



**BC Forest Safety Council**

*Unsafe is Unacceptable*

**WORK SAFE BC**

WORKING TO MAKE A DIFFERENCE

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Nanaimo, BC, Canada

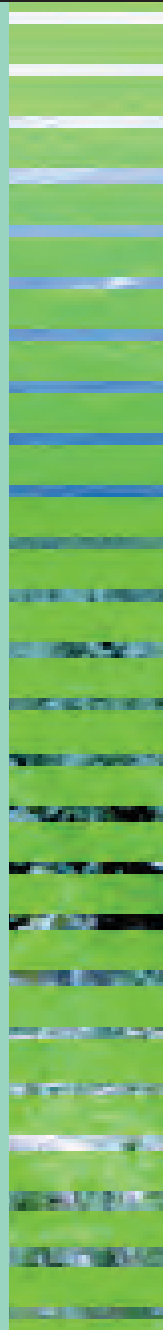
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## Preferred Height of Backcuts Above Undercuts in Relation to Diameter Size

Diameter of Tree	Height Difference
<b><i>Humbolt and Swanson Undercuts:</i></b>	
Up to 36 inches (3 ft)	$\frac{3}{4}$ - 1 inches
48 - 60 inches (4 - 5 ft)	1 $\frac{1}{2}$ inches
<b><i>Humbolt, Swanson and Pie Undercuts:</i></b>	
72 - 84 inches (6 - 7 ft)	2 inches
96 - 108 inches (8 - 9 ft)	3 inches
120 - 144 inches (10 - 12 ft)	4 inches
156 inches (13 ft ) and above	6 inches
<b><i>Conventional and Pie (frozen) Undercuts:</i></b>	
Up to 14 inches (1 ft 2 in)	$\frac{3}{4}$ - 1 inches
16 - 36 inches (1 ft 4 in - 3 ft)	2 inches
48 - 60 inches (4 - 5 ft)	3 inches
72 - 84 inches (6 -7 ft)	4 inches
96 - 108 inches (8 - 9 ft)	6 inches
120 to 144 inches (10 - 12 ft)	8 inches
156 inches (13 ft) and above	12 inches

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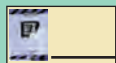
## Written Safe Work Procedures

Written falling and bucking procedures are a legal requirement no matter where you work. They may be called Job Safety Breakdowns (JSBs), Standard Operating Procedures (SOPs) or Job Safety Analysis (JSAs). We call them **Safe Work Procedures** and they are identified with this symbol.



It is your responsibility to know and follow these procedures; ensure that you have an updated version.

It is the supervisor's/bullbucker's responsibility to ensure that you are competent in these procedures. During regular review of these procedures, feel free to ask questions or suggest changes. Improvements keep the safe work procedures current, relevant and safe.



This symbol alerts you that the text refers to important *Workers' Compensation Act* or Occupational Health & Safety Regulation information. Feel free to quote specific regulations in the space provided.



This symbol identifies the signs of professionalism that demonstrate working habits of a safe faller.



This symbol highlights situations and work habits that can cause Musculoskeletal Injuries.

## 25 Heavy Leaners



**Hazards:** these trees lean heavily towards the direction of fall and present an increased risk of barberchair, kickback, stump pull, throwback, flying debris, lifted root mat or root pull. To reduce these risks fall heavy leaners slightly off the lean, i.e., more to the side lean. Establish **escape routes (16)**.

**SWP**

### Small Diameter Tree

#### ① Undercut: construct it

small but as large as the tree will allow without pinching the bar, often no more than 1/4 tree diameter.

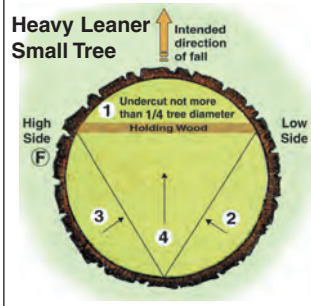
② **Backcut:** visually line up first cut to ensure adequate holding wood. Make partial cut on the low side.

③ Make partial cut on high side. Review escape routes.

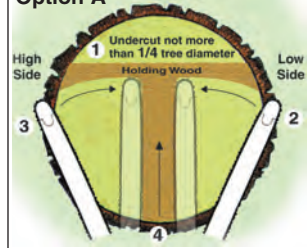
④ Finish backcut, closely watching the cut. Look up; listen carefully for tree movement. Be prepared to move away quickly and take cover at any sign of the tree falling.

⑤ When tree starts to fall, follow **escape procedures (16)**, watching for root pull, **barberchair (23)**, and overhead hazards.

### Heavy Leaner Small Tree



### Heavy Leaner Large Tree – Option A



### Large Diameter, Option A

**SWP**

① **Undercut:** as large as the tree will allow to prevent bar from becoming pinched, but often no more than 1/4 tree diameter.

