

## **Section Two**

### **Working Safely in Partial Cuttings**



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## Carrying Out Logging Operations

The forest development plan and the silviculture prescription have been approved and a cutting permit issued. The approved plans have been reviewed and copies given to the licensee and/or contractor. The logging supervisor and his workers are preparing to carry out the logging.

Before operations begin, everyone involved must be reminded that there are unique hazards to working in standing timber. Workers must be alert at all times to the hazards around them. Each worker will be responsible for making decisions on the ground and communicating them to his/her supervisor and fellow-workers.

Similarly, supervisors must clearly communicate to workers the plan/silviculture prescription objectives and operational standards required to successfully implement logging operations.

### **SAFETY FIRST!**

- Step 1: Always read and understand your plans and maps.
- Step 2: Always match your plan and maps to what you find on the ground, and then check that you can safely do the work.
- Step 3: If you cannot safely follow the plan and map, stop and ask.
- Step 4: Know your abilities. Ask if you are not sure.

## General Procedures

- To ensure that safety is maintained during partial cutting, planners, logging supervisors and workers must be aware of:
  - ~ potential harvesting restrictions and operational considerations such as excessive soil moisture, extreme weather conditions and difficult terrain
  - ~ previously unidentified resource features (e.g., discovery of a raptor nest in a danger tree that will require establishment of a no-work zone)
  - ~ the particular hazards unique to the type of partial cutting being done.
- Logging supervisors must establish a work plan to ensure that felling and yarding operations are kept separate, and that the mancheck/buddy system is not compromised by equipment and noise.
- Logging supervisors should establish regular pre-work meetings to provide an opportunity to discuss potential hazards (broken tops, yarding and skidding conditions, etc.) with the logging crew. Tailgate sessions are particularly useful to review plans, clear up problems, and review job safety breakdowns.
- Logging supervisors must establish a shutdown policy for fog, wind, rain, soil disturbance and mechanical problems, and ensure this policy is followed: wind concerns, for example, are crucial in partial cutting because of the potential for windthrown trees and falling limbs.

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- Logging supervisors must:
    - ~ ensure that the work area is thoroughly inspected for windthrow hazards after significant storm events, especially after weekend storms
    - ~ remove such hazards before operations continue.
  - Logging supervisors will:
    - ~ assess the field site for hazardous conditions
    - ~ stop any unsafe work and get the issue resolved
    - ~ maintain communication with the planner throughout the project to anticipate and resolve problems.
  - Logging supervisors should set up and monitor the “two tree-length” rule, especially where there is reduced visibility between equipment operators and other workers.
  - Logging supervisors and workers are responsible for ensuring that landings are not overfilled and are used within design specifications.
  - Logging supervisors should ensure that:
    - ~ well-marked walk-off routes are noted on all maps, known to workers, and clearly marked at the site to allow evacuation of injured personnel
    - ~ all danger trees within reach of work areas have been removed.
  - Workers must be aware that visibility is obscured when working under a partial canopy and:
    - ~ wear high-visibility vests at all times
    - ~ make frequent sound checks or visual checks
    - ~ be familiar with the felling plan on a daily basis
    - ~ maintain at least two tree lengths between fallers, and between fallers and other workers.



*All danger trees must be removed progressively.*

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## Weather

### Wind

Some types of partial cutting expose the interior of the stand to wind, causing non-windfirm trees (especially shallow-rooted species on thin or saturated soils) to be blown down more easily.

- The logging supervisor should establish windspeed shutdown criteria that take into account:
  - ~ seasonal wind patterns and the exposure of the site
  - ~ tree species—some have more stable rooting habits than others
  - ~ the quality and health of the stand. Unhealthy trees tend to have hidden hazards (e.g., unstable rooting systems of trees growing on windfalls, weakened roots and stems of diseased trees)
  - ~ shallow and/or poorly-drained soils.
- Workers should locate access/exit trails to control exposure to blowdown risks during winds in heavily-thinned partial cuts.



