, and a large crack) and should be removed.

Multiple Defects

The recognition of multiple defects in a tree is critical when evaluating its potential to fail. Multiple defects that are touching or are close to one another should be carefully examined. If more than one serious defect occurs on the tree's main stem, you should assume that the tree poses a very high level of risk.

Corrective Actions

Corrective actions begin with a thorough evaluation. If a high-risk situation exists, there are four recommended options for correcting the problem: move the target, prune the tree, convert the tree to a wildlife tree, or remove the tree.

Move the Target

Moving the target is often an inexpensive, effective, and simple treatment for correcting a high-risk tree. Easily moved items like play sets and swings, vehicles, and picnic tables can be placed out of the reach of the hazardous tree with little effort and expense.

If the target cannot be moved and a high-risk situation exists, consider blocking access to the target area until the hazard can be eliminated.

Prune the Tree

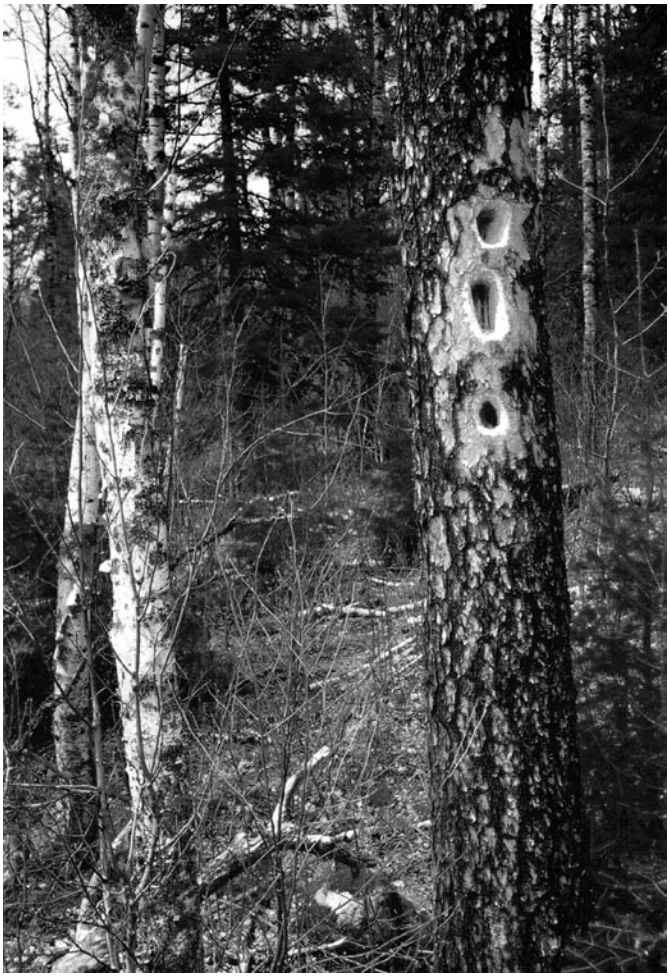
A defective branch or branches may cause a high-risk situation, even though the rest of the tree is sound. In this case, pruning the branch or branches solves the problem.

Practicing proper tree pruning is excellent "preventive medicine" for reducing the occurrence of defective, high-risk trees. By pruning properly, early in a tree's life, you can prevent or correct many of the problems that cause trees to fail as they mature.

Improper pruning techniques can worsen the problem, and may ultimately result in the formation of cracks, decay, cankers, or poor tree architecture that lead to very high risk situations. (See the Backyard Woods Tip Sheet on Prune Your Trees for more information.)