② **Backcut:** Visually line up cuts. Make a partial cut towards the centre on the low side.

③ Make a partial cut towards the centre on the high side. Review **escape routes (16)**.

④ Proceed to cut the centre holding wood to finish the backcut. Always finish the backcut from the high side.

⑤ Watch the cut closely. Look up and listen carefully for tree movement. Be prepared to move and take cover at the first sign of the tree falling.

⑥ When tree starts to fall, follow **escape procedures (16)**, watching for potential root pull, **barberchair (23)** and overhead hazards.

### Large Diameter, Option B

**SWP**

① **Undercut:** as large as possible without pinching the bar, often no more than 1/4 tree diameter.

② **Backcut:** sight through undercut to line up cuts. Bore in and make partial cut on low side towards holding wood.

③ Turn saw over and cut towards the centre on the low side leaving adequate centre holding wood.

④ Bore in and make partial cut on high side towards holding wood.

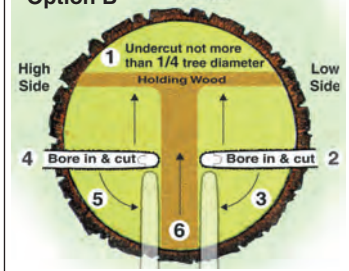
⑤ Turn chainsaw over and finish the cut on the high side keeping the centre holding wood intact. Review **escape routes (16)**.

⑥ Proceed to cut centre holding wood to finish backcut. Always finish backcut from the high side.

⑦ Watch the cut closely. Look/listen carefully for tree movement. Be prepared to move and take cover at any sign of the tree falling.

⑧ When tree starts to fall, follow **escape procedures (16)**, watching for potential root pull, **barberchair (23)**, and overhead hazards.

### Heavy Leaner Large Tree – Option B



## 26 Limb-Tied Trees



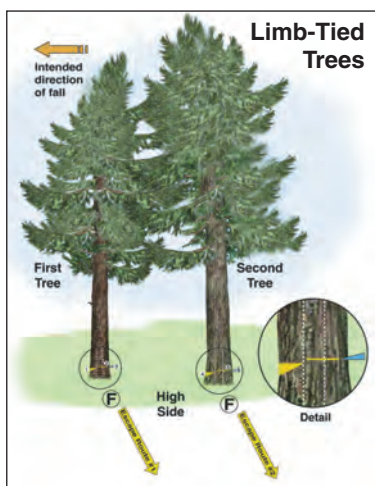
Trees with limbs tied together must be felled together.

**Hazards:** overhead and hidden hazards due to limited visibility; 1<sup>st</sup> tree could fall while the 2<sup>nd</sup> tree is being cut, or 1<sup>st</sup> tree could sit back from a gust of wind before 2<sup>nd</sup> tree is ready to fall.

**SWP**

- Complete assessment on both trees. Check for hazards such as broken tops, limbs and loose debris in canopy.
- Decide which direction to fall the trees, i.e., usually the direction of the fall goes with the more dominant leaning tree.
- Identify the 1<sup>st</sup> tree.
- Determine the soundness of the tree and root systems.
- Brush out **escape routes (16)** for both trees.
- Carefully plan the sequence of cuts.
- If either tree appears unsafe to fall stop work; seek qualified assistance.

**Note:** if the 1<sup>st</sup> tree is a dangerous tree and the 2<sup>nd</sup> tree is sound, the sequence of cuts will begin with constructing the undercut on the 2<sup>nd</sup> tree first. Then move to the 1<sup>st</sup> tree and construct undercut and backcut, setting **wedges (8)**. Construct the backcut on the 2<sup>nd</sup> tree. This sequence will allow the faller to construct the falling cuts without turning away from the dangerous tree. If 1<sup>st</sup> tree is sound but the 2<sup>nd</sup>



tree is a dangerous tree, stop work and seek qualified assistance; consider **alternative falling methods (33)**.

**SWP**

**First Tree** ① Construct the undercut.

② Construct backcut; leave enough holding wood.

③ Set wedge(s) to stabilize the tree. Strike wedges alternately until the limbs of the 1<sup>st</sup> tree begin to pull on the 2<sup>nd</sup> tree.

**Note:** once you are finished with this tree do not go back to it.

### Second Tree

Never turn your back on the 1<sup>st</sup> tree as it is cut up. When making cuts in the 2<sup>nd</sup> tree, keep your eyes on 1<sup>st</sup> tree for movement. Be prepared to move away quickly using the **escape route (16)** and take cover to avoid any overhead hazards.

④ Construct the undercut to match the falling direction of the 1<sup>st</sup> tree.

⑤ Start the backcut.

⑥ Set first wedge.