*Locate escape trails in partial-cut work areas to avoid worker exposure to blowdown risk during high winds.*

### Snow and Frozen Timber

- The logging supervisor must establish shutdown criteria for heavy, wet snow and extreme cold conditions.
- Workers must be aware of the danger of:
  - ~ snow-laden treetops and brittle branches breaking off more easily
  - ~ heavy clumps of snow falling off trees
  - ~ whiteouts that may occur from felling snow-laden trees, and obscure overhead hazards
  - ~ impaired visibility resulting from heavy snowfall
  - ~ the weight of snow on snags causing them to fall out of the standing timber into the active work areas
  - ~ the risk of tripping when walking through felled and bucked timber covered with snow
  - ~ not being able to see snow-covered bucked logs which may up-end or swing when yarded
  - ~ logs and equipment unexpectedly sliding on ice or snow.

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- Fallers must:
    - ~ avoid working where snow-laden canopies make felling unduly hazardous
    - ~ watch for:
      - direction of lean caused by additional weight of snow —for example, saplings may fall in the direction of the weight, regardless of the undercut and holding wood
      - snow-laden branches breaking off without warning.
    - ~ be aware that:
      - dry snow accumulation may impede the ability to detect widowmakers and loose limbs that could be thrown back during the felling process
      - a cloud of dry snow occurs as the tree is falling, creating a whiteout that will last several seconds and obscuring overhead hazards
      - sprung limbs, pivot points, loose logs and depressions in the ground may not be detected when logs are bucked in snow
      - felled and bucked trees can slide unpredictably in snow.



*Whiteouts from felling snow-laden trees may prevent the faller from seeing heavy clumps of snow or broken branches dislodged from the crown.*

- To avoid the danger of the wedge kicking out during the felling of frozen timber, the faller should insert a second wedge or use wedges that are appropriate for the time of year (some wedges stick better than others in frozen wood).
- Fallers must establish well-made “getaway trails” to cope with decreased mobility in snow.
- Fallers must establish a special safe work plan where snow shovellers are employed:
  - ~ Two “getaway trails” must be dug out from the trunk of the tree if the snow level is more than 40 cm deep
  - ~ Shovellers must maintain a minimum two-tree-length distance from the felling activity
  - ~ Shovellers must never work downslope of a faller in the hazard area
  - ~ Snow clearing must be done in a manner that allows the faller full access to the tree.

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## Excessive Rainfall

Excessive rainfall may increase the risk of debris torrents and landslides. Many coastal operations have unstable terrain or the potential for debris torrents on slopes above work areas.

- Workers should be familiar with the local history of landslides on steep, water-saturated slopes.
- The logging supervisor must shut down the operation when there is a danger of mud and rock slides or debris torrents.
- Workers must be alert to the dangers of mud/rock slides and debris torrents, and learn to recognize the early warning signs.

When the ground is saturated, shallow-rooted trees and trees growing on thin soils may blow down even during minor winds.

- Workers must be taught to recognize poorly-drained and saturated soils, because trees growing on these sites will have shallow root systems and be especially prone to windthrow compared to trees growing on well-drained soils.
- Workers must be aware that the root system of trees growing on saturated soils are more easily disturbed and that whole root systems may pull out of the ground if the tree falls.
- Heavy rainfall can reduce the ability to hear nearby workers and equipment.
- Muddy conditions may place additional strain on rigging, skidding and yarding equipment, resulting in breakage and dangerous situations.
- Operations must cease if rainfall shutdown criteria are exceeded.

## Fog

- The logging supervisor must suspend operations where excessive fog seriously impairs visibility.
- Workers must be aware that they may not be able to see the lay of the logs, thereby increasing the hazard of not seeing up-ending and swinging logs.
- Workers must be aware of the danger of the haulback dislodging logs, roots and stumps that they cannot see.
- Yarding crews may lose sight of the turn of logs and not be able to see potential problems as the turn is yarded to the landing.
- Fallers must be able to see the top of the tree to check for overhead hazards.

## Bright Sun

- Workers should carry out frequent visual checks if glare is likely to prevent them from detecting potential hazards.
- Workers must pause to let eyes adjust when moving from bright sun into shade and vice versa.
- Workers must anticipate windshield glare that may occur while moving from the shade of a partial canopy into cutblock openings.





