Dangerous Tree Assessor's Course

Wildland Fire Safety Module

Forest Service British Columbia

British Columbia

WorkSafe bc.com

Revised Edition – November 2005

FOREWORD

This training course provides information and technical procedures for assessing tree hazards and establishing appropriate safe work practices in situations where there is potential exposure to workers involved in wildland fire fighting, from dangerous trees. It also provides information on habitat quality which can be used to retain some high-value wildlife trees where opportunities exist to assess both tree hazards and wildlife tree habitat value (e.g., in sustained action fires where there is sufficient time to assess wildlife tree habitat components).

Fire crews involved in wildland fire fighting do not have the time to complete a detailed tree assessment to determine if trees that appear dangerous might actually be assessed as safe. Consequently, this course primarily focuses on worker safety and tree defects which can be visually inspected and rated as having "high defect failure potential."

Persons who wish to learn more about wildlife/danger tree assessments applicable to post-fire forestry activities (e.g., tree planting burned areas), should take this training module in conjunction with the regular "Wildlife/Danger Tree Assessor's Course for Forestry Operations."

Ralph Mohrmann
Ministry of Forests
Protection Branch

Nancy Densmore
Ministry of Forests
Forest Practices Branch

Mike Neilsen
Work Safe BC
Prevention Division

Richard Thompson
Ministry Environment
Biodiversity Branch

ACKNOWLEDGEMENTS

A variety of people contributed to the development of this training module. Thanks are extended to the Wildlife Tree Committee of British Columbia (WTC) for permission to use some materials and concepts adapted from the "Wildlife/Danger Tree Assessor's Course – Forest Harvesting and Silviculture." Steve Bachop & Todd Nessman (Ministry of Forests, Protection Branch) were instrumental in their support throughout the development and revision of this module. Additional review comments were received from various Ministry of Forests protection staff. Specific thanks are extended to Neil Campbell (Wildfire Ltd.), Doug Ellis (Malaspina University College), Fred Marshall (Marshall Forestry Services), and Phil Ranson and Alvin Boyer (Ministry of Forests Protection) for their valuable contributions to this current course workbook. Todd Manning (Manning, Cooper and Associates) compiled and edited this document and revised the training materials.

WHAT IS A WILDLIFE TREE?

Trees in various stages of life, death and decay are important components of the structure and function of all natural forest ecosystems. Wildlife trees are part of this cycle of life and death. They are constantly being formed by biotic and abiotic factors such as insects, fungi, fire and weather.

> A wildlife tree is any standing dead or live tree with special characteristics that provide valuable habitat for the conservation or enhancement of wildlife.

In British Columbia, 80 species of birds, mammals and amphibians depend on wildlife trees for nesting, feeding and shelter. Some wildlife trees are protected under Section 34 of the provincial Wildlife Act, which reads as follows:

> "A person who, except as provided by regulation, possesses, takes, injures, molests or destroys
>
> (a) a bird or its egg,
>
> (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or
>
> (c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg
>
> commits an offence."

Depending on their cause of death, specific tree defects and condition, and the type of work activity, some wildlife trees can be dangerous. A discussion of tree danger rating is found in the upcoming sections. More information on wildlife tree habitat value is found in Appendix 1.

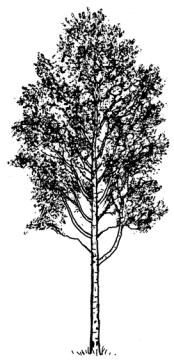
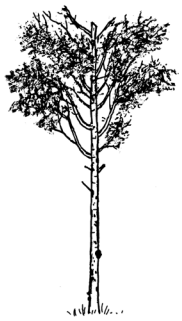
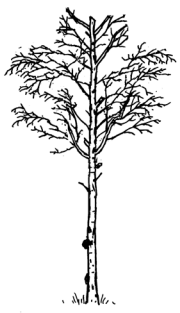
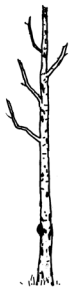
Bat roost in cedar snag
Photo courtesy of Province of British Columbia

TREE CLASS COMPARISON FOR CONIFERS AND HARDWOOD TREES

The following tree decay class diagrams illustrate the general breakage and decay patterns seen in coniferous and deciduous trees. The six step hardwood classification system (broad-leaved deciduous trees) is parallel to the coniferous scheme, but is more accelerated in the middle and latter classes. Both systems are used in this workbook to provide information for rating trees for defect failure potential and ecological habitat value. A detailed description of class 2 trees is found in Appendix 1 (p. 1-6).

	Live				Dead				Dead Fallen
Conifers	1	2	3	4	5	6	7	8	9
Hardwoods	1	2	3	4		5			6

	LIVE		DEAD						DEAD FALLEN
			Hard			Spongy	Soft		
Tree class	1	2	3	4	5	6	7	8	9
						approx. 2/3 original height 	approx. 1/2 original height 	approx. 1/3 original height 	
Description	**Live/healthy;** no decay or structural damage.	**Live/unhealthy;** internal decay or growth deformities or other structural damage (including stem damage, dead or broken tops); dying tree.	**Dead;** recently dead, needles or fine twigs present.	**Dead;** no needles/twigs; 50% of branches lost; only larger limbs remain; often loose bark.	**Dead;** most branches/bark absent; some internal decay.	**Dead;** very little branches or bark; sapwood/heart-wood may be sloughing from upper bole; decay more advanced; lateral roots of larger trees usually softening.	**Dead;** extensive internal decay; outer shell may be hard; lateral roots usually completely decomposed; hollow or nearly hollow shells.		**Debris;** downed trees or stumps.

	LIVE		DEAD			DEAD FALLEN
Tree class	1	2	3	4	5	6
						

WHAT IS A DANGEROUS TREE?

In the past, the term "snag" has been synonymous with "dangerous tree" and was historically defined in forestry operations as:

"a standing dead or dying tree over 3 metres in height"

However, live trees may have features that could be hazardous to workers. Consequently, the term "snag" has been replaced with "dangerous tree."

The following interpretation of "dangerous tree" now applies and is quoted from WCB Regulation 26.11 as follows:

A DANGEROUS TREE...

...is any tree (regardless of its size) that is hazardous to people or facilities because of:

- location or lean
- physical damage
- overhead hazards
- deterioration of limbs, stem or root system
- a combination of the above.

Exposure is not limited to the active work area, but also includes the perimeter of the work (within 1 tree length or greater depending on site factors such as slope), as well as other locations such as rest areas and staging areas. (See Glossary for definition of work area.)

Consider the following simple equation which illustrates the relationship between risk, tree hazard or condition and exposure (i.e. work activity or location)

RISK = HAZARD x EXPOSURE

The procedures for determining whether a tree is dangerous to workers under various levels of disturbance, and the appropriate steps and safety procedures for mitigating the hazard, are described in the following sections.

WHEN TO CONDUCT VISUAL TREE INSPECTIONS (also refer to Steps 1–5 on the following pages)

- at the time of the initial on-the-ground fire assessment
- prior to any workers entering the area to commence on-the-ground fire suppression
- if, since the previous assessment, BUI values are above thresholds AND there is continuous burning within the area of work
- if more than three days with continuous burning have passed since the previous assessment
- if work activity in the area creates more disturbance than what the area was originally assessed for
- conduct tree inspections to the highest disturbance level (i.e., work activity) you expect to attain on site
- tree inspections need only be conducted on trees which are visually "suspect" (i.e., they are damaged or potentially dangerous).

DETERMINING TREE DANGER RATING

There are five steps required to determine tree danger rating:

STEP 1 Determine level of ground or tree disturbance [1, 2 , 3, 4] and type of work activity. See Table 1.

STEP 2 Conduct site assessment overview. Look for site factors which suggest tree decline or potential tree failure. Refer to Table 2.

STEP 3 Conduct visual tree inspection. Assess the tree(s) for visual hazard indicators (see tables 3, 3A and 3B). If the root condition is suspect (i.e., the roots have been burned into, severed or uplifted), a shallow root excavation with a Pulaski may be necessary.

STEP 4 Make the appropriate safety decision (either Safe or Dangerous), and implement necesasary actions.

STEP 5 Provide Documentation of assessed trees and assessed areas (includes date, location, level of disturbance, marking procedures and how danger trees have been managed).

STEP 1

Level of Disturbance

Various work activities are associated with differing levels of disturbance. Activities rated as very low risk (VLR) or low (l) disturbance create negligible ground or tree disturbance and as a result, expose workers to very little danger.* However, as the level of disturbance increases, so does the potential danger. As a result, fewer activities are appropriate around potentially dangerous trees under situations of higher ground or tree disturbance. Table 1 relates level of disturbance with various work activities.