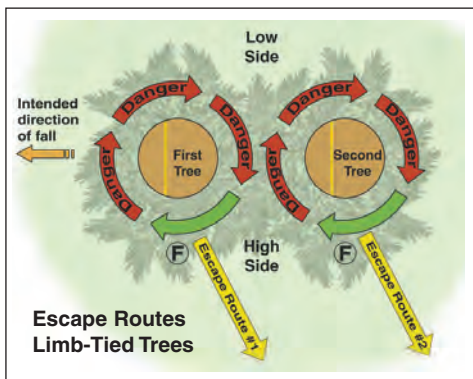
⑦ Continue the backcut. Look up regularly checking both trees for movement.

⑧ Set second wedge if necessary.

⑨ Complete backcut. Leave adequate holding wood intact.

⑩ Follow regular **wedging procedure (21)**.

⑪ When tree starts to fall, follow **escape procedures (16)**.





## 27 Pushing – Jackpots

Pushing a tree with another tree is only done to overcome specific falling difficulties or hazards. It can be used in two applications:

- 1) a plan to safely fall a tree or dangerous tree that leans heavily back or is hazardous, and
- 2) an alternate plan in case a tree unexpectedly sits back or proves impossible to wedge against the lean.

If the 1<sup>st</sup> tree is dangerous, follow 1<sup>st</sup> **Note** in **limb-tied trees (26)**.

**Never push a dangerous tree with another dangerous tree.**

Never **Domino fall (22)**. Seek qualified assistance and plan **alternative falling methods (33)** if necessary.

**SWP**

① Choose the pusher tree no more than 20° off the imaginary centre line behind the tree being pushed; it should be on the high side, must be sound, free of defects, and be able to overcome the weight of the 1<sup>st</sup> tree.

② Complete a **tree assessment (17)** on both trees including lean and direction of fall.

③ Brush out around both trees; cut two **escape routes (16)** and remove any tripping hazards. Walk both routes.

④ Construct undercut in 1<sup>st</sup> tree, no more than 1/4 tree diameter.

⑤ Start the backcut. Set wedges to ensure that the tree does not sit back on the bar. If your plan was to wedge the 1<sup>st</sup> tree over, follow **wedging procedures (21)** while maintaining adequate holding wood. If the tree does not lift and fall by wedging, proceed to the pre-determined pusher tree.

**Note:** Once you leave the 1<sup>st</sup> tree do not go back to it. Never turn your back on it as it is cut up. When working on the 2<sup>nd</sup> tree, regularly check the 1<sup>st</sup> tree for movement. If there is movement, quickly follow **escape procedures (16)** and take cover to avoid any overhead hazards.

⑥ Construct the undercut of the pusher tree. Use sight lines to ensure the correct direction of fall to hit the cut-up tree.

⑦ Start the backcut. Palm wedge; finish the backcut leaving adequate holding wood intact.

⑧ Review escape routes.

⑨ Wedge as required to make the tree fall.

⑩ When tree starts to fall, follow **escape procedures (16)**.



A professional faller uses proper planning, appropriate wedges and an axe of adequate size to minimize the use of pushing.

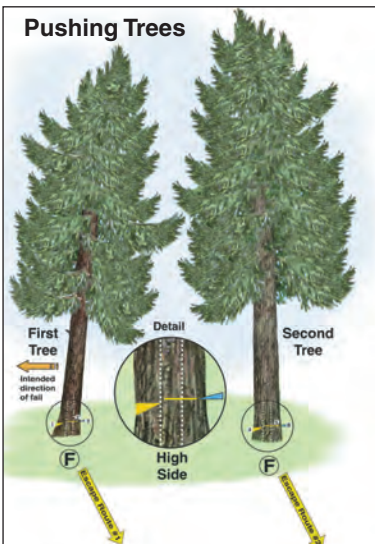
**SWP**

### **Jack Pot (Multiple Hang-ups)**

A jackpot is similar to a hang-up situation but involves multiple trees. Complete a tree assessment for all trees involved and plan a cutting sequence. Get qualified assistance if you are not sure how to deal with this falling difficulty. Consider **alternative falling methods (33)** if hand falling is unsafe.



### **Pushing Trees**



## 27 Pushing – Jackpots

## 28 Falling Dangerous Trees

### Dangerous Tree Assessment

**SWP** ① From a distance, assess the tree from top to bottom considering its size, height, condition, lean and **dangerous tree indicators (13)**.

② If the tree is suspected to be hollow, “sound it” with the axe.

③ To decide the falling direction, consider the following:

- Direction of lean
- Limb distribution
- Snow load
- Open areas to ensure an unobstructed fall path



### **SWP** Falling a Dangerous Tree

Fall dangerous trees into an open area as soon as it is safe to do so. ① Fuel up chainsaw prior to starting any cuts and have **wedging tools (8)** readily available at the base of the tree.