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## Felling in Partial Cuttings

### Training and Preparation

- Fallers must be familiar with the Workers' Compensation Board Industrial Health and Safety Regulations and the *Fallers and Buckers Handbook*.
- New fallers should be trained at least to the WCB Faller and Bucker training standard, preferably by fallers with partial-cutting experience. Experienced fallers should review the training program periodically.
- Fallers unfamiliar with partial-cutting operations should participate in a documented review of standard safe work procedures and a basic job safety breakdown, with particular emphasis on felling direction accuracy, increased potential for brushing, and upslope felling limitations.
- Fallers should attend pre-work meetings with supervisors and planners to:
  - ~ understand the management goals and objectives of the silvicultural system being applied, and its limitations
  - ~ address problems that may pose risks both to fallers and, later on, to logging crews
  - ~ ensure that the harvesting method, windthrow management, disease and pest control, and visual quality objectives are understood and can be safely met
  - ~ ensure that tree selection criteria for the whole block and criteria to fell alternate trees are clearly understood
  - ~ consider tree placement, bucking length, and safe-lifting weight requirements for safe and efficient yarding in cable, helicopter, ground-based, and horse-logging operations.



*Pre-work conferences with fallers are essential to safe logging operations.*

- Fallers should check to ensure that field maps clearly identify:
  - ~ prescription area boundaries
  - ~ harvesting methods and equipment to be used

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- ~ any objectives for non-timber forest resources that may impact harvest operations, including prescriptions for riparian management areas, wildlife tree patches, and gully management areas
  - ~ yarding corridors and landings
  - ~ direction of yarding
  - ~ skid roads
  - ~ access routes
  - ~ emergency evacuation routes
  - ~ hazards and no-work zones
  - ~ locations of all reserve areas, including wildlife tree patches and riparian reserve zones
  - ~ locations of all special management areas including riparian management zones
  - ~ locations of machine-felling areas.
- Before beginning operations, fallers should walk the work area to:
    - ~ fit the plan to what is on the ground, determine if the objectives of the plan can be met safely and confirm that the field layout is consistent with the map
    - ~ confirm the feasibility of the felling plan
    - ~ consider the implementation of tree selection criteria and the objectives for the chosen silvicultural system
    - ~ confirm the feasibility of tree-placement and bucking length requirements
    - ~ understand the objectives for leaving reserves in the block
    - ~ identify on the ground all riparian management areas (RMAs), wildlife tree patches (WTPs) and other special management areas shown on the field map
    - ~ take into account ground slope, timber type and lean, and the density of the top canopy in preparing to selectively fell timber (this is especially important within the narrow openings that may result from the establishment of RMAs)
    - ~ identify all potential problems which the supervisor will be required to control
    - ~ develop an on-site safety work plan with felling partners and other workers to include safe work areas with a minimum two tree-length separation, an effective mancheck system, identified emergency evacuation trails, and a safe work procedure for each work day
    - ~ ensure that personal safety programs are not compromised.
  - Fallers should be especially aware of:
    - ~ overhead hazards when working in stands with old-growth characteristics (e.g., patchy, uneven-aged trees of various sizes, form, health and lean)
    - ~ hazardous hang-ups and brushing damage to residual trees when working in stands where the objective is to leave a uniform distribution of residual trees.

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## Cutblock Design

Poor cutblock design may prevent fallers from safely accomplishing specific management objectives. Improper or poor selection of leave-trees can create potential hazards for felling and yarding crews, especially where stands have a high proportion of unstable trees and overhead hazards. For example, the timber lean may be away from one site boundary, but the trees selected for removal could be of a height that the tops will fall into an RMA or WTP in a narrow logging layout.

The same situation might be encountered with parallel boundaries, where the block has been engineered on narrow benches below steep, inoperable slopes. Similarly, V-shaped RMA junctions may restrict safe cross-slope felling of trees when opening up the lower face of a block.

Difficulties may also arise when management objectives are incompatible. It may be impractical to retain wildlife trees if the goal is a uniform distribution of leave-trees. The overlapping no-work zones for even a small number of designated wildlife trees would necessitate leaving group reserves (e.g., WTPs) rather than uniformly distributed leave-trees. This may make the block design unworkable.

The faller must stop work immediately if his safety or the safety of the crew is endangered. He must contact his supervisor immediately to develop an alternate plan. He may need to work in another area until the supervisor gives instructions.