Table 1. Levels of disturbance for unprotected workers in various fire-related work activities*

Level of Disturbance (LOD)	Type of Work Activity
Very Low Risk (VLR) **	• surveys • stand reconnaissance • tree marking, boundary marking • fire guard/control line layout • establishing hose lays in green (unburned) areas • burning off • road or trail travel with light vehicles (ATV, pickups <5500 kg GVWR) in green (unburned) areas
1	• fire control and mop-up with hand tools and/or water hoses (manual activities only) • establishing hose lays in black (burned) areas • road or trail travel with light vehicles (ATV, pickups <5500 kg GVWR) in black (burned) areas • road travel with heavy vehicles (>5500 kg GVRW) on ballasted and compacted roads (all areas) • tree bucking • slashing
2 and 3	• road travel with heavy vehicles (>5500 kg GVRW) on non-ballasted and non-compacted roads or trails (includes unguarded heavy equipment travel such as skidders) • manned pump sites • tree falling *** • use of heavy mechanized equipment • use of light and intermediate helicopters where workers are exposed to rotorwash • staging and marshaling areas
4	• use of medium and heavy helicopters were workers are exposed to rotorwash • fire camps, fire bases • staging and marshalling

* NOTE Risk can be considered as a combination of tree hazard (condition) AND exposure to that hazard (i.e. work activity and location). RISK = HAZARD x EXPOSURE

** NOTE Very Low Risk (VLR) activities usually result in negligible amounts of ground or tree disturbance and have very low exposure time to potential tree hazards. Consequently, the risk of injury or damage due to tree hazards is very low under these circumstances. Workers should keep a "heads-up" and stay away from any obvious dangerous trees and overhead tree hazards (e.g.,insecurely lodged trees; hanging tops or limbs). **A pre-work inspection is not required for VLR activities**

*** NOTE Does not include falling dangerous trees

Wind Influence

Workers must be aware of wind conditions and the influence of wind on tree stability. Strong winds increase the potential of trees failing. Potentially dangerous trees within reach of work areas must be removed or managed by a certified assessor who determines whether the tree is safe or dangerous, and manages it in accordance with the established practices. If wind conditions become strong enough (i.e., >65km/hr; winds set whole trees in motion and cause branches to break and fly in the air, walking is impeded by the wind), workers should consider leaving the work area and go to a safe refuge

Build-up Index (BUI)

The Build-up Index (BUI) represents a numerical rating for the amount of fuel available for combustion in the sub-surface layer located between forest litter (non-decomposed vegetation) and mineral soil (parent material, hardpan, rock). This fuel layer is more commonly known as organic soil and is where the roots of trees are located, seeking nutrients and moisture. The lack of moisture entering this layer over a period of time causes drying. This drying over time is represented by the BUI value. The higher the numerical rating, the drier the soil is. The drier the soil, the more the organic matter within it becomes available as fuel to wildfire. When more soil is consumed during a fire, the risk to tree instability increases. This instability may be caused by the burning of the root system itself, or the undermining of the anchoring soil layer which supports the roots. Either one can compromise worker safety. For this reason the BUI threshold values for various fuel types are used as an indicator of potential tree instability and hazard (see Table 2).

Different fuel types have different BUI threshold values. This is due to the relationship between soil condition (amount, depth, structure and moisture of organic layers), climate and tree species. Consequently, different forest soils have different fuel consumption rates (e.g., fires in spruce stands often burn away live roots as well as undermine the anchoring soil layer surrounding the near-surface "plate-root" system of spruces).

FBP System
Fuel types

Group	Identifier	Description
Coniferous	C-1	Spruce-lichen woodland
	C-2	Boreal spruce
	C-3	Mature jack or lodgepole pine
	C-4	Immature jack lodgepole pine
	C-5	Red & white pine
	C-6	Conifer plantation
	C-7	Ponderosa pine - Douglas fir
Deciduous	D-1	Leafless aspen
Mixedwood	M-1	Boreal mixedwood- leafless
	M-2	Boreal mixedwood- green
	M-3	Dead balsam fir mixedwood- leafless
	M-4	Dead balsam fir mixedwood- green
Slash	S-1	Jack or lodgepole pine slash
	S-2	White spruce/balsam slash
	S-3	Coasta cedar/hemlock/Douglas fir slash
Open	O-1a	Matted grass
	O-1b	Standing grass

* M-1 & M-2 are transitional between C-2 and D-1

STEP 2

Table 2. Site Assessment Overview (for all tree species)

How to use this table: The following site/stand factors should be reviewed during a walk through of the site, prior to individual tree inspection. The site overview provides a context for inspection of individual trees (i.e., it will identify overall site problems such as damaged roots and soil condition, or windthrow hazard). Specific tree defect failure ratings are summarized in Table 3A.

Site/Stand Factors	Hazard Indicators/Influences
Stand history and condition	• evidence of past tree failure • natural disturbance history (e.g., old burn, old root rot area) • stand age and structure • tree species composition • evidence of root and/or stem diseases • soil or slope instability • sites where air tanker or water scooper aerial drops have recently occurred • sites where blasting has recently occurred
Flooding	• high water table • evidence of water damaged/decayed roots • area prone to flooding
Windthrow potential	• topography (e.g., ridge crests) • prevailing winds (e.g., valley bottom outflows) • evidence of significant windthrow • area of high or recent exposure • stems with height/diameter ratio >90* • saturated soils • shallow soils • restricted rooting depth (clays, bedrock)
Crown condition	• stress cone crop • thinning foliage • chlorosis • rounded crown • small live crown (<20%)* • crown imbalance (majority of branch weight on one side)
Resinosis	• higher than normal stem or basal pitch flow
Tree lean	• trees recently leaning due to windstorm, root damage, shifting root mat or other causes.
Severity of fire/burn and BUI thresholds	• depth and severity of burn • amount of root burn • damage to anchoring • deep basal stem burn **Canadian Forest Fire Danger Rating System** **Fuel Type** — **BUI Threshold Value** C–1 — >40 C–2, C–3, C–4, C–5, C–6 — >60 C–7 — >80 D–1 — >30 M–1, M–2, M–3, M–4 — >40
Time since fire	• If Buildup Index Values are above the established thresholds and there is continuous active burning within the area of work • If more than three days with continuous burning have passed since the last assessment • Also consider the depth and degree of root damage(burning) in the area to be assessed.

* Trees with small live crown proportions and low stem taper have poor crown balance. This can increase their blowdown/falldown hazard, especially if the rooting system is weak.

Step 3

Visual Tree Inspection

The determination of tree safety/danger is generally a visual process. Only trees which are considered by a certified assessor to be "suspect" or potentially dangerous after conducting "the site assessment overview" need a visual tree inspection. Where visual inspection identifies questionable root stability, the tree would usually be rated as "high defect failure potential," and be considered dangerous, unless further probing with a hand tool indicates that the roots are sound. Careful observation of potential tree defects and hazards is required (see below for discussion).

Tree Hazards

A tree can be potentially dangerous if it has defects in its top, branches, stem or root system. The degree of hazard will vary with the size of the tree, type and location of the defect, the severity of any damage, the tree species, and nature of the work activity or target.

The danger tree assessment process requires that assessors identify tree hazards and know how to recognize, evaluate and manage for all types of hazards.

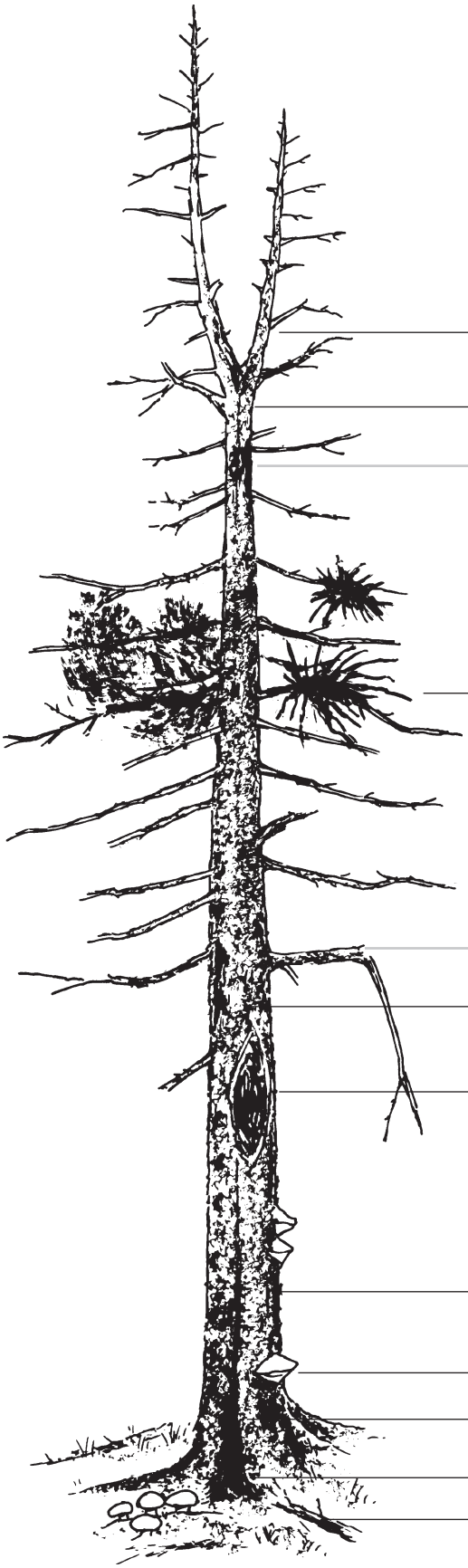
Live or Dead Tree Defects

Tree defects can be separated into three categories: top and branch defects, stem defects, and root and butt defects.