② Brush out a work area around the base of the tree. Remove material on the ground that could be thrown back at the faller when the tree lands. Remove loose bark and check for rot.

③ Determine the direction of the fall, then create two well brushed out **escape routes (16)**.



④ Construct undercut and backcut at comfortable height to ensure maximum visibility and freedom of movement, i.e., waist to chest height. Whenever possible, make the cuts in solid wood.

⑤ Examine the sawdust from the undercut to confirm the condition of the stem, i.e., dark, soft or crumbly sawdust indicates rot.

⑥ Ensure undercut is large enough and cleaned out to ensure fluid fall, and to reduce wedging and associated vibrations.

⑦ Watch the top, limbs and defect areas of the stem while making the falling cuts. At any sign of tree failure or collapse immediately move to your escape route and take cover.



⑧ **Start backcut above undercut - see Cover F (Preferred Height of Backcut).**

⑨ Only **wedge (8)** if absolutely necessary to make the tree fall. Use dangerous tree wedging procedures below.



⑩ Finish the backcut, watching cut and top closely for movement.

⑪ When the dangerous tree is committed to the fall follow **escape procedures (16)**.

⑫ Remove any high stumps so that they do not become a hazard to you or to the harvesting crew.

### **SWP** Dangerous Tree Wedging Procedure

① Turn chainsaw off.

② Lift earmuffs to hear even slight tree movements.

③ Lift face screen to see tree top for overhead hazards.

④ Palm 2 wedges side by side.

⑤ Gently tap the wedges alternately. Scrutinize the whole stem after every tap. Wedging vibrations act as shock waves that can cause loose bark, rotten tops or limbs to break off.

⑥ Keep free hand against the stem to feel the vibration. Wait until the vibration stops before tapping again. Never drive or strike the wedge as in normal **wedging techniques (21)**. The tree is not sound and striking the wedge could cause the tree to fail.

### **SWP** Fire Kill

Treat all fire-killed trees as dangerous trees. Use additional eye protection and a dust mask; drink adequate amounts of water.

## Cut-Up Trees

These are trees that a faller placed one or more cuts into, and subsequently, the faller has to leave the trees unattended, still standing, partially fell or hung up. Follow the cut-up tree procedure.

## Hung-Up (Catapult) Trees

Hung-up trees have been pushed or fallen into standing trees or timber by weather conditions, or poor planning, shoddy work practices or loss of control of a tree. Investigations of many fatal accidents have revealed that fallers were working under a hang-up they created.

**SWP**

## Cut-Up Tree Procedure

Strictly follow this procedure.

1. Mark tree or immediate area with bright coloured flagging.
2. Discontinue work in the area.
3. Report to the supervisor or bullbucker immediately.
4. Notify all workers who could possibly enter the area.
5. **Barricade (10)** and place signage at access routes to falling area. Nobody has the authority to enter without permission from the faller and supervisor/bullbucker.
6. Remove cut-up trees prior to any other work being conducted in the area.

**SWP**

Hang-up situations demand the utmost care in planning the sequence of cuts.

- ① Assess whether the hang-up can be felled safely, i.e., when the first tree is cut up, it must be safe to fall the other tree(s).
- ② Jointly assess the hang-ups with another experienced faller.
- ③ If a faller can not fall the hang-up safely, consider an **alternative falling method (33)**, i.e., blasting, machine assist.
- ④ Develop a safe work plan prior to removing the trees.
- ⑤ Carefully plan **escape routes (16)** to reduce the chance of being struck by flying debris and overhead hazards.
- ⑥ Never work in the danger zone under a hung-up tree. Keep the trunk of the supporting tree between yourself and the hung-up tree.



## Hazards from Road Construction

Leaners, logs stacked against timber, hanging tops or limbs, rocks embedded in trees, loose rocks and stumps.



**SWP**

- ✎ Use extra caution when working below the road.
- ✎ Remove hazard with loader, other machinery or alternate methods, i.e., blasting, before proceeding to fall.
- ✎ If it is unsafe to fall the trees stop work and report to the supervisor/bullbucker.
- ✎ Notify other workers, or remove hazards and proceed to fall.
- ✎ Widening or daylighting below the road is not recommended.



## Hazards from Mechanical Damage

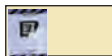
Tree or root damage from mechanical harvesting or other harvesting methods, or road and skid trail construction, can increase hazards on the ground and overhead as well as root system failure. Damaged leaners and trees on steep slopes may react more dramatically.

**SWP**

- ✎ Create two **escape routes (16)**. High potential for stem and root failure, and snow and debris piled against trees from machine activity can make escape difficult.
- ✎ If you can not create adequate escape routes, do not fall the tree. Report to supervisor/bullbucker; consider **alternate falling methods (33)**.
- ✎ Remove excessive ground debris prior to falling tree.