*Considerations of safe felling practices (e.g., safe cross-slope felling and felling adjacent to WTPs and NWZs) must be incorporated into cutblock design.*

## Felling Corridors or Trails

- If ground conditions permit, fallers should first fell all yarding corridors (and trails to all corridors). This will provide safe work areas for the faller and his partner once felling in the remainder of the block begins.
- While felling corridors or skid trails, the faller must maintain an adequate distance between the skidder and other on-site workers and equipment.
- Field maps should be referenced frequently to confirm current location and ensure that a minimum two tree-length distance is maintained between the faller, other workers, and logging equipment.

## Felling Among Leave-Trees

- Fallers are responsible for the final selection of trees to be felled and the direction of felling; poor directional felling will create yarding hazards for the harvesting crew.
- Fallers must minimize brushing of residual trees because:
  - ~ the tree may become lodged, creating an additional hazard
  - ~ loose limbs and tops or widowmakers may be tossed back towards the stump and strike the faller
  - ~ hidden danger trees and snags can break loose and fall towards the faller
  - ~ canopy hazards may be created for the yarding crew.
- Fallers must observe visibility limitations and adjust their procedures accordingly to evaluate overhead hazards (e.g., do not fell trees if foggy conditions make it impossible to see the tree tops).
- Fallers must discuss all changes to the daily workplan with the other fallers to ensure that safe work distances are maintained between them.
- Fallers must take care to remove any trees that, when brushed, may pose a hazard to workers (e.g., deciduous trees often have a large canopy and the dead limbs can be very brittle, creating a safety hazard).
- Fallers must pre-plan escape routes to safe locations a sufficient distance away from the stump of the tree being felled.
- When seeking a safe location, fallers should move at least three metres back and away at a 45° angle to the uphill side of the stump.
- Fallers should take cover behind a tree and stay sheltered until the felled tree is on the ground.
- Fallers should contact the supervisor if a dense tree canopy restricts the felling of selected trees. The plan may have to be modified to address safety concerns.
- Fallers should avoid pushing timber except to overcome a felling difficulty. In such cases, a wedge must be driven into the back cut of all cut trees. Domino felling is prohibited.



*Be alert to the danger of hidden snags that can break loose and hit the faller.*



*Avoid unnecessary brushing of leave-trees.*

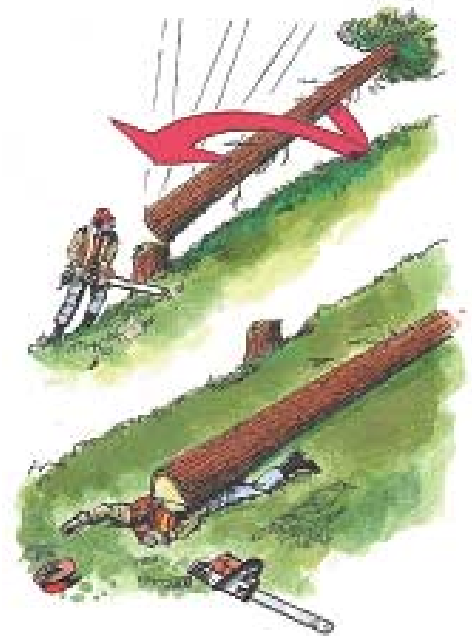


*Saplings in the felling path must be removed where they pose a potential danger.*

- Fallers must remove saplings if there is a danger that the saplings may spring back when the larger trees are felled.
- Fallers must carefully assess any standing tree for overhead hazards or damaged roots; if it is a danger tree it must be felled.
- If the faller cannot safely dislodge widowmakers left hanging in the canopy, he must notify his supervisor, flag the hazardous tree, and establish a no-work zone with the appropriate flagging.

### **Felling on Steep Slopes**

- Patches/groups of trees on steep slopes should be felled side-slope or slightly uphill across the hillside to hold the timber on the slope for safe bucking.
- Fallers must avoid felling directly up steep slopes because:
  - ~ the tree is more likely to kick back and/or slide back downhill
  - ~ trees are more likely to be brushed, causing broken portions to fall or roll downhill towards the faller
  - ~ there is a greater chance of the butt flipping up, down, or even sideways if the ground is uneven, placing the faller at risk of being struck, thrown into the air, or pinned
  - ~ the tree is less likely to be positioned for safe bucking because of the sliding hazard.
- Be cautious of constricted cutblock configurations or V-shaped RMA junctions, which may restrict cross-slope felling and force the faller into an uphill felling situation.
- If uphill felling cannot be avoided, the faller should try to fell the tree at an angle no greater than 15° upslope.