> Tables 3A and 3B provide a summary of high failure potential tree defects associated with live or dead trees. Trees with NO defects or only defects which fall below the high failure threshold, are often rated safe. However, see Step 4 for further safety procedure information.

On the following two pages are diagrams of the major tree defects.

Generalized Tree Defects or Indicators Which Influence Tree Failure



Eight Common Dangerous Tree Defects (for further description see Table 3A)

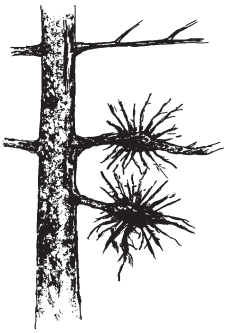
Hazardous tops (HT)

proportion of tree height

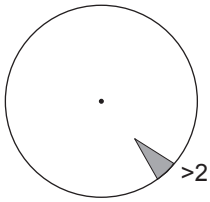
single leader secondary top that resulted from an old top breakage

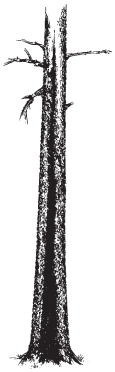
Dead and broken limbs(DL)

Witches' broom (WB)



Split trunk (ST)

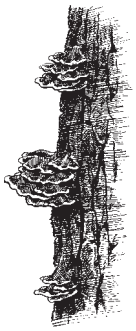




Stem damage (scarring, fire damage, or butt rot) (SD)

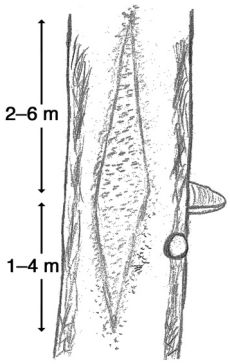
Butt and stem cankers (CA)

Fungal fruiting bodies (conks and mushrooms) (CM)*



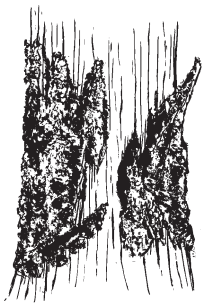
* A list of common tree pathogens found in B.C. is described in Appendix 2.

Fungal decay columns



Column of heartrot decay extending above and below fungal fruiting body (conk). General rule of thumb —decay often extends 2–6 m above conk and 1–4 m below. **Circular nest cavities(NC) are a good indicator of heartrot decay** (drawing not to scale).

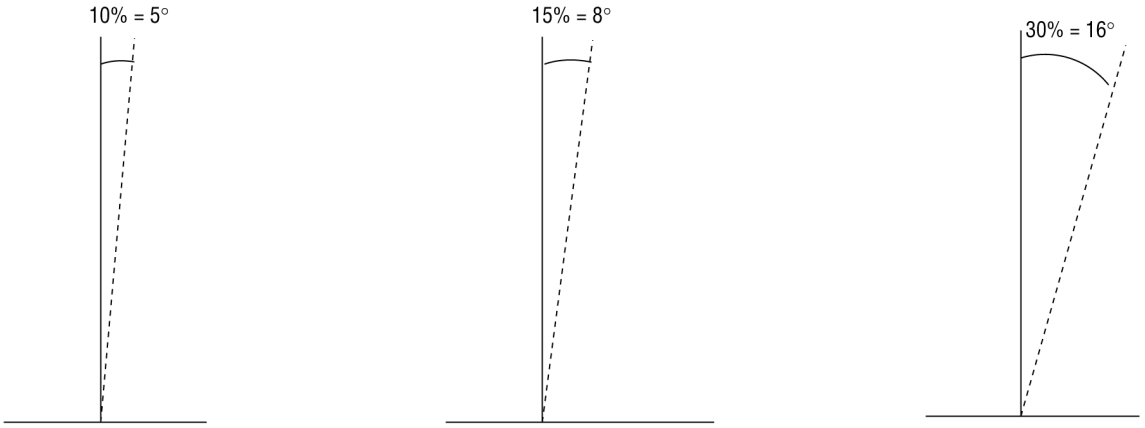
Thick sloughing bark (SB)



Tree lean and root condition must also be evaluated as part of the "Visual Inspection Process" (Step 3). Specific failure potential criteria for tree lean and root condition are described in Table 3A.

Tree Lean

Tree lean may be recent or long-standing. Dead trees and dangerous live trees that are leaning must be assessed for severe root and basal rot. Long-standing lean trees have often subsequently grown a vertical top in the time since the lean occurred. Live lean trees develop tension and compression wood at stress points, to aid in support. They also develop a reinforced root system, where disturbed, to compensate for prior damage. Unless the roots are disturbed further or decay is present, the potential for failure of long-standing leaning trees is low, and such trees need not be considered a hazard.



Recently-leaning trees are tilted over their entire length. Since there is no evidence of subsequent reinforcement of the root system or bole wood, assessors must assume hazard potential.


Lean

Assessors should also identify other rooting problems which can compound the effects of high tree lean. These include shallow roots or substrate, burned, damaged or decayed roots and/or lifted roots, burned or disturbed anchoring soil layers, or adjacent history of windthrow.

Leaning trees which are **securely lodged** in a large sound tree with no chance of breaking free, have negligible lean hazard. Leaning trees in this condition must be evaluated on an individual basis.


Sweep

Sweep is defined as the curvature or distortion of the stem, and is often associated with competition for sunlight, snowpack and steep slope conditions. Sweep should not be confused with lean.

Slope is an important determinant of the direction of falling, and how far and with what force a tree will roll or slide after falling. Danger trees falling on slopes may travel farther than the length of the tree.

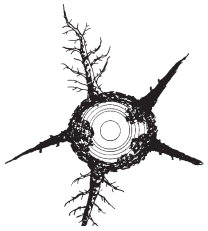

Steep slope

Root Condition (based on visual inspection)

Root condition should be assessed at the root collar (as close to the ground as possible).

If visual inspection indicates questionable root stability, then a shallow root excavation and cautious chopping or probing into the roots with a Pulaski or other suitable hand tool should be done to expose the condition of the roots and to determine if the type of scheduled work activity will destabilize the tree.

Example 1:



This tree has 5 major later roots. Excavation with a pulaski showed that 3 roots had decay and were unstable. The tree was assessed as dangerous.

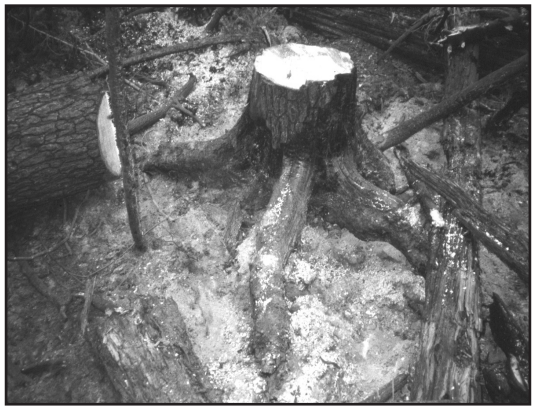
Example 2:

Heavy equipment used during fire guard construction has severed the root system of this tree, resulting in more than 50% lateral roots damaged. This is a high defect failure

Trees with **>50% of lateral roots *damaged, burned or decayed*** have a HIGH failure potential rating (see Table 3A). This condition should not be confused with roots where the soil duff layer has **been scraped or burned away**—merely **exposing the roots, not damaging them**.

Watch for root systems which have been severely burned along with the supporting/anchoring soil layer. These "propped" roots can be very unstable.