## Overhead Powerlines

If falling near overhead powerlines, determine if trees can violate limits of approach. Request local Power Authority to inspect the site. If any trees violate limits of approach, stop work and discuss with supervisor/bullbucker. Follow instructions from the local Power Authority, as per written directions on the current Assurance in Writing form.







Recognize added hazards from weather and environmental conditions; take precautions and ensure your **physical well-being (3)**.

### Visibility

Fog, rain and **snow (31)** all reduce visibility and muffle sound during falling and while moving in the falling area. Ensure safe distances are maintained, i.e., **two-tree lengths rule (10)**. Perform **man-check procedures (9)** more frequently as cold weather reduces an injured worker's chances of survival.

**SWP**

### Fog

If fog does not allow you to see and accurately assess trees and surrounding work areas, stop falling until conditions improve. Ensure **man-check procedures (9)** still function properly.

### Wind

Often, dangerous trees are brought down by wind, and overhead hazards dislodge and fall unexpectedly. A gust of wind can also cause a partially cut tree to fall prematurely or sit back.

☞ Before the wind creates a problem, move to a protected area or stop falling until conditions improve. Avoid **cut-up trees (29)**.

**SWP**

### Lightning

- ☞ Allow enough time to find and take cover in a safe shelter, i.e., hard-top vehicle, thick canopy of immature trees.
- ☞ Stay away from bodies of water and metal objects, i.e., tools and chainsaws. Turn off radio and communication equipment.
- ☞ Spread out, do not stand in a group. Stay at least 10 m (33 ft) away from the highest potential conductor. Do not be an isolated tall object, i.e., avoid open areas such as meadows, ridges, and mountain tops, and do not be connected to anything that may be an isolated tall object.

### Rain and Unstable Terrain

- Heavy rain can impact on access to the work area, i.e., swollen creeks, road washouts, debris torrents, landslides in and above the falling area, and flooding. Blowdown also occurs more readily in saturated ground.
- Heavy rains make it difficult to judge the lean, see overhead hazards, and hear nearby workers and equipment.

**SWP**

☞ Discuss terrain stability assessment and indicators at the **initial safety meeting (9)**; know company shutdown and evacuation procedures, and **First Aid coverage (11)**.

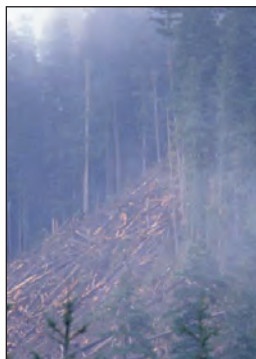
### Avalanches

Be aware of avalanche risks; do not enter gullies, steep slopes and known avalanche chutes over 50% when snow depths exceed 30" (75 cm), especially during warming temperature trends.

### Shutdown Procedures

Everyone must know company shutdown criteria and evacuation procedures. If you are unsure about these details ask for the procedures at the **initial safety meeting (9)**. Do not leave your operating area until all workers have been accounted for.

- ☞ Shut down operation in consultation with supervisor/bullbucker when there is a danger of mud/rock slides or debris torrents.
- ☞ Shut down operation in consultation with supervisor/bullbucker during heavy wet snow and extreme cold conditions.



## 31 Working in Snow and Frozen Conditions

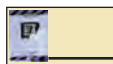
Dehydration, frostbite and hypothermia can threaten your **physical well-being (3)** and safety; follow safe work procedures.

### Stomping and Shovelling

These practices are used to remove snow and other ground debris and tripping hazards, create **escape routes (16)** and ensure appropriate stump heights. Stomping is used in shallow snow or when stump height is not a concern. When shovelling, the technique of cutting the snow and drawing the snow back with the shovel is easier on the arms and back. If lifting the snow, precut smaller chunks before lifting the shovel.



- The depression at the tree base must not exceed 18" (45 cm) on the high side, to facilitate a safe escape.



- Establish a safe work plan where snow shovellers are employed.
- Shovellers must maintain at least **two tree-lengths (10)** distance from any falling activity, and must not work downslope from a faller.
- Clear the snow so that the faller has full access to the tree.
- To cut at a comfortable height, it is not necessary to shovel out around a dangerous tree.
- To maintain a minimum 12" stump

height in snow depth over 36", mechanical assistance may be required to remove the snow.

**SWP**

- ① Stomp or shovel out a working area around the tree.
- ② Stomp or shovel out appropriate **escape routes (16)** to manage the problem of decreased mobility in snow. Pack snow to ensure solid footing.
- ③ Complete **tree assessment (17)**. Check trees for snow load which could cause whiteouts, barberchairs, hang-ups, **brushing (16)** or trees sitting back. Check for hidden and overhead hazards.
- ④ Check work area for ground debris, stomp the snow down and check for debris that could be thrown back as the falling tree lands. Buck ground debris into shorter lengths to prevent this reaction.
- ⑤ Determine an open area in which to fall the tree.
- ⑥ Cut away limbs in and above tree well to increase ventilation.
- ⑦ Construct appropriate undercut and backcut. In frozen wood, consider using **Pie Undercuts (19)** and use **winter wedges (8)** when wedging is required.
- ⑧ When tree starts to fall, follow **escape procedures (16)**.