*Never fell directly up steep slopes.*

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## Hung-up Trees

- If a tree being felled strikes a leave-tree and hangs-up, the faller must develop a safe work plan to remove it. Similarly, the faller should check to see if residual trees are damaged. Danger trees must be removed before further work is done in the hazardous area.
- If the faller considers the situation unsafe to fell, he must first conspicuously mark the danger (lodged/damaged) tree and alert any other workers who may enter the hazardous area. The supervisor must also be informed, and is responsible to ensure that the hazard is removed by a safe alternative method, such as using a machine or blasting.
- A faller always has the right to walk away from a hazard created while felling or bucking, as long as he first marks the hazard, closes the area to other workers, and notifies the supervisor.



*Fallers have the right to walk away from unsafe conditions, but must close the area first.*

*Regardless of the tree-marking system (marked-to-cut or marked-to-leave), the faller always has the final choice which trees may be safely cut, which trees can be safely retained, and the sequence of tree cutting.*

## Bucking

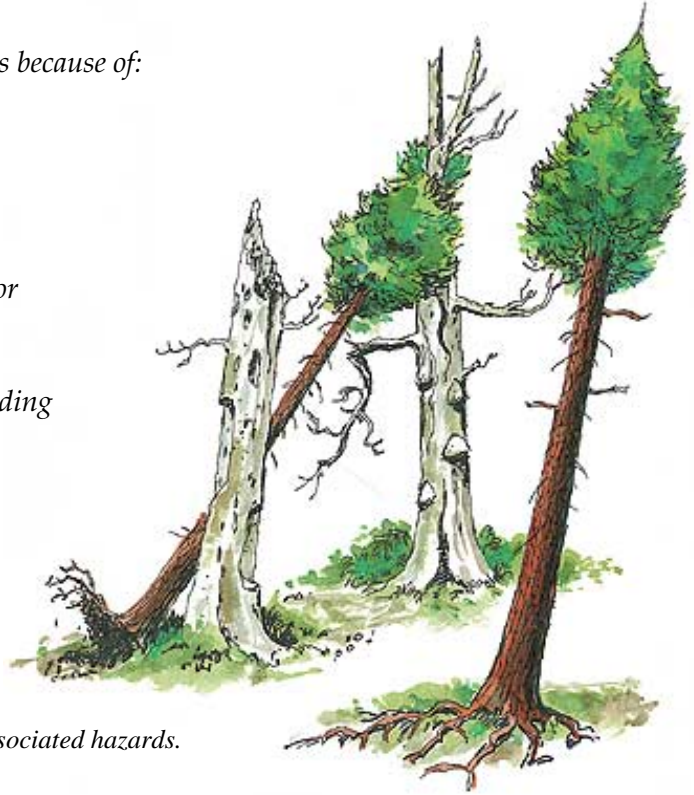
- Fallers should ensure that bucking cuts do not impede the rigging crew's ability to remove the logs from around the leave trees.
- Fallers must assess trees to determine any bind that may be present, and what direction it will shift during bucking, especially on steep slopes.
- If a tree is bound within standing timber, the faller must determine how to buck the tree and stay clear of the sweep of the log as the bind is released, and how to control the danger of pivot points.
- Fallers must properly buck all logs, to facilitate safe yarding.
- If a bucking cut cannot be completed safely, the faller must leave it, mark/flag it, and notify the supervisor at the end of the shift.
- Fallers should be aware of loose logs, root wads, rock outcroppings, stumps, windfalls and hidden ground debris, and adjust their position accordingly.
- Fallers should remember the fallers' adage, "look up, look down, look around" in all partial-cutting operations.

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## Danger Trees

A danger tree is any tree that endangers workers because of:

- excessive lean over the work area, or
- physical damage, or
- overhead hazards, or
- deterioration of limbs, stem or root system, or
- any combination of the above, or
- any tree that interferes with safe felling, yarding or loading.