- Trees on shallow soils over bedrock or hardpan, or with high water tables, will have shallow root systems. Also look for root pull and cracked or lifting soil mats. They will become more hazardous over time and should be examined carefully before work commences.
- Trees growing in or near areas where root disease is seen to be present are likely to be diseased as well. Watch for stand openings associated with uprooted trees, standing trees with thin or discoloured crown foliage (chlorosis), and fruiting bodies of root disease-causing fungi near the base



Burned and severed roots – high failure potential. Tree felled.

Table 3 describes the 4 significant tree hazards which indicate a high failure potential and therefore a Dangerous rating for level 1 disturbance/work activities—lesser hazards(as described in Table 3a) can be rated Safe for level 1 activities. In most cases a site assessment overview conducted by a qualified person will be sufficient to identify the significant tree hazards at level 1.

Table 3. Danger Tree Assessment Process for Level 1 Disturbance Activities—4 Significant Hazard Indicators

D = dangerous	**D** if tree has one or more of the following **significant tree hazards**: • insecurely lodged tree • hung-up limbs or tops (consider size and height above ground) • highly decadent or unstable: i) >50% of tree cross-sectional area damaged, burned, scarred, decayed or fractured; ii) class 4-8 trees with heartrot conks along the majority of the length of the stem; or iii) >50% lateral roots damaged or with advanced decay • recent high lean (>15% toward work area) AND damaged root system/anchoring soil layer
S = safe	all other trees

The qualified person must be sufficiently experienced and/or trained to be able to recognize and ensure workers avoid exposure to the above significant hazards. Crews should be instructed to keep a "heads-up" for any of the 4 significant hazards and to stay away (generally greater than 1.5 defect lengths) from any trees showing these hazards. However, any trees that the qualified person determines or suspects to be dangerous must be dealt with as follows **BEFORE** any workers enter that area:

- have tree(s) or hazardous parts removed
- flag a no-work zone of appropriate size and shape around tree(s) and instruct workers to stay out of this area (generally 1.5 defect lengths in size).

NOTE: Work crews must also observe wind speed conditions. If wind conditions become strong enough (i.e., winds set whole trees in motion), workers should consider leaving the work area and go to a safe refuge.

Table 3a. **Dangerous Tree Criteria for Level 2 and 3 Disturbance Activities**
NOTE: Any tree defects as described in the boxes below will be rated as DANGEROUS for level 2 and 3 disturbances.
Trees with lesser defects can be rated SAFE for level 2 and 3 - take care to not brush trees if failing adjacent trees.

Defect Category	Species Group	
	Douglas-fir, larch, pines, spruces	**Western redcedar, yellow cedar**
Hazardous top (HT)	Class 2-5: Top (any size) in the form of a fork, multiple stem or single leader secondary top where structural weakness is evident; **OR** Class 4 and 5 trees: top as single leader secondary top, fork or multiple stems **> 30% of tree height**	Class 2-5: Top (any size) in the form of a fork, multiple stem or single leader secondary top where structural weakness is evident.
Dead limbs (DL)	▪ Dead limbs >10 cm diameter **with structural weakness** ▪ Cracked, decayed, broken or hung-up limbs	▪ Dead limbs >15 cm diameter **with structural weakness** ▪ Cracked, decayed, broken or hung-up limbs
Witches' broom (WB)	Brooms >~\ m diameter on live or dead branches **AND** evidence of decay, cracking or failure	n/a
Split trunk (ST) (includes frost, lightning, wind - and impact- induced cracks)	Crack or split >2 cm wide extending >25% of tree diameter into stem AND evidence of decay in surrounding stem wood	Class 2 and 3 trees: Crack or split 2m wide extending > 50% of tree diameter into stem **AND** evidence of decay in surrounding stem wood. Class 4-8 trees: Crack or split > 2cm wide **AND** evidence of decay in surrounding stem wood
Stem damage (SD) includes scarring, fire, machine and animal damage or butt rot)	>50% of tree cross-sectional area damaged, burned, scarred or fractured	>50% of tree cross-sectional area damaged, burned, scarred or fractured
Thick sloughing bark or sloughing sapwood (SB) bark applicable to Douglas-fir, larch, ponderosa pine and cottonwood >50cm dbh)	Large pieces of bark or sapwood separated and sloughing from bole of tree	Bark n/a Long slabs of sapwood hanging from bole of tree
Butt and stem cankers (CA)	> 50% of butt or stem circumference as a perennial canker face*	n/a
Fungal fruiting bodies CM) (conks and mushrooms)**	**Any heartrot fungus present** Exception: For veteran and dominant trees, if Phellinus pini conks present **BUT** NO other visible defects/damage to stem that allow oxygen exchange (e.g., broken top,, scarring, nest cavity, etc.) = SAFE; • Sap-rotting fungi present on any tree < 30 cm dbh where saprot width is > 5 cm	n/a
Tree lean (TL) (for class 1-3 trees)	Lean >15% toward target/work area **AND** tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)	Lean >15% toward target/work area AND tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope) - For candelabra-branched trees, where candelabras are predominantly on lean side of tree — lean >10% toward target/work area and tree has rooting problems
Tree lean (TL) (for class 4-8 trees)	Lean >10% toward target/work area **AND** tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)	Lean >10% toward target/work area AND tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)
Root inspection (RI)	Occurrence of any of the following: root pull or lifting root mat; visible damage or decay to roots affects >50% of lateral roots	Occurrence of any of the following: root pull or lifting root mat; visible damage or decay to roots affects >50% of lateral roots

Table 3a. **Dangerous Tree Criteria for Level 2 and 3 Disturbance Activities (concluded)**
NOTE: Any tree defects as described in the boxes below will be rated as DANGEROUS for level 2 and 3 disturbances. Trees with lesser defects can be rated SAFE for level 2 and 3 - take care to not brush these trees if falling adjacent trees.

Defect Category	Species Group	
	Hemlock, true firs	Broad-Leaved deciduous
Hazardous top (HT)	Class 2-5: Top (any size) in the form of a fork, multiple stem or single leader secondary top where structural weakness is evident; **OR** Class 4 and 5 trees; top as single leader secondary top, fork or multiple stems which are >20% of tree height	Class 2-5: Top (any size) as fork, co-dominant or multiple stems where structural weakness is evident; **OR** • Where dead top > 20% of tree height
Dead limbs (DL)	▪ Dead limbs >10 cm diameter with structural weakness ▪ Cracked, decayed, broken or hung-up limbs	▪ Dead limbs >10 cm diameter with structural weakness ▪ Cracked, decayed, broken or hung-up limbs
Witches' broom (WB)	Brooms >1 m diameter on live or dead branches AND evidence of decay, cracking or failure	n/a
Split trunk (ST) (includes frost, lightning, wind-and impact-induced cracks)	Crack or split >2 cm wide extending >25% of tree diameter into stem AND evidence of decay in surrounding stem wood	Crack or split >2 cm wide extending > 25% of tree diameter into stem AND evidence of decay in surrounding stem wood
Stem damage (SD) includes scarring fire, machine, and animal damage or butt rot)	50% of tree cross-sectional area damaged, burned, scarred or fractured	> 25% of tree cross - sectional area damaged, burned, scarred or fractured
Thick sloughing bark or sloughing sapwood (SB) (bark applicable to Douglas-fir, larch, ponderosa pine and cottonwood >50cm dbh)	n/a	Large pieces of bark separated and sloughing from bole of tree
Butt and stem cankers (CA)	n/a	• >20% of butt or stem circumference as a perennial canker face* • > 50% of butt or stem circumference as a canker face on a dead tree
Fungal fruiting bodies (CM) ** (conks and mushrooms)	Any heartrot fungi present; **OR** Sap-rotting fungi present on trees <60 cm dbh where saprot width is >6 cm	Any heartrot fungi present *** Sap-rotting fungi present on trees <60cm dbh where saprot width is >6 cm
Tree lean (TL) (for class 1-3)	Lean >15% toward target/work area AND tree has rooting problems (i.e., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)	Lean >15% toward target/work area AND tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)
Tree lean (TL) (for class 4-8 trees)	Lean >10% toward target/work area AND tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)	Lean >10% toward target/work area AND tree has rooting problems (e.g., damaged roots; shallow, compacted or wet soils; cracked or lifting root mat; steep slope)
Root Inspection (RI)	Occurrence of any of the following: root pull or lifting root mat; visible damage or decay to roots affects >50% of lateral roots	Occurrence of any of the following: root pull or lifting root mat; visible damage or decay to roots affects >50% of lateral roots.

NOTE: Structural weakness includes decay, cracking, breakage, embedded bark or cracking at single leaders, forks or multiple stem unions, presence of conks, stem scars, and woodpecker cavities. (NC)

Additional Notes to Table 3a

NOTE: A single leader secondary top is a growth leader **(live or dead)** on a tree which formed after the breakage of the original tree top.