### Snow Loads and Frozen Wood

These conditions make it difficult to fall a tree in any other direction but where it is leaning or weighted. Consider this when planning the direction of fall. Snow loads along with **frozen brittle wood (35)** can cause **dangerous trees (13)** to fall unexpectedly.

### Whiteouts

Whiteouts impair visibility to a point where you can not see the tree falling. Overhead hazards such as limbs, hung-ups, falling heavy clumps of snow and debris throwback are impossible to see. Falling snow can also block **escape routes (16)** and cause disorientation.



## Falling Against the Lean

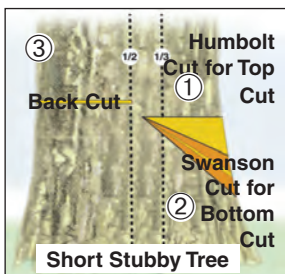
This process of putting backcut in first before undercut is used where the tree is too small for normal **wedging techniques (21)**; tree leans against falling pattern and no pusher tree is available; leaner would fall into riparian zone or standing timber.



**Hazards:** tree may sit back, break off, strike other standing trees, hang up or pinch the chainsaw.

**SWP**

- ① Complete **tree assessment (17)**; brush out around tree, clear two **escape routes (16)**; walk both routes.
- ② Construct backcut first, then set a wedge as soon as possible. Finish backcut and set 2<sup>nd</sup> wedge.
- ③ Construct undercut of 1/4 tree diameter; **top cut should be below backcut (see Cover F (Preferred Height of Backcut))** to provide an anti-kickback step and assist wedging. Take your time; stop repeatedly to ensure that cuts meet and holding wood is kept intact. Clean out undercut.
- ④ Review escape routes; strike wedges alternately.
- ⑤ When tree starts to fall, follow **escape procedures (16)**.
- ⑥ For **large diameter** trees, follow regular cutting and **wedging procedures (21)**.



## Short Stubby Trees

These are trees with broken-off stems



with 3:1 height-to-base ratio, and trees that do not fall over because base is heavier than stem.

**Hazards:** stem collapses while falling, butt kicks back towards faller or timber breaks and throws back debris when striking standing stubs, risks to harvesting crew, i.e., hang-ups, upending turns, roll-over hazards to ground-based machines.

**SWP**

- Assess tree; check for cracked seams and rot, sloughing bark and sapwood. Brush out tree and escape routes.
- ① Construct undercut 1/3 to 1/2 of tree diameter;
  - ② Undercut opening should be between Humbolt & **Swanson (19)**. Larger undercut minimizes the use of wedges and wedging vibration. Clean out undercut. Regularly watch top for signs of fall or collapse. The conventional undercut is not recommended.
  - ③ **Start backcut above undercut - see Cover F (Preferred Height of Backcut)**; ensure holding wood is intact, otherwise, stem may sit on the stump and not fall. Palm wedge in backcut as soon as possible to avoid pinching bar. Follow wedging procedures for **dangerous trees (28)** if needed. When tree starts to fall, follow **escape procedures (16)**.

## Refalling a Cut-Up Tree



Is used when tree sits back due to misjudged lean, failure to set a wedge in backcut, frozen wood, wind gusts, or snow load, and a wedge can no longer be set.

**Hazards:** tree may **barberchair (23)**, fall over backwards or split. Loss of control, wind may push tree in original intended direction.

**SWP**

- ① Stay at the base of the tree; do not go in front of the undercut or where the tree is leaning.
- ② Assess the tree; ensure an unobstructed fall path. If it can not be felled safely, stop and contact supervisor/bullbucker.
- ③ Clear new **escape route (16)** while facing the cut-up tree.
- ④ Make new cuts as high as possible from the original falling cuts as there is a risk of a vertical split between 1<sup>st</sup> and 2<sup>nd</sup> set of cuts.
- ⑤ Fall the tree in the direction of its new lean.
- ⑥ When tree starts to fall, follow **escape procedures (16)**.

## Return Home Safe

- Go to work physically and mentally fit to perform your job safely.
- Stay focused on safety at all times, every day:



– Recognize the hazard



– Evaluate the situation/hazard



– Control the hazard

- Wear the required personal protective equipment.
- Correct an unsafe condition or report it to your supervisor/bullbucker immediately.
- Know your limitations.
- Never go beyond your abilities.
- Evaluate and correct your workmanship.
- Safety must include concern for your fellow worker.