*Danger trees and associated hazards.*

Danger trees must be managed during all phases of partial cutting—pioneering right-of-ways, road and landing construction, felling, yarding, loading, hauling and road deactivation.

- Fallers can recognize danger trees by these warning signs:
  - ~ excessive lean (>10%–15%)—exposed roots on leaning trees indicate possible previous damage from adverse weather conditions
  - ~ root-rot—shown by loss of needles in the crown; in advanced cases, the tree may have dropped all needles and is already dead
  - ~ black seams—indicate a hollow trunk or one that is severely rain-checked or diseased
  - ~ fungal growths on the trunk and at the base of the limbs—indicate a decayed tree that could fall once surrounding trees are felled
  - ~ weakened sections of the trunk caused by cat faces, school marms, forked stems or radial cracks
  - ~ significant mechanical damage to bole or roots
  - ~ large dead, broken and hanging limbs, large forked and dead spike tops, broken tops, loose bark, large witches' broom (>1 m diameter) or any loose debris in the crown that could easily be dislodged and fall.
- Fallers should remove danger trees as soon as it is safe to do so, or establish appropriately flagged no-work zones around them.

- Before felling danger trees, fallers must:
  - ~ ensure that they are not designated wildlife trees (these must be protected by a no-work zone or wildlife tree patch)
  - ~ develop a clear felling path so that the tree will not toss debris back towards the faller
  - ~ clear an escape route to a pre-planned safe area.
- If a danger tree cannot be safely removed, the faller must establish a no-work zone. All workers must be alerted to the location of the no-work zone and its location marked on all field maps.
- Following consultation with the supervisor, if a danger tree cannot be located in a no-work zone or felled safely, it must be removed with explosives or by other recognized safe means.

*Trees adjacent to a cutblock boundary which are felled for safety reasons must be left on site, unless approved for removal by the Forest Officer. Never cut trees outside the cutblock boundary, unless required for safety reasons.*

## **Felling Near Riparian Reserves, Wildlife Tree Patches**

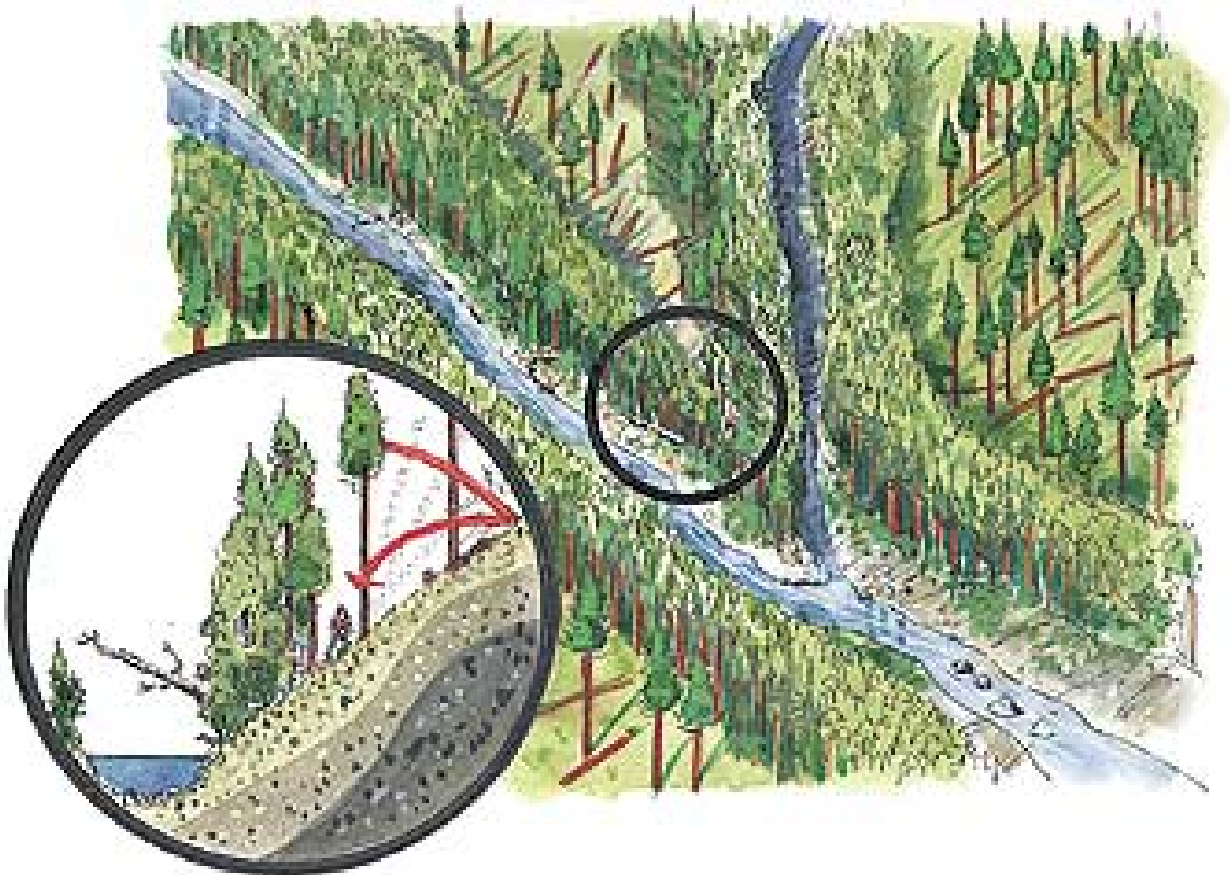
- Fallers should be aware of the cutblock boundary flagging and request additional flagging if standing timber obscures existing flagging and blazing.
- Fallers should be knowledgeable of the felling opening and face plan.
- Fallers must not fell blazed boundary trees of reserves and the cutblock except to overcome a felling difficulty. If the tree needs to be removed, it must be felled above the painted blaze mark so that the boundaries can easily be identified. If the blaze is too high, the faller may fell it below the mark, but the stump should be marked again.
- Because riparian reserve zones are seldom engineered in straight lines, and because trees will tend to develop limbs and lean towards open areas, fallers may have difficulty keeping the timber in lay. If a faller cannot safely fell the selected trees, he must notify his supervisor. The felling boundary may need to be adjusted by the planner.



