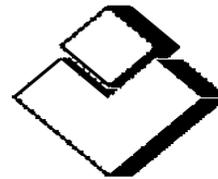
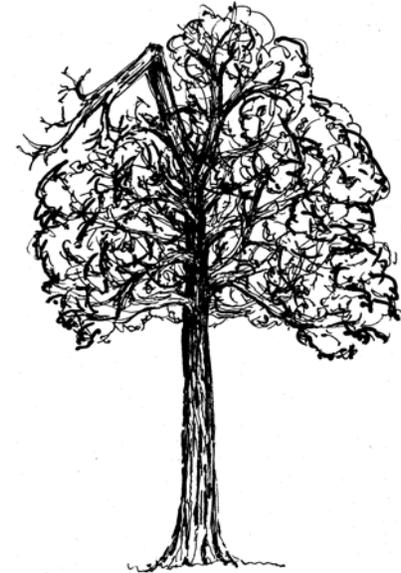


# Managing Hazardous Trees

## Vermont Danger Tree Management Guidelines



Vermont Department  
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# **NOTES**

In determining the hazard area, the following criteria must be evaluated: slope of the ground; direction of the lean; and height of the tree.

### TYPE 3 DANGER TREE HAZARD AREAS

#### Level or sloped ground, no discernable lean:

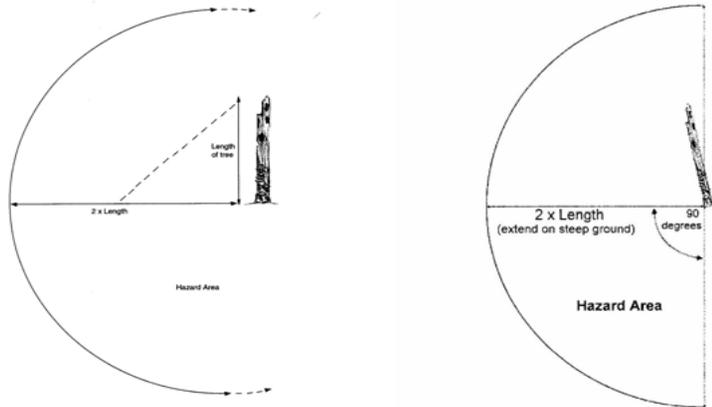
The hazard area would form a circle around the tree with a radius of 2 times the height.

#### Level or sloped ground, lean in any direction:

The hazard area would be 90 degrees on each side of the lean and within 2 times the height of the tree beginning at the base.\*

**The area behind the lean is not a hazard area unless equipment or falling timber contacts the reserve tree. Striking a Type 3 reserve tree could force a backlash opposite the lean, creating an additional hazard during the time of impact.**

*\* On steep ground the hazard area may have to be extended to protect workers.*



This booklet is designed as a set of guidelines to help you make decisions about managing hazardous trees. These were adapted from guidelines used in other states, and were prepared through the cooperation of the Vermont Department of Labor and Industry and the Vermont Office of the National Wildlife Federation.

Personnel from the following organizations and agencies assisted in a review of the guidelines:

Smart Wood  
USDA Forest Service  
Vermont Department of Forest, Parks and Recreation  
Vermont Forest Products Association  
Yankee Forest Safety Network

Text prepared by Mark Lorenzo,  
National Wildlife Federation

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# Managing Hazardous Trees

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## TYPE 3 DANGER TREES

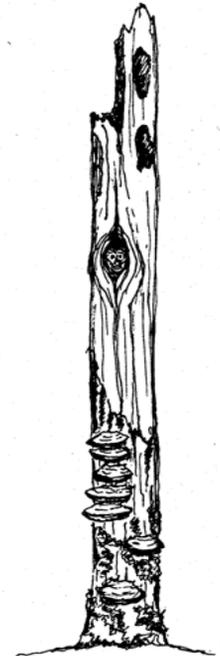
Type 3 danger trees are live or dead with unstable trunk or roots, and with or without bark. This includes "soft" snags as well as live trees with unstable roots caused by root rot or fire. They are considered the most dangerous type. Identifying Type 3 trees requires careful consideration.

Conks are a good indicator of internal stem decay which often suggests an unstable trunk. Pockets of root rot can often be determined by the lean or clumping of dead trees. Burned out trunks and/or roots may also suggest severe instability.

Short, broken top dead trees that lack limbs or bark do not necessarily constitute a Type 3 tree. They may instead be classified as Type 1, if the trunk and roots appear sound and the species is of a type that remains stable for long periods.

Unexpected collapse could occur from any portion of the roots or trunk. Thus, testing the snag at breast height may not give an accurate indication of the tree's condition higher up where failures can occur. Type 3 trees must always be considered danger trees.

The hazard area for a Type 3 tree is defined as the area on the ground that could be reached by any portion of the tree that may collapse (see Type 3 hazard area description on page 10). Should forest practices take place within the hazard area the tree must be felled or removed using techniques that minimize employee exposure before felling.



