

## **Dangerous Tree Management in Preparation for Silviculture Activities**

### **Background**

The standard of care for the management of dangerous trees (DT) in forestry operations of British Columbia is outlined in the Wildlife/Danger Tree Assessors Course (WDTAC). The WDTAC is endorsed by WorkSafeBC (the Workers' Compensation Board of BC) and was developed to promote the conservation of wildlife trees and associated stand-level biodiversity in a safe and operationally efficient manner. The harvesting and silviculture module of the WDTAC details the specific assessment criteria and damage thresholds necessary to determine whether tree defects are safe or dangerous for given work activities, and recommends the appropriate safe work procedures.

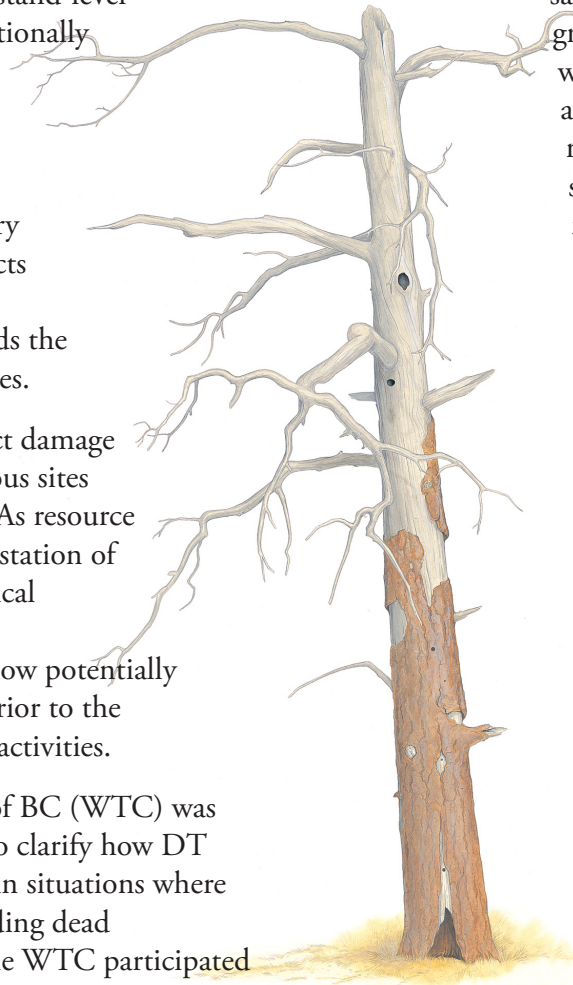
The effects of wildfire and insect damage have recently impacted numerous sites throughout British Columbia. As resource managers prepare for the reforestation of these impacted sites it is of critical importance that planners and contractors carefully consider how potentially DT are going to be managed prior to the commencement of silviculture activities.

The Wildlife Tree Committee of BC (WTC) was asked by various stakeholders to clarify how DT should be managed, especially in situations where there are high densities of standing dead and dying trees. Members of the WTC participated in a field review of a number of sites in the Kamloops and Princeton areas. The following information outlines appropriate points of control that are needed to promote a safe and effective reforestation strategy.

### **Points of Control for Worksite Safety**

Foundational to effective and safe implementation of forestry projects are a clear understanding of the treatment objectives, the coordination of hazard planning, and the establishment of a safety management system. A framework for the process can be presented in a “points of control” matrix for worker safety. It is a linkage of all participant groups, from landowner to forestry worker, who are responsible for the activities at the worksite. Specific to reforestation of high stem density sites, a “points of control” matrix is outlined in table 1. This matrix links all the various groups to a set of control tasks that must be integrated and coordinated. The control tasks include the setting of management objectives, submitting a notice of project forestry to WorkSafeBC, assessing the capacity of workforce tiers (contractors, assessors, fallers, planters, equipment operators), assessment of worksite hazards, and opportunities for seeking consultation.

The process for mitigating the hazards associated with DT can seem overwhelming amidst a landscape of dead and dying trees. However, with a commitment to develop and follow a “points of control” process, managers can safely manage DT and implement successful silviculture projects.