*The locations of riparian reserves and wildlife tree patches must be clearly identified on maps and in the field.*



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- After careful assessment, fallers may consider using tree jacks to fell a tree into the work area when it leans towards a reserve or wildlife tree patch (see *Faller and Bucker Handbook*). Fallers must not jack trees suffering from root-rot, or poorly rooted trees. If wedging is likely to be inadequate, they must advise the supervisor, who may consider cable attachment to pull the trees over. Otherwise, they should not be cut.
  - When felling along backlines, sidelines or riparian reserves, it is often necessary to change the felling direction or even fell across streams until a sufficiently wide operating area is established. Upon changing direction, the faller should be particularly wary of logs being flipped back or around by the felled tree.



*Narrow block configurations and v-shaped RMA junctions may restrict safe cross-slope felling.*

- Where winding boundaries narrow cutblock design or v-shaped RMA junctions do not allow for keeping felled timber in lay or restrict safe cross-slope felling, the faller must notify the supervisor to have the felling line moved. This may require an amendment to approved plans. Areas where uphill felling is prohibited must be ribboned out.
- Fallers may enter riparian reserves or wildlife tree patches to fell danger trees where a safe danger tree removal procedure has been identified in the work plan, but felled trees must be left on site until approved for removal by the Forest Officer.

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- Where a high-quality wildlife tree outside the block boundary or within a riparian reserve/wildlife tree patch endangers workers, fallers should adjust their work pattern away from any danger and flag an appropriate no-work zone until a qualified assessor evaluates the tree for protection or removal, depending on stand-level management objectives.
  - Hazardous wildlife trees designated for retention must be adequately buffered by a wildlife tree patch or appropriate no-work zone established along the cutblock boundary.
  - Where the establishment of no-work zones interferes with the felling pattern in the adjacent work area (e.g., work area now too narrow to avoid felling trees into the reserve or over the boundary) the faller must cease work and notify his supervisor to develop an alternative felling plan.

*It is especially difficult to retain wildlife trees in partial-cutting situations where the primary objective is to leave a uniform distribution of residual trees. Overlapping no-work zones will often necessitate leaving groups of residual trees (e.g., wildlife tree patches) rather than uniformly distributed leave trees.*