* Perennial cankers are generally circular to lens-shaped cankers that can persist for years, and slowly expand at about the same rate as the radial growth of the affected live tree. They gradually take on a sunken appearance as tissues under the dead cambium and do not grow along with the surrounding wood. They are sometimes called ''exploding cankers."

** If identity of wood decay fungus cannot be determined (e.g., saprot or heartrot), then de fault to Dangerous rating.
OR if there are conks distributed along the bole length, then default to Dangerous rating.

*** An alternate safe work procedure for dealing with fungal conks on live trembling aspen is described in Appendix 8.

**** A list of common tree species names and their species codes is found in Appendix 9.

Nest Cavities

Nest cavities themselves (which are usually circular in shape) should **NOT** be considered a defect, but only an indication of the approximate location of internal decay. Some trees with nest cavities will have sufficient sound shell in this section of the tree, but this will vary with tree species and size, type of decay pathogen present, and other factors (e.g., other tree damage, site moisture, species of excavating bird, etc.).

Use of Cab-Guarded Machinery

Where heavy mechanized machinery is being used (e.g., for guard construction), it is recommended that only machines with manufacturer-installed cabs and associated protective cab structures be used. There should be no workers on the ground outside of these machines while they are working and within reach of surrounding trees.

Table 3B. Danger Tree Assessment Process for Level 4 Disturbance Activities

When conducting level 4 disturbance assessments, only the following four types of trees are rated safe. All other trees will be rated Dangerous for level 4 activities.

Level 4 disturbance

S = Safe
if tree is one of the following:

- class 1 tree (all species)
- class 2 trees with NO structural defects (all species) (usually wind- or snow-snapped green trees, very light fire scorching).
- class 2 **cedars** with LOW failure potential defects (refer to table at right)
- class 3 **conifers** with NO structural defects (tree recently killed by insects, climate or light intensity fire— these will have no structural damage or decay)

D = Dangerous all other trees
(fall tree; create a no-work zone;
or remove hazardous parts)

Any leave tree that is damaged during the work activity must be reassessed if work is to continue within reach of the tree.

CLASS 2 CEDAR TREES ARE SAFE IF THEY FIT THE FOLLOWING CRITERIA:

Defect Category	Western Redcedar, Yellow cedar LOW FAILURE POTENTIAL
Hazardous top (HT)	**S**econdary top (live or dead) as single leader, V-shaped fork or multiple stems <30% of tree height, with **no evidence** of decay, cracking, failure or other structural weakness
Dead limbs (DL)	Dead limbs <15 cm diameter with **no evidence** of decay, cracking or failure; OR Dead limbs (no size limit) on class 2 trees with **no evidence** of decay, cracking or failure
Split trunk (ST) (includes frost, lightning and wind-induced cracks; does not include dry checking)	Crack or split >2 cm wide extending <50% of tree diameter into stem; **no evidence** of decay in surrounding stemwood
Stem damage (SD) (includes scarring, fire damage, machine damage, animal damage or butt rot)	<50% of tree cross-sectional area damaged, scarred or fractured with **no evidence** of decay in remaining stemwood
Tree lean (TL)	Lean <30% (16°) toward target/work area **and** tree has no rooting problems
Lean — candelabra branched trees (for class 1 and 2 trees) (where candelabras are predominantly on lean side of tree)	Lean <10% (5°) toward target/work area **and** tree has no rooting problems
Root inspection	**No visible problems:** no root pull or lifting root mat. Any visible structural damage to roots only affects <25% of lateral roots (remaining roots undamaged)

Step 4

Safety Procedures

Tree assessed as SAFE ("S")	• tree safe to work around, no removal or modification necessary • mark tree as Safe (if required) • if necessary prior to further work occurring on site, reassess tree at a later time as an "indicator" tree (i.e., indication of site-specific changes to tree hazard due to changes in fire conditions).
Trees assessed as DANGEROUS ("D")	• mark tree as Dangerous (if required) • remove tree • remove dangerous part of tree (e.g., hazardous limb) • flagged no-work zone. • use of spotters (see explanation below).
Areas marked as no-work zones (NWZ)	• these areas usually contain a high density of dangerous trees • area (NWZ) boundaries must be flagged in the field • document NWZ location and flagging procedures • determine associated work activities adjacent to these areas.
Areas assessed as safe	• these areas will have had a site assessment overview and will have been visually inspected by a qualified assessor for dangerous trees before any other work activities commence in that area • all "suspect" or potentially dangerous trees will have been visually inspected and marked appropriately (see marking procedures below), and the necessary safety procedures implemented (e.g., danger trees have been removed or placed in suitable NWZs) • areas which have been assessed as safe must have their locations clearly mapped and documented, and their boundaries identified and communicated to workers who will be on site. This includes describing the marking procedures for individual trees assessed as SAFE, or the location and flagging procedures used in no-work zones established around individual trees (these NWZs will usually only be for dangerous but very high habitat value trees) • determine associated work activities adjacent to these areas.

Use of Spotters

The use of spotters to watch suspect or potentially dangerous trees in order to allow other workers to carry out fire suppression actions may be utilized as long as **this is for a short duration, there is no other practicable alternative safety procedure, and the work carried out is critical to controlling the fire**. If this practice is to be utilized, then it is essential that all workers on-site are aware of the procedures to be used and appropriate action required if a tree appears in any way to be posing a threat of injury to any workers on-site at that time. All procedures must be documented and placed on the appropriate incident file

STEP 5

DOCUMENTATION

The certified tree assessor must document the following information on the FS 502c field card, or other retrievable format. Also refer to Appendix 4 for an example of assessment documentation.

- assessor's name
- date and time of assessment
- location of assessed area or trees (where appropriate this should be mapped to scale)
- marking protocol for individual trees assessed as "Safe" or "Dangerous" (i.e., paint or flagging colour) (see Appendix 5)
- location and method of identifying no-work zones (i.e., location mapped or described, and type of boundary flagging used)
- locations of areas assessed as safe (map or describe location and include relevant boundary flagging or tree marking procedures) Include GPS coordinates (UTMS) if available
- level of disturbance/work activity the area was assessed for (i.e., road travel; workers in area using heavy equipment; tree falling; etc.)
- describe how the above information was communicated to appropriate personnel (i.e., develop a safety plan). The assessor must give a brief explanation/orientation to crews on site concerning the safety procedures associated with danger tree assessments (i.e., tree marking protocol, location of no-work zones, localities of areas assessed as safe).
- documentation must be available and retrievable (i.e., copied to fire file)
- documentation (data forms, maps of assessed area) must be forwarded to the Danger Tree Specialist once the assessment work has been completed for a given area. (i.e. on a daily basis)

See Appedndix 4 and 6 for example of documentation and mapping

MARKING OF TREES ASSESSED AS SAFE OR DANGEROUS

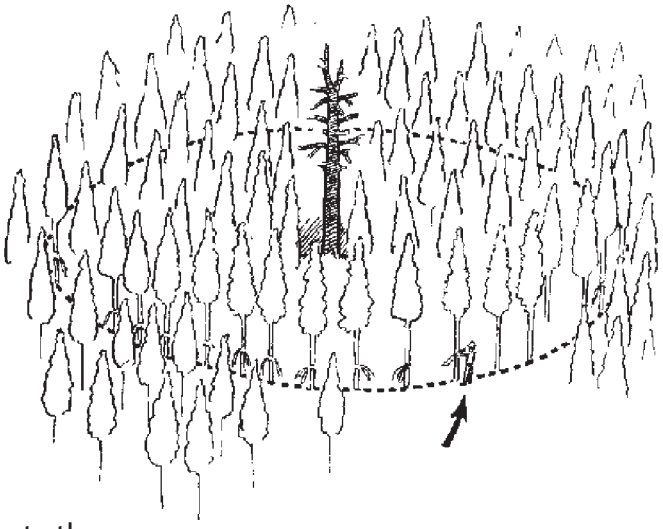
- Trees which have NO VISUAL HAZARD INDICATORS (e.g., trees with no structural damage or disease and no indication of other problems based on the site assessment overview) DO NOT have to be assessed nor marked. Only mark trees assessed as "Dangerous" or assessed as "Safe" suspect trees.
- Trees which are "suspect of hazards" and are then determined to be either "Dangerous" or "Safe" based on the site assessment overview and visual tree inspection may be marked in the field as follows:

  - mark trees determined to be Dangerous with colour flagging, or by painting a large "D" on it or other suitable marking which must be documented and communicated to workers on site. The tree must then be removed or a flagged no-work zone established around it before workers enter this area.
  - trees determined to be Safe may be marked by painting a large "S" on it or other suitable marking which must be documented and communicated to workers on site. These "SAFE" trees will include a tree that upon initial observation appears dangerous, but after assessment is found to be safe.