## Have A Safe Day

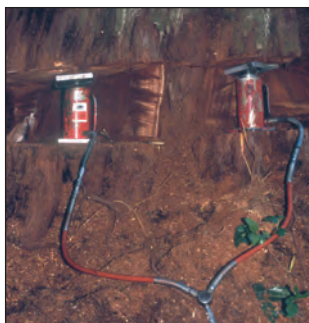
## General Procedures

These techniques may involve different equipment and machinery and rely on teamwork. The faller is in charge of the falling operation and must be **visible (3)** to machine operators at all times. Ensure that faller, workers and machine operator have reviewed the detailed, written site-specific safe work procedures. Each situation may vary and may require a modification of steps.

SWP

### Jacking

- ① Jacking should only be done by fallers trained and experienced in jacking procedures.
- ② Assistance, if required, must be by another competent person.
- ③ The jack operator must be in a safe position to avoid being struck by the tree, jack, plates or other debris.
- ④ Trainees must be trained under close supervision of a qualified faller experienced in jacking, and given appropriate written procedures.



SWP

### Pushover Falling

Pushover falling is an acceptable site-specific procedure in which ground-based equipment is used to push over trees, or to assist fallers to overcome falling difficulties.

- ① Wear **PPE (2)** and **Hi-Vis clothing (3)**.
- ② Complete a **tree assessment (17)** to ensure the tree will not collapse in the process of being pushed.
- ③ Position the machine, i.e., excavator, opposite the intended direction of the fall to maximize the pushing force and to avoid using swing motors. The machine must be adequately guarded and large enough to push the tree with a single steady push instead of having to rock the tree or digging up the roots.
- ④ Construct undercut, start backcut, and set wedges.
- ⑤ Position the bucket or boom on the tree as high as possible for the best leverage. A bucket with teeth reduces the risk of slippage.
- ⑥ The faller directs the machine to push gently on the tree.
- ⑦ Faller completes backcut ensuring adequate holding wood.
- ⑧ The faller must retreat to a safe location, take cover, and signal the machine operator to complete the fall of the tree.
- ⑨ Faller must stay in a safe location until an 'all clear' signal is given by the machine operator.

## Line Pulling

Use this special falling technique when a tree can not be felled in a specific direction by conventional falling with wedges, i.e., against the lean, away from a creek, stream or lake. The tree must be suitable for line pull and withstand the forces applied to it in this technique.



### Hazards

Line may be set too low, machine pulls the line too hard or inconsistently, pulls the tree off the stump or causes a barberchair. Maintain the **two tree-lengths (10)** rule, i.e. tree can hit the machine used to pull the line, or if the line breaks, faller and workers may get hit by whip-lashing line, tree or debris.

## Blasting

If conventional methods can not be safely employed, blasting is a safe alternate method to remove hazardous trees, i.e., **dangerous trees (28)**, **jack pots (27)**, **hang-ups (29)** and **windthrow (40)**. Only a person with a valid Blaster's Certificate can blast a tree.

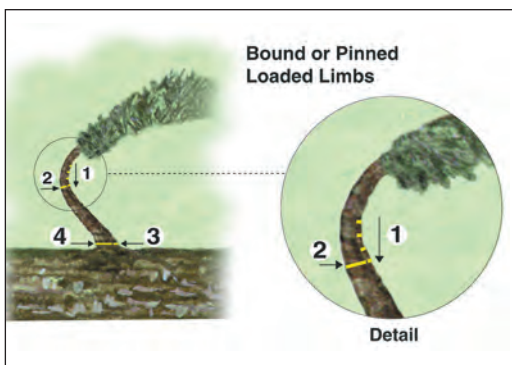


## 34 Loaded Limbs



### Cutting Loaded Limbs

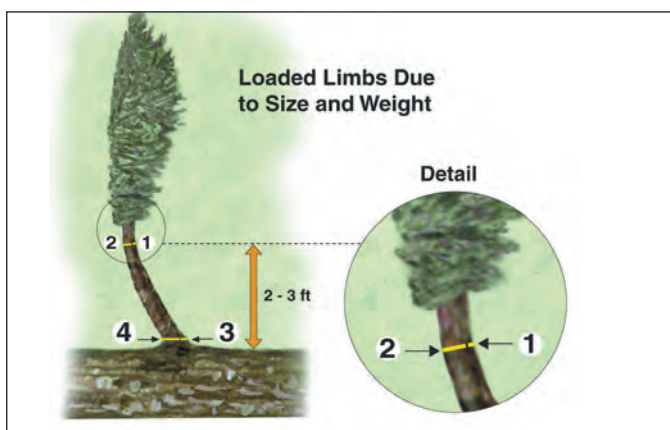
Tension in a limb can be caused by a limb being bound or pinned, or due to its own weight. Learn to recognize that the load on a limb can be seen by looking at the direction of the bend or the bow of the limb. Determine the tension points and where the loaded limb is bound, i.e., under other limbs, logs or debris.