## TYPE 2 DANGER TREE HAZARD AREAS

### Level or sloped ground, no discernable lean:

Step 1: Determine the length of the top or portion that would dislodge, and double its length.

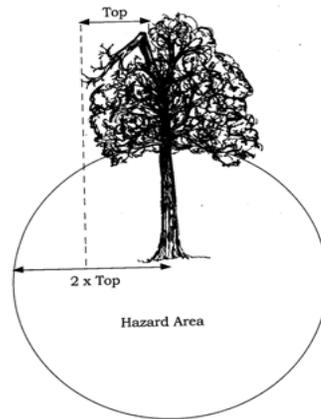
Step 2: The hazard area forms a circle around the tree with a radius equal to 2 times the length of the possibly dislodged portion.\*

### Level or sloped ground, lean in any direction

Step 1. Determine the length of the top or portion that would dislodge, and double its length.

Step 2. Determine the amount of lean (horizontal distance from the top or portion that would dislodge, relative to the base).

Step 3. The hazard area would be the distance determined by adding steps 1 and 2, and then adding 90 degrees on each side of the lean beginning at the base.\*



**The area behind the lean is not a hazard area unless equipment or failing timber contacts the reserve tree. Striking a Type 2 tree could force a backlash opposite the lean, creating an additional hazard during the time of impact.**

*\* On steep ground the hazard area may have to be extended to protect workers.*

## INTRODUCTION

Dead, dying and live defective trees are an important part of a healthy forest. Cavity trees, snags and deadwood provides crucial habitat for many birds, mammals, amphibians, reptiles, insects and a variety of plants and fungi.

The risks of working around standing dead, dying, or defective trees pose obstacles for logging operations, though. These trees, as well as non-defective trees, are now being managed as reserve trees. Reserve trees can be defined as those trees reserved from cutting for a variety of purposes, including but not limited to, wildlife use, seed source, research, genetics, and structural diversity. Although reserving trees for these purposes can be challenging, with some forethought, they can be safely retained.

Regulations promulgated by the Occupational Safety and Health Administration (OSHA) have recognized the hazard potential of dead, dying and defective trees. OSHA identifies such trees as “danger trees” and requires specific actions that must be taken around “danger trees.” For purposes of this guide, OSHA’s terminology will be used when referring to dead, dying or substantially defective trees.

The OSHA “Danger Tree” rule (29 C.F.R. § 1910.266 (h)(1)(vi)) states that:

*Each danger tree shall be felled, removed or avoided. Each danger tree, including lodged trees and snags, shall be felled or removed using mechanical or other techniques that minimize employee exposure before work is commenced in the area of the danger tree. If the danger tree is not felled or removed, it shall be marked and no work shall be conducted within two tree lengths of the danger tree unless the employer demonstrates that a shorter distance will not create a hazard for an employee.*

*A danger tree includes any standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or damage to the tree, and direction or lean of the tree.*

These guidelines are intended for use in any forest harvest where danger trees are to be retained. They provide a technical framework to allow for the retention of danger trees in concert with safe work practices, and forest and wildlife management goals. In these guidelines, danger trees are classified in three categories Type 1, 2, and 3, and appropriate safety measures are described.

This document is designed to show and explain various danger trees and to help all parties involved in timber management implement a consistent set of criteria, which will help lay a foundation for informed decisions about safe work practices and resource objectives.

Trees infected with root rots have weakened root systems that require a more thorough evaluation.

Another Type 1 tree can be defined as a sound long standing snag with no evidence of root rot, no lean, and without a top.

Because Type 1 danger trees are generally stable, they pose the least hazard to workers, and may be retained wherever healthy trees could be. Normal measures for safe harvesting should be used in the vicinity of Type 1 trees.

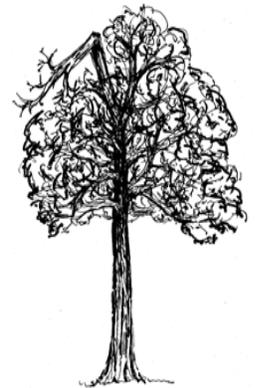
## **TYPE 2 DANGER TREES**

Type 2 danger trees are live or dead trees with broken or unstable tops or upper portions. Trees with ice-damaged tops can often be defined as Type 2. Although the roots and main portions of the trunk are sound, these danger trees pose a high hazard because of defects in live or dead wood higher up in the tree. Ground vibration from falling trees, wind, heavy equipment or other harvesting activity can dislodge slabs, chunks, limbs, or the entire upper portion of the tree.

Because these danger trees do not collapse at the base, but somewhere above, testing the tree at breast height will not give an accurate indication of the tree’s condition at a higher location where failures are likely to occur.

The area on the ground that could be reached by a dislodged top or limb is called the “hazard area” for a Type 2 tree. Should forest practices take place within the hazard area, the tree must be felled or removed using techniques that minimize employee exposure before felling is commenced.

In determining the hazard area, evaluate the following criteria: slope of the ground; amount and direction of lean; and length of the top portion that would dislodge.



## DANGER TREE TYPES and HAZARD AREAS

Recognizing danger tree types (those potentially hazardous trees planned for retention to meet management objectives) is the first step in identifying potential hazard areas. These definitions are based upon conditions that affect the tree's stability and are visible to an observer on the ground.

They are divided into three classification, ranging from the safest (Type 1), to moderately hazardous (Type 2), to the most dangerous (Type 3).

For example, Type 1 danger trees have low-hazard and low-failure probability, while Type 3 danger trees have extreme-hazard and extreme-failure probability. All danger trees fit one of these types.

Specific defects, which could cause failure, must be evaluated for each type of danger tree.

**When a danger tree is questionable, it should be assigned the next higher type.**

### TYPE 1 DANGER TREES

Type 1 danger trees are damaged, dying or dead trees with a sound top, trunk and roots. Identifying Type 1 trees requires careful observation. Causes of tree mortality include disease, wind or ice damage, insects, fire, adverse weather or lightning.

Fire-scorched trees may remain stable for years if the trunk and root systems are not badly burned; however, not all fire-scorched trees may be safe. Pre-existing defects may be charred and difficult to detect, rendering a tree that was dangerous before the fire even more dangerous afterward. If the fire burned the root system, it may be damaged, altering Type 1 danger tree status.



## SAFETY PLANNING

Safety planning is essential to ensure that workers are not exposed to the hazards of danger trees, and that the objectives for retaining reserve trees are achieved.

The objective of the safety plan is to provide a safe working environment for the forest worker and forest users. There are six steps for successful safety planning:

- 1.) **Know reserve tree objectives.**
- 2.) **Develop a viable site plan.**
- 3.) **Communicate the plan to workers and landowners.**
- 4.) **Follow the plan.**
- 5.) **Monitor it continuously.**
- 6.) **Modify if necessary.**

### Know Management Objectives

Reserve tree objectives will determine the kinds, sizes, characteristics and locations of trees. Knowing what the needs are, and why, will help in recognizing which cutting and logging techniques to use as well as when to fell dead wood and when to leave it standing. This is helpful in identifying the options to work with when designing a safety plan. For example, the need to conserve wildlife habitat is a common element in forest management planning.

### *Wildlife Needs*

A tree, when reserved for cavity-using wildlife, may be dead, dying or live defective. It is important, for biological and safety reasons, to recognize that this includes all trees from the live defective condition to fully dead. Healthy, green trees may also be reserved for wildlife habitat and other purposes, but these are not considered “danger trees”.

Wildlife species that make or use tree cavities are dependent on three main variables for survival:

- number and distribution of reserve trees;
- height and diameter of reserve trees; and,
- amount of decay in reserve trees.

### **Long-Range Site Planning**

Long range planning on a large scale provides more design options for safe ways to reserve trees and meet wildlife needs. The arrangement, distribution and diversity of reserve trees is key to meeting wildlife objectives in a manner compatible with safe work practices. Snag retention can also aid in retaining soil and preventing soil erosion.

Uniform distribution of reserve trees is not necessary. Danger trees can be clumped with healthy reserve trees to accommodate operational needs. If adequate amounts of trees, clumps and units are well dispersed throughout the site, you may meet present and future cavity-using wildlife needs. Riparian zones, inoperable steep slopes, non-productive sites, wetlands and other sensitive sites, which will not receive timber harvesting treatments, are excellent sites for danger tree retention.

### **Communicate With All Workers, (and Landowners if Necessary)**

It is the responsibility of all woods workers to be informed of the hazards of working around danger trees. They must be able to recognize a danger when it exists, and know how to deal with the situation. Specifically, all workers should:

- Review the safety plan with supervisors before entering a new area or setting, or conducting new activity;
- Be able to recognize the three types of danger trees described in this guide; and,
- Be able to avoid or eliminate the hazard areas around Type 2 and Type 3 trees as described in the following guidelines.

Because timber fellers are usually the first workers to approach a danger tree during the harvest activity, they are at risk of having an accident. The trees they cut or retain can also determine if management objectives are met. Thus, including timber fellers in the planning, or at minimum discussing the plan with them, is critical to achieving safety objectives.

Inform landowners of any hazard avoidance areas that are not clearly marked on site.

### **Follow the Plan**

It is the responsibility of all consultants, contractors and workers to do their work according to the safety strategies in the plan.

### **Monitor Continuously**

Once the operation has begun, conditions may change. Therefore, both supervisors and workers should be alert to new or unexpected hazards that may arise and should be prepared to adjust the safety plan accordingly.

### **Modify if Necessary**

If new or revised strategies are needed, they should be developed before work proceeds further. Changes in the safety plan must be communicated to all workers on the site.

**Type 1 Tree**



**Type 2 Tree**



**Type 3 Tree**