- If trees are spray marked either "D" or "S", this will be with fluorescent spray paint - blue or lime green recommended - at eye level on the tree with the letters large enough to be seen from 1½ tree lengths away from all directions.
- Whatever flagging or paint colours which were used must be documented.
- Refer to Appendix 5 for suggested danger tree marking procedures.

FLAGGING NO-WORK ZONES AROUND SINGLE TREES

No-work zones will generally only be installed around dangerous but high-value wildlife trees, or around trees too dangerous to fell. The assessor should ensure that all no-work zones are easily identifiable in the field, and their locations communicated to workers who may subsequently be in the area (see "Documentation" above).



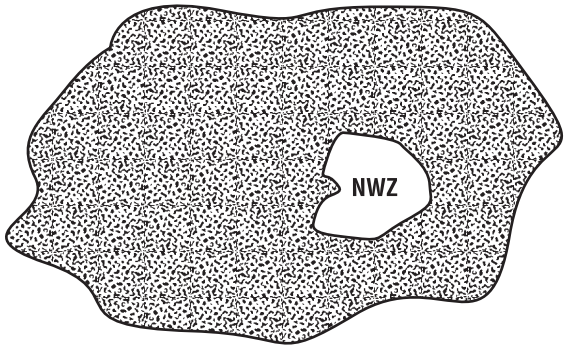
Once the no-work zone has been calculated by the assessor, the area should be flagged.

Flagging should be placed at sufficient intervals so that workers will always be able to see the NWZ boundary from any position along its perimeter. When necessary, flag the inside of the no-work zone with a second color tape to indicate the centre. This will indicate the orientation of the NWZ to workers.

For short duration and exposure fire situations (e.g., initial attack) NWZ boundaries must be clearly identified on site and documented. Flagging may not be necessary in these circumstances. No forest worker is allowed to enter the no-work zone except to remove a specific tree hazard to the work area (e.g., danger tree faller or guarded mechanical feller buncher enters zone to remove a dangerous tree along NWZ edge).

DELINEATING LARGER NO-WORK ZONE AREAS

- In wildfire burns with a high density of stems, where potentially hundreds or thousands of standing dead trees remain, it is not possible to assess each tree for potential safety hazards. In this circumstance, some areas may not be treated (e.g., mop-up activities) or will be treated at a later time or may contain numerous high-value wildlife trees. These areas should be delineated with "no-work zone" flagging or other physically identifiable boundary.
- Any dangerous trees along the edges of these no-work zones which can reach =the work area, should be removed before work activities commence.



Burned area

NWZ

No-work zone contains a high density of potentially dangerous trees or high-value wildlife trees.

- No forest worker is allowed to enter the no-work zone except to remove a specific tree hazard to the work area (e.g., danger tree faller or guarded mechanical feller buncher enters zone to remove a dangerous tree along NWZ edge).
- The locations of no-work zones and no-work zone boundaries which have been flagged on the ground MUST be communicated to any workers who may subsequently be in the area.
- See documentation requirements on page 19.

GUIDELINES FOR KEEPING OR REMOVING DANGER TREES

- Fell all danger trees in main part of work area, and in and along access and evacuation trails. This includes trees marked "D" and any other trees which the faller (or machine operator) finds unsafe to the work area as a result of the falling process.
- Use qualified fallers.
- Use explosives or appropriate machinery, where necessary, to fell danger trees too dangerous for hand felling.
- If danger trees are too dangerous to fell safely, leave a no-work zone of appropriate size and shape around them.
- If felling danger trees will create excessive fuel loading and create fire control difficulties, assess if the area can be left and declared a no-work zone. This procedure must be discussed and approved with supervisor.
- Trees with high failure potential around work perimeters can be left provided they lean sufficiently away from the present work area and not into an adjacent work area.
- Remove danger trees above and below roads if they pose a potential hazard to road activity.
- Where possible, dangerous trees can be removed with adequately guarded machinery.

WORK PROCEDURES FOR ASSESSED AREAS

Once an area has been assessed, there is still work required before crews can be allowed to enter:

- Assuming that the assessor has found dangerous trees, a qualified danger tree faller must now cover the area. The faller must remove all trees marked as dangerous, except those that are retained within No Work Zones.
- The faller must be supplied with a map showing the relative location and numbers of trees to be felled. This map and numbers will ensure the faller does not miss any trees.
- The areas that are completed (assessed/felled/NWZs) must be included in the ongoing documentation for both large and small fires.
- The procedures for reassessment of areas/trees must also be followed depending on site conditions.

> Also refer to Appendix 7 (Ministry of Forests Protection Branch Occupational Safe Work Standard #1) for additional information on dangerous tree assessment and related safety procedures.

REASSESSMENT OF TREES

- Reassessment of previously assessed trees should occur before workers enter the area:
  - if BUI values are above established thresholds AND there is continuous active burning within the area of work
  - if more than 3 days with continuous burning have passed since the last assessment
  - if work activity in the area creates more disturbance than what the area was originally assessed for
- If an area is reassessed, any tree previously marked as safe, but which after some time is now determined to be dangerous (e.g., because of a smoldering fire burning the roots), shall then have an "X" sprayed over the "S" and be marked with a "D." It should then be removed or a no-work zone established around it.
- Assessments in green (unburned) areas outside of the active fire area need only be done once for the appropriate level of disturbance (work activity)

NO-WORK ZONES (NWZ)

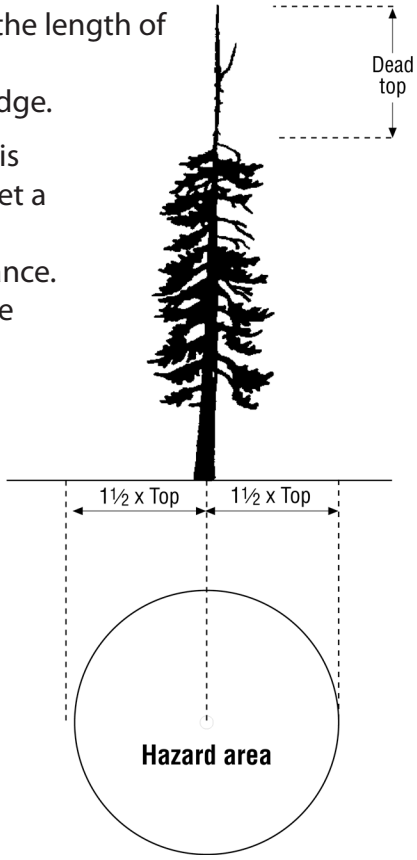
- The purpose of NWZs is to keep workers out of this area. Only the perimeter of the NWZ, if it is adjacent to an active work area, needs to be assessed for additional tree hazards.
- When the decision has been made to retain a tree that has been assessed as dangerous to workers, a no-work zone must be designated. This includes high-value wildlife trees which have been assessed as dangerous. The no-work zone must include all the area on the ground that could be reached by any dislodged portion of the tree.
- No-work zones will take into account the nature of the hazard and the lean of the tree.
- On steep ground, the no-work zone will be extended downhill to protect workers.
- A kick-back area should be included for semicircular no-work zones. The size and shape of this area is determined by tree lean, condition and form (branching).

Note: The size of NWZs is 1.5 times the defect length. This length can be modified (larger or smaller) depending on the site-specificconditions, such as slope or surrounding tree size and condition. The NWZ must be big enough to accommodate the hazard.

The following are the most common types of no-work zones:

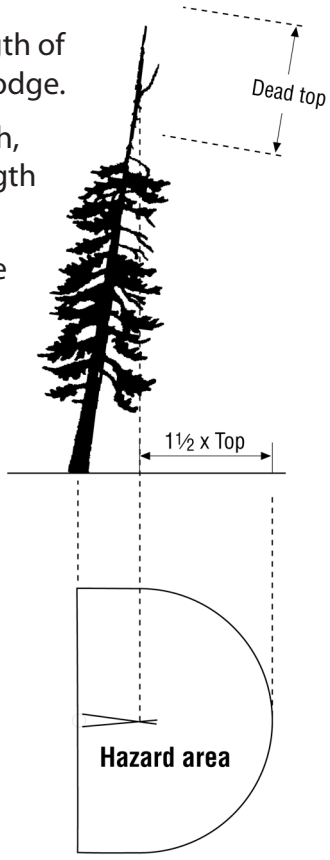
A. Sound tree, no lean, hazardous top, flat ground

1. Determine the length of top that might dislodge.
2. Add ½ of this length, to get a 1½ top length distance. This distance is the radius of the no-work zone.