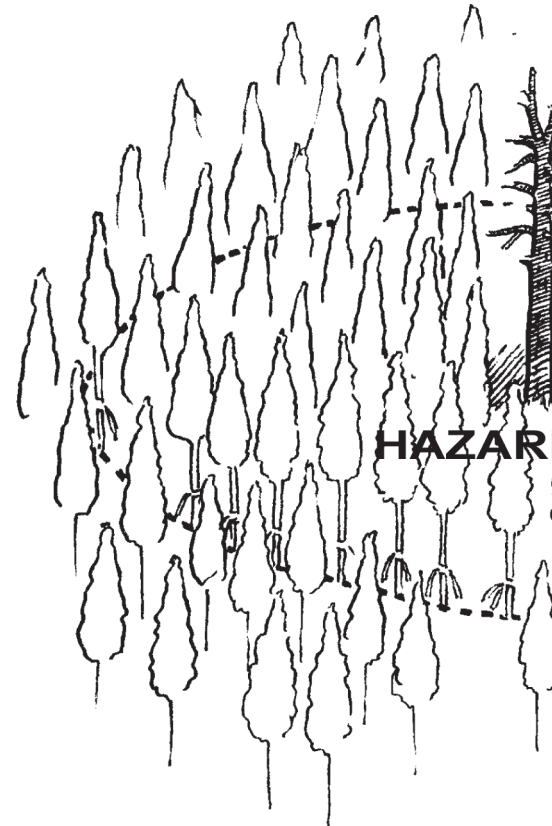
## Dangerous Tree Assessment and Planning

Before planners select a mitigation plan for dangerous trees they must recognize the fact that hand falling is one of the most hazardous occupations in BC.

To safely fall DT requires considerable training, experience and supervision. It is imperative that managers, supervisors, and fallers work together to reduce the risks associated with managing DT. This process will require a shift in the worker's mind set from "CAN the DT be felled?" (risk acceptance) to one of "SHOULD the DT be felled?" (risk control). Managers can help to minimize the amount of hand falling by implementing the following during the assessment and planning phase of reforestation projects:

1. Conduct a thorough site assessment to stratify the work site into treatment units of similar safety and operational needs (e.g., high/low density of dangerous trees, high/low levels of natural regeneration, high/low priority treatment areas, etc). Consideration should be given to the following stand and site factors:
  - a. Stand history and condition (disturbance history, time-since-death, age and density of the stand, tree species composition, etc),
  - b. Common weather patterns and conditions (snow, fog, ice, flooding, drought),
  - c. Windthrow potential,
  - d. Tree symptoms (crown thinning, basal resin flows, root disease, tree lean, conks, etc.), and
  - e. Tree failure patterns and causes;
2. Consider the acceptability of natural regeneration (usually abundant on burned areas) amidst multiple management objectives (access plans, fuel loading and abatement strategies, wildlife needs, recreation and visual quality objectives, future stand tending plans, forest health issues, etc);
3. Use experienced and qualified DT assessors that can assess to the proper assessment criteria for Level of Disturbance (LOD) 1. Inexperienced assessors may default trees into a dangerous rating because of insufficient knowledge and skill to correctly apply the LOD-1 hazard assessment criteria. It is also recommended that assessment be done as a separate phase and prior to treatment for some of the following reasons:

- a. Combined faller-assessor roles can distract the faller from devoting their full concentration when falling DT,
  - b. The assessment phase provides time to develop or consider alternatives to hand falling (e.g. use of NWZ or modify treatment plans),
  - c. Faller-assessors tend to treat more trees than required because of the "if in doubt, cut it out" factor, and
  - d. Planners are better able to anticipate and control slash loading (excessive slash from over-treating can reduce mobility to planters and increases eye-level hazards for planters); and
4. Integrate the use of no-work zones to reduce the reliance on hand falling, or to consider alternatives to hand falling (machine assist, explosives, mechanized falling, land clearing with appropriately guarded equipment).



## Managing Dangerous Tree Mitigation

Once the decision is made to hand fall a DT it is imperative that management, supervisors and fallers have a clear understanding of how the LOD for each treatment phase is integrated into the safety plans. According to the WDTAC, the failure potential for tree defects varies in relation to the LOD. Tree planting is considered to be a LOD-1 activity while tree falling is a LOD-3 activity. A tree with defects dangerous for LOD-3 activities may be safe for LOD-1 activities. Therefore, the following safety controls

must be followed for hand falling a tree identified as dangerous for LOD-1 reforestation activities:

1. Use fallers that are qualified and certified to a standard acceptable to the Board and are experienced in falling dangerous trees for the timber type and terrain conditions of the site;
2. Provide supervision by a qualified person during the falling operation;
3. Ensure the faller assesses the immediate surroundings around the dangerous tree and

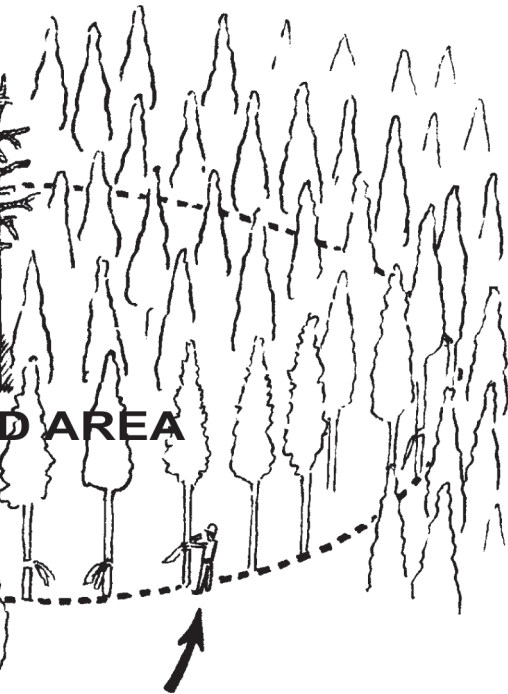
then removes any hazards that will prevent the safe felling of the identified dangerous tree. Some of the hazards the faller must consider include:

- a. Ground debris,
- b. Overhead hazards and tree lean,
- c. Compromised escape routes,
- d. Loose rock, and
- e. Presence of trees that are dangerous for the activity of falling (trees that meet the assessment criteria of dangerous for LOD-3);

4. Ensure the faller carefully determines a falling plan for each DT, giving consideration to the hazard area (a spherical area) surrounding the identified LOD-1 DT:
  - a. The hazard area around the DT will be defined by the size and density of surrounding trees but has traditionally been considered 1.5 tree lengths,
  - b. The faller must decide whether the identified DT can be felled safely into an opening without brushing other standing trees, and
  - c. The site treatment plan must provide the faller with flexibility to overcome falling difficulties (opportunity to create an adequate opening,

or remove trees within the hazard area that are rated as dangerous for LOD-3 and may put the faller at risk when attempting to fall the identified DT);

5. Ensure the treatment actions appropriately manage to the appropriate LOD:
  - a. The LOD for the hazard area of the identified DT is temporarily LOD-3. The falling plan for this DT must consider the presence of trees having dangerous defects according to LOD-3 criteria,
  - b. Once the faller has safely removed the identified LOD-1 DT the falling task is over within the hazard area of this DT and the faller moves to the next identified DT,
  - c. Fallers should not continue to “sanitize” the hazard area of trees that might be dangerous for LOD-3 (but Safe for LOD-1) simply because there was a momentary falling activity (i.e., the cutting of one dangerous tree),
  - d. If the density of identified LOD-1 DT are high and the hazard areas overlap continuously from DT to DT, then the treatment at the worksite must be upgraded to a LOD-3 treatment, and
  - e. In extremely high density stands where openings are few the faller must review trees within the hazard area according to the LOD-4 criteria and adjust the falling plan around each DT accordingly.



## Communication

It is important throughout the site management process that each participant group documents its activities and communicates in a timely manner to the participant groups identified in the safety management system (see the points of control matrix). Where uncertainty exists, these items need to be reviewed on-site and clarified before proceeding. Opportunities for continuous improvement can also be better realized if there is regular communication amongst the participant groups.

For further information on how to integrate DT management to your work plans consult with your local WorkSafeBC safety officer or contact the WTC at: [www.for.gov.bc.ca/hfp/values/wildlife/WLT/contacts.htm](http://www.for.gov.bc.ca/hfp/values/wildlife/WLT/contacts.htm).

**Table 1: Danger tree assessment “points of control” for high-density stem count areas**

| Group (s)                                                    | Management Objectives and Planning                                                                                                                                                                         | Due Diligence Documentation                                                                                                                                                                                                         | Assessment of Capacity                                                                                                                                                                                 | Hazard Management                                                                                      | No Work Zones (NWZ)                                                                                                | Access Route Hazards                                                                                                                          | Consultations                                                                             |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Owner</b>                                                 | Does the area require planting? What are the treatment objectives? Strategy shift from “can it be done” to “should it be done”.                                                                            | Signed contracts with emphasis on safety systems in place and working, meetings, site visits, Notice of Project-Forestry (NOPF), etc.                                                                                               | Is the PC capable of doing the job? (confirm past experience)                                                                                                                                          | Pass on all known or ought to be known hazards to the next level.                                      | Assessor's role in a continuum of land use plans.                                                                  | Pass on all known or ought to be known hazards to the next level.                                                                             | With PC, Project Recipient, WorkSafeBC and/or Wildlife Tree Committee.                    |
| <b>Prime Contractor (PC)</b>                                 | Treatment objectives, hazard planning, safety management system in place to ensure coordination of and compliance by sub-contractors.                                                                      | Signed agreement acknowledging control for a specific time and area; NOPF; all meetings, site safety plan, site visits, etc..                                                                                                       | Is the contractor capable of taking on the job functions? (confirm past experience).                                                                                                                   | Pass on all known or ought to be known hazards to the next level. Mitigate where responsible.          | Assessor's function is clearly communicated.                                                                       | Access safety coordination, use proper road protocol, ensure access roads are safe to use. (Presence of DT, x-ditches, cut/fill slopes, etc). | With Owner, Project Recipient, WorkSafeBC and/or Wildlife Tree Committee.                 |
| <b>Project Recipient (contract or permit/license holder)</b> | Planning for the project, resources, locations, work sequencing, etc. Meetings with supervisor and workers, pre-work orientations.                                                                         | Signed contracts with emphasis on safety systems in place and working; meetings, site visits, NOPF, site safety plan, etc.                                                                                                          | Are the supervisor and/or the faller/ operators and planters qualified and capable of doing the job?                                                                                                   | Pass on all known or ought to be known hazards to the next level. Mitigate or eliminate known hazards. | Ensure Assessors are aware of expectations.                                                                        | Ensure access roads are safe for travel, use proper road protocol (Presence of DT, x-ditches, cut/fill slopes, etc).                          | With Owner, PC, Supervisor, Assessor, Workers, WorkSafeBC and/or Wildlife Tree Committee. |
| <b>Supervisor</b>                                            | Daily for the project, resources, locations, work sequencing, etc. Meetings with workers (pre-work orientations, crew talks, etc.).                                                                        | Safety meetings (initial and on-going) with all crews, site inspections, incident investigations, site safety plan, daily safety contacts.                                                                                          | Are assessors and fallers qualified and able to perform their job functions? Site inspections conducted?                                                                                               | Pass on all known or ought to be known hazards to the next level. Mitigate or eliminate known hazards. | Ensure Assessors are aware of expectations.                                                                        | Report hazards on access roads to all and use proper road protocol.                                                                           | With PC, Assessor, Workers, WorkSafeBC and/or Wildlife Tree Committee.                    |
| <b>Tree Assessor</b>                                         | Site overview with treatment objectives, 5 step process from WDTC.                                                                                                                                         | Valid and current DT certification; Site Assessment Overview Summary; Assessment LOD and criteria; map and field marking procedures; assessment cards; mitigation and site safety plan.                                             | Will the workers be able to conduct the work safely according to the assessments?                                                                                                                      | Pass on all known or ought to be known hazards to the next level.                                      | Areas meeting the NWZ criteria will be identified appropriately. Should the faller try to fall or is a NWZ safest? | Report hazards on access roads to person in charge and use proper road protocol.                                                              | With Recipient, Supervisor, WorkSafeBC and/or Wildlife Tree Committee.                    |
| <b>Faller</b>                                                | Qualified and certified fallers meet with Supervisor to review objectives (Possess the knowledge, skills, abilities and experience to fall DT) Are alternatives available (blasting, machine assist, etc). | Site safety plan; Valid and current DT Certification; Faller's certification and logbook; record of DT mitigation and NWZ; Pre-work and tailgate reviews; Quality Assurance reviews; DT Blaster certificate and Blaster's Log Book. | Each situation as it appears in the work plan and on the ground must consider all aspects of the BC faller standard.                                                                                   | Recognize, evaluate and control the hazards on-site.                                                   | Keep out of NWZ and/or when a situation is beyond ability; find assistance and report to person in charge.         | Report hazards on access roads to person in charge and use proper road protocol. Use traffic control when falling near roads.                 | With Recipient, Supervisor, Assessor, WorkSafeBC and/or Wildlife Tree Committee.          |
| <b>Machine Operators</b>                                     | Qualified and Experienced Operators meet with Supervisor or recipient to review objectives. Does the treatment produce the desired results and within safety regulations?                                  | Site safety plan; DT awareness training; safe work procedures; record of DT mitigation & NWZ; Prework and tailgate reviews, Quality Assurance reviews.                                                                              | Each situation as it appears in the work plan and on the ground considering all aspects of: experience, slope restrictions, machine guarding, manufacturer's written specifications, regulations, etc. | Recognize, evaluate and control the hazards on-site.                                                   | Keep out of NWZ and/or when a situation is beyond ability find assistance and report to person in charge.          | Report hazards on access roads to person in charge and use proper road protocol. Use traffic control when tree may fall near roads.           | With Recipient, Supervisor, Assessor, Workers, WorkSafeBC and/or Wildlife Tree Committee. |
| <b>Tree Planters</b>                                         | Initial meeting with Supervisor or Recipient to review objectives. Can the treatment be safely implemented?                                                                                                | Site Safety plans (work restrictions, evacuation routes); QP training or DT certification; record of NWZ installations; Pre-work and tailgate safety reviews; safety inspections and incident reviews.                              | Each situation as it appears in the work plan and on the ground; consider escape routes and safety zones.                                                                                              | Recognize, evaluate and know when to evacuate due to hazards.                                          | Keep out of NWZ and/or when a situation is beyond ability find assistance and report to person in charge.          | Report hazards on access roads to person in charge and use proper road protocol.                                                              | With Recipient, Supervisor, Assessor, Workers, WorkSafeBC and/or Wildlife Tree Committee. |