Convert the Tree to a Wildlife Tree

Creating wildlife habitat is a corrective action that is often overlooked. Corrective actions should be selected with safety first and foremost; however, options exist that can



Leave this wildlife tree if it will not endanger a target, the target can be moved, or the tree can be reduced in size to prevent damage to a target.

successfully reduce safety risks and also leave at least a portion of the tree intact to provide wildlife habitat. One option is to reduce the height of a tree to the point that it would no longer strike a target if it should fail. Removing major branches that are structurally defective, and leaving a portion of the tree intact for wildlife habitat may also be possible. For valuable wildlife trees, consider redirecting a trail or walkway so that it is located outside the striking distance of the tree. If a tree must be removed for safety reasons, consider leaving the tree on ground to create wildlife habitat.

Remove the Tree

Before cutting a tree down, carefully consider the alternatives. The effects of removing a tree are often pronounced in landscape situations and may result in reduced property values. Tree removal should be considered as the final option and used only when the other corrective actions will not work. Tree removal is inherently dangerous and is even more serious when homes and other targets are involved. Removal of very high-risk trees is usually a job for a professional arborist.

Cabling and Bracing

Cabling and bracing do not eliminate all the safety risks associated with a highly defective tree, but when done correctly by a trained arborist, it can extend the time a tree or its parts are safe. Done incorrectly, it creates a more serious hazard. Cabling or bracing is not recommended for a high-risk tree unless the tree has significant historic or landscape value, the cabling or bracing is done by a trained arborist, is regularly inspected, and properly maintained.

Conclusions

Evaluating and treating high-risk trees can be a complicated process, requiring a certain level of knowledge and expertise. This publication outlines some of the basic problems that may alert you to a hazardous situation, and suggests some possible ways to correct them. A professional forester or arborist should undertake many of the suggested corrective actions. When in doubt about how much risk a defective tree poses, or how to best treat it, consult a professional forester or arborist. You may wish to contact the local Cooperative Extension Office for educational assistance and to inquire if a listing of qualified consulting foresters or arborists is available for your area. Otherwise, consult your phone book under “Arborists” or “Tree Service.”

Remember that trees do not live forever. Design and follow a backyard landscape plan that includes proper tree selection, and a cycle of tree maintenance and replacement. (See Backyard Woods Tip Sheet on Make a Master Plan for more information.) For backyard woodlot management, see the Backyard Woods Tip Sheet on Help Your Preferred Trees Grow for information on how to select trees with the greatest potential to accomplish your goals, whether they include improving wildlife habitat, enhancing the beauty of the woods, increasing recreational opportunities, or improving timber quality.

In the Forest

The USDA Forest Service and the U.S. Department of Interior’s National Park Service manage developed recreational areas within the National Forests and Parks to help ensure public safety. Both Federal agencies have established hazard tree management policies and standards, requiring periodic, thorough, and documented tree inspections of developed recreation sites. Many State Forests and parks have similar tree risk management plans. Just as the management practices of National and State Forests and Parks help to ensure public safety, your backyard woods should be properly managed to ensure a safe environment for your family and friends.

Suggested Reading

Albers, J.; Hayes, E. 1993. How to detect, assess and correct hazard trees in recreational areas, revised edition. St. Paul, MN: Minnesota DNR; 63 p.

Bedker, P.J.; O'Brien, J.G.; Mielke, M.E. 1995. How to prune trees. NA-FR-01-95. Radnor, PA: USDA Forest Service, Northeastern Area State and Private Forestry; 30 p. Also available at: http://www.na.fs.fed.us.

Fazio, J. 1989. How to hire an arborist. Tree City USA Bulletin No. 6. Nebraska City, NE: National Arbor Day Foundation; 8 p.

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Robbins, K. 1986. How to recognize and reduce tree hazards in recreation sites. NA-FR-31. Radnor, PA: USDA Forest Service, Northeastern Area; 28 p.

Shigo, A. L. 1986. A new tree biology. Durham, NH: Shigo and Trees, Associates; 595 p.

Acknowledgments

Information in this tip sheet is a modified version of the publication entitled How to recognize hazardous defects in trees. NA-FR-01-96. Radnor, PA: USDA Forest Service, Northeastern Area State and Private Forestry; 19 pp. The publication is also available at: http://www.na.fs.fed.us.

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