B. Sound tree with lean, hazardous top, flat ground

1. Determine the length of top that might dislodge.
2. Add ½ of this length, to get a 1½ top length distance.
3. Determine from the lean how far from the base of the tree the top might land.

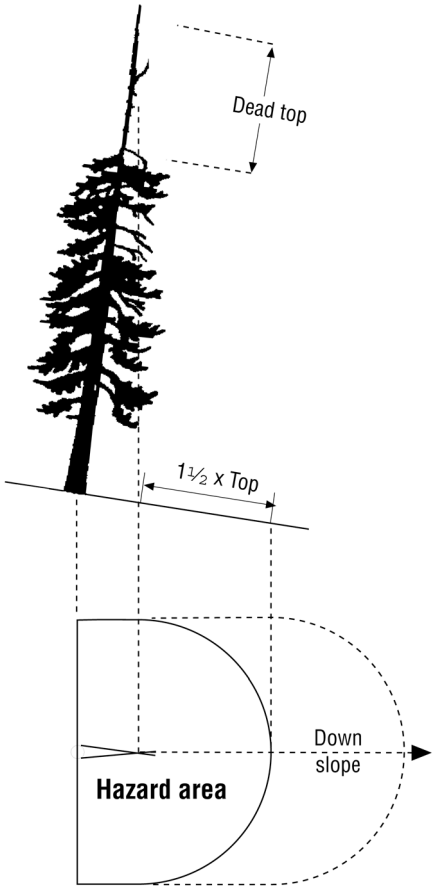


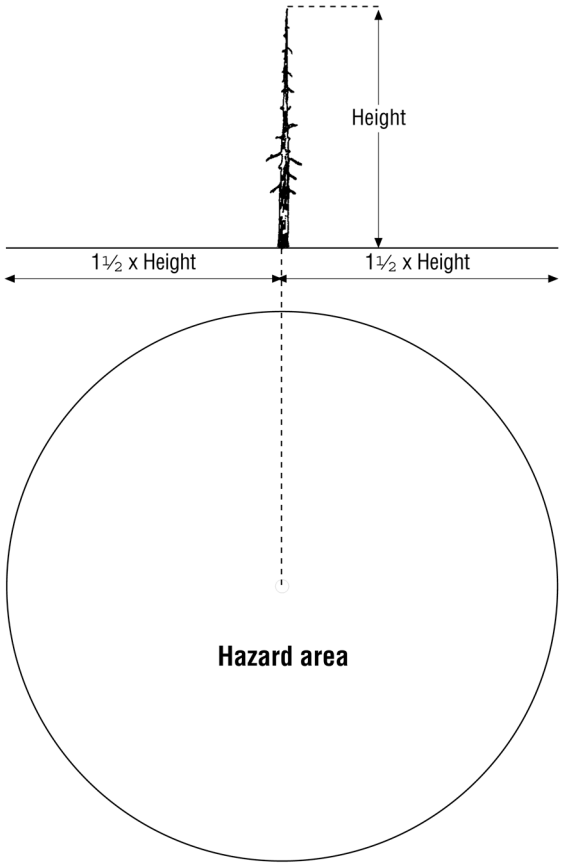
C. Sound tree with lean, hazardous top, on slope

1. Determine the length of top that might dislodge.
2. Add ½ of this length, to get a 1½ top length distance (horizontal distance from tree).
3. From the lean, determine how far from the base of the tree the top might land.
4. On slopes >30%, extend the no-work zone downslope. This distance must be determined on a site-specific basis.

D. Unsound or hazardous tree, no lean, flat ground

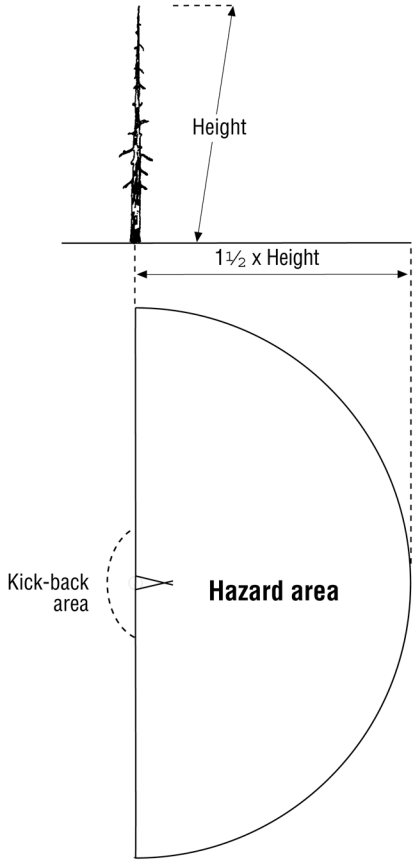
1. Measure the height of the tree.
2. The no-work zone is a circle around the tree, with a radius of up to 1½ times the height.





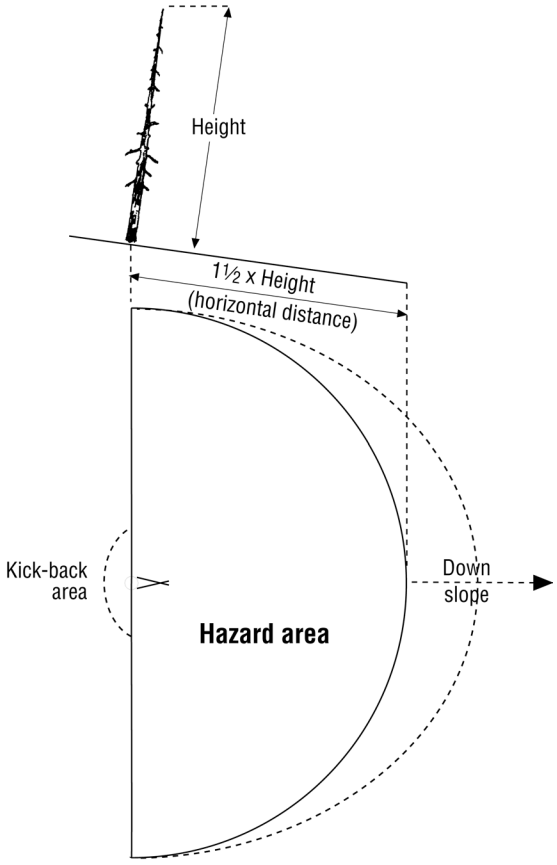
E. Unsound or hazardous tree, with lean, flat ground

1. Measure the height of the tree.
2. Add ½ of this length to get a 1½ tree length no-work zone.



F. Unsound or hazardous tree, with lean, on slope

1. Measure the height of the tree.
2. The no-work zone is a half-circle extending 90° on each side of the lean, with a radius of 1½ times the height of the tree.
3. On slopes >30%, extend the no-work zone downslope. This distance must be determined on a site-specific basis.
4. Trees on a >30% slope need to be carefully assessed for their wildlife tree value, as the no-work zone will take up a large part of the treatment area.

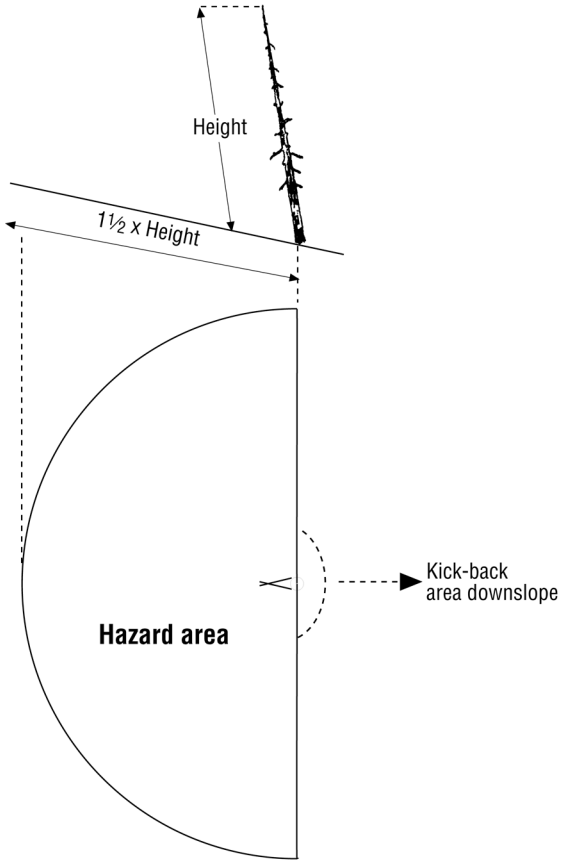


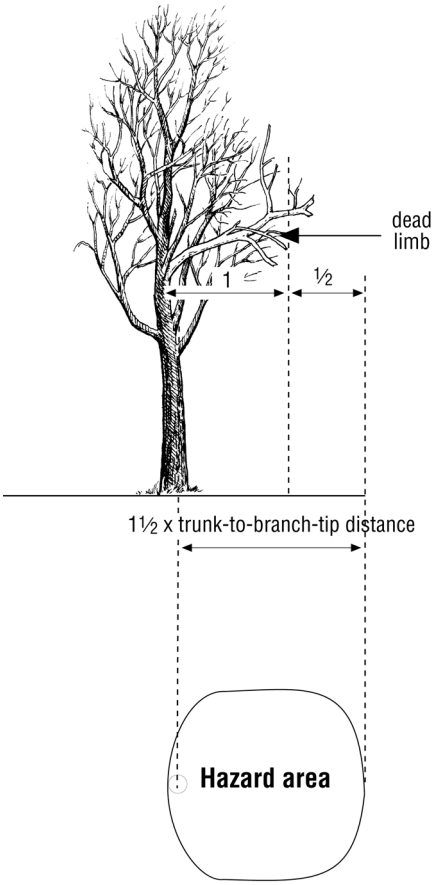
5. Where the tree slopes uphill, the no-work zone should be 1½ times the tree height going upslope.
6. Where the tree slopes uphill, depending on the slope of the hill, a kick-back area will be added on a site-specific basis.

G. Deciduous, sound tree, no lean, defective branches

1. Determine the length of defective limbs that might dislodge.
2. Add ½ of this length to get a 1½ limb length distance.

The 1½ limb length distance must be calculated for all defective limbs on the tree.





Dangerous Trees Along Roadsides

Potentially dangerous trees along and within reach of active roads should be assessed according to the appropriate level of disturbance (i.e., level 1 for light vehicle use and level 2 for heavy vehicle use).

Other factors to consider are:

- amount of lean toward road
- distance from road
- slope toward road
- rooting condition
- any hazardous tree defects (e.g., large dead top) that can reach the road.

Refer to Tables 3 and 3a in order to determine overall danger rating for trees along roadsides.

Large Fire Operations

- Because of the size and relative logistics of fighting large fires, danger tree assessments in these scenarios require careful planning, coordination and communication.
- The requirement for Wildlife Danger Tree assessments is now an integral part of fire operations. Danger tree assessors must be aware of the operations objectives in order to do the most effective job of tree assessment.
- In order to keep crews productive, it can require several assessors in the field each day to ensure enough area is assessed and danger trees removed ahead of the fire crews.
- Large fire operations and documentation require that a seasoned/experienced assessor be in charge of the overall operation (i.e., a "Danger Tree Specialist").

Danger Tree Specialist

- The "Danger Tree Specialist" will be responsible for ensuring that all assessors working on the project are completing assessments to the required standard. If able, he/she should spend time with each assessor to ensure continuity and consistency of field assessments, documentation and implementation of appropriate safety procedures.
- The "Danger Trees Specialist" will work in conjunction with the Planning Section to ensure that the completion, documentation, mapping and communication of ongoingassessments are produced in a timely manner.
- On a daily basis, the "Danger Tree Specialist" must produce a summary of all areas assessed and pass this information on to the Planning Section.
- The assessment of Danger Trees must be part of the project safety plan.

NOTES

GLOSSARY

biogeoclimatic subzone	A representative class of ecosystem under the influence of the same regional climate. It is associated with a distinct climax (or near-climax) group of plants. For example, the Sub-Boreal Spruce Moist Cool (SBSmk) subzone is characterized by a hybrid spruce-huckleberry-highbush cranberry plant association.
blind conk	Sometimes called swollen knots; are significant indicators of decay. They typically appear as pronounced swellings around knots, and are the result of the tree attempting to heal over an old conk. Often the affected knot and new conk is partially covered by sound wood, which is implied by the term "blind" conk.
build up index (BUI)	A numerical rating of the total amount of fuel available for combustion that combines duff moisture code (DMC) and drought code (DC).
canker	Dead portion of the cambium and bark on a branch or the main stem. Cankers can be raised or sunken and are sometimes surrounded by a raised lip of tissue.
certified assessor	A person who has successfully passed one or more of the "Wildlife/ Danger Tree Assessor's Course" modules sponsored by the Wildlife Tree Committee of British Columbia since November 1998, and who holds a valid certificate which signifies this designation.
chlorotic	Yellowing of normally green foliage tissue due to lack of chlorophyll. Usually indicates poor growing conditions or some sort of tree stress (e.g., root disease).
coarse woody debris	Fallen trees and parts of trees on the forest floor.
conk	The fruiting body of a wood decay fungus; bracket-like or reclined or flat on the host or ground, but not a mushroom. Usually woody or leathery in texture.
danger tree	A live or dead tree whose trunk, root system or branches have deteriorated or have been damaged so as to be a potential danger to workers in the vicinity.
drought code (DC)	A numerical rating of the average moisture content of deep, compact, organic layers. This code indicates seasonal drought effects on forest fuels, and the amount of smoldering in deep duff layers and large logs.
duff moisture code (DMC)	Numerical rating of the average moisture content of loosely compacted organic layers of moderate depth. This code indicates fuel consumption in moderate duff layers and medium-sized woody material.
embedded bark	Bark that is pushed inside a developing branch or stem crotch, causing visible cracking and a weakened structure.

fire intensity	The rate of heat energy release per unit time per unit length of fire front. Frontal fire intensity is a major determinant of certain fire effects and difficulty of control.
fire perimeter	The entire outer edge or boundary of a fire.
forest activity	Any activity that requires workers to be in the field where they may be in the vicinity of living or dead trees.
live cull	A live tree with some visible external defect such as a broken, dead, or forked top, split or scarred trunk, or fungal conks.
live tree	A living, growing tree with good vigor, no structural problems, and no visible signs of disease or decay.
no-work zone (NWZ)	A flagged area on the ground (must be indicated on site map) where no worker shall enter except to remove hazards. Workers will be informed about no-work zones prior to commencement of work on site. No-work zones are usually 1½ times the length of the tree defect, but can be modified larger or smaller depending on site-specific conditions such as slope or size of adjacent standing timber.
pathogen	A living organism that incites disease in a host.
qualified person	A person experienced in the specified work activity and who, by reason of education, training, experience or a combination thereof, is able to recognize and evaluate hazards associated with trees, with due regard for the anticipated work activity and possible disturbance of the tree(s).
resinosis	An abnormal flow of resin or pitch from conifers, often from the base or lower stem. Resinosis can indicate the presence of tree pathogens or damage.
rust	A disease caused by infection with one of the rust fungi, often producing brown to red spores at some point during the infection.
scaffold branching	Multiple stem and branch attachments characteristic of some deciduous trees. They consist of a system of co-dominant branches and lack a central leader.
secondary top	A growth leader on a tree which usually forms after the breakage or die-back of the original tree top. Secondary tops (live or dead) can occur as single leaders, forks or multiple tops. They may be hazardous, especially if there is evidence of decay or cracking at the point of the original top breakage.
sloughing	Starting to separate and eventually falling or breaking away from the tree trunk.
spike top	The pointed dead tip of a living tree from which most of the needles and branches have fallen off. The length of this "spike-shaped" dead tip is variable and can sometimes be up to 1/3 or more of the tree height for species such as cedars. This top dieback may be caused by

	insects, disease, or climatic factors.
suspect tree	Suspect trees are any live or dead tree with a visible defect which could cause failure of the tree, either whole or in part, for the applicable level of disturbance. Suspect trees require a visual inspection as well as a site assessment by a qualified person or a certified danger tree assessor, in order to determine whether they are dangerous for a particular level of disturbance/type of work activity.
veteran tree	A tree which is significantly older than the trees of the main canopy (usually 150 years of age or greater). The tree may have survived one or more fires as evidenced by fire scars. Veteran trees are usually isolated in distribution and often extend well above the main tree canopy. Because of their large size, they usually provide valuable wildlife tree habitat.
wildlife tree	A standing dead or live tree with special characteristics that provide valuable habitat for the conservation or enhancement of wildlife.
Wildlife Tree Committee	A committee organized in 1985 to find ways of maintaining wildlife tree habitat in forestry activities without endangering the safety of forest workers.
work area	Includes area of actual fire fighting within the fire perimeter and adjacent areas by 1½ or more tree lengths, as well as access roads, evacuation routes, helicopter landing areas, rest areas, staging areas, marshalling points, and incident facilities.
work place	Includes all locations where a worker is or is likely to be engaged in work activities. In the case of forest workers, this includes locations where they are exposed to trees.