### SWP Bound or Pinned Loaded Limbs

① Make a series of shallow cuts on the underside of the bow or bend of the limb slowly releasing the tension in the arch.

- ② Complete top cut to release the tension in the limb.
- ③ Underbuck a shallow cut flush with the tree stem.
- ④ Finish with a top cut to remove stub.



SWP

### Loaded Limb Due to Size and Weight

- ① Reach out to a comfortable distance and make a shallow cut on the underside of the limb.
- ② Complete the cut from the top side to release the tension eliminating the weight.
- ③ Underbuck a shallow cut flush with the tree stem.
- ④ Finish with a top cut to remove stub.

# 35 Limbing and Taping Hazards

## Limbing

Maintain secure footing and balance to avoid **strains and sprains (14)(15)**; ensure caulks are clean. Keep bar arm straight, and weight of chainsaw close to you. Do not reach, extend your body, or cross the body with the chainsaw. Reposition instead by moving feet and turning the body.






**SWP** Remove loose limbs that have landed on the tree. Limb top and both sides, do not cut supporting limbs. Release tension in **loaded limbs (34)** before cutting. Make cuts flush at base of tree. Do not leave stubs, they are tripping hazards and cause puncture wounds. Be aware of log movement while cutting.



## Taping Hazards

Wear **gloves (2)** to avoid cuts on hands and fingers from side of tape as it rewinds or when it is hung-up.

**SWP** Limb and tape out to desired log length. Mark the spot with your caulks, not with the **bar tip (7)**. Lower face screen, and control tape while retrieving it; if it hangs up, walk back to free it.

Hazard: 	Evaluate the Hazard: 	Control the Hazard: 
Rain	<ul style="list-style-type: none"><li>Impacts secure footing</li><li>Felled trees may be unstable and slide</li></ul>	<ul style="list-style-type: none"><li>Ensure solid footing</li><li>Use alternate log lengths</li><li>Ensure log is stable and supported for bucking</li></ul>
Fog	<ul style="list-style-type: none"><li>Impaired visibility</li><li>Unexpected slipping hazards due to moisture</li></ul>	<ul style="list-style-type: none"><li>If overhead hazards can not be assessed do not proceed to buck</li></ul>
Wind	<ul style="list-style-type: none"><li>“Active” canopy, blows down overhead hazards</li><li>Sawdust blown into face</li></ul>	<ul style="list-style-type: none"><li>Check canopy regularly for overhead hazards</li><li>Use face screen and additional eye protection</li><li>Change body positions</li></ul>
Running Sap in the Spring	<ul style="list-style-type: none"><li>Bark peels off easily</li><li>Pitch flies back into face</li></ul>	<ul style="list-style-type: none"><li>Assess bark for loose pieces or crack lines</li><li>Ensure that caulks are sharp and cleaned</li><li>Use face screen and additional face protection</li></ul>
Frost, Ice, Snow	<ul style="list-style-type: none"><li>Impacts secure footing, i.e., increased risk of slipping and tripping</li><li>Hides ground debris and pivot points</li><li>Trees slide and roll easier</li><li>Increases potential for chain reaction</li></ul>	<ul style="list-style-type: none"><li>Wear <b>caulk boots (2)</b> appropriate for weather</li><li>Check for tripping hazards or tensioned limbs</li><li>Check for tripping hazards, pivot points, tensioned limbs</li><li>Assess tree stability</li><li>Assess surrounding area</li></ul>
Frozen Wood	<ul style="list-style-type: none"><li>Wood is more brittle; cuts break open quicker, when you are cutting. Less friction and more sliding between logs, trees, stumps and ground</li></ul>	<ul style="list-style-type: none"><li>Assess the tree stability before bucking</li><li>Ensure secure footing</li><li>Ensure escape routes are cleared</li></ul>

## 36 Bucking Hazards – Top and Bottom Binds

### Hazards

Be aware of the following hazards associated with bucking, specifically in broken ground, steep slopes, ravines, and gullies:

- 🔪 Overhead, i.e., ensure that canopy is stable
- 🔪 **Chainsaw Kickbacks (7)**
- 🔪 Pivoting action causing logs to swing, roll and slide unexpectedly
- 🔪 Unstable materials from above or behind you, i.e., loose rocks, roots, chain reactions
- 🔪 Hidden or **tensioned (34)** limbs
- 🔪 Slips, trips and falls, i.e., as a result of unstable body position on supersaturated soils, loose bark, loose rock, snow and ice
- 🔪 Binds (see below)
- 🔪 **Windthrow/blowdown (40)**

### Sliding, Rolling and Chain Reactions of Logs

Remember that logs will roll, on flat or steep terrain. Before each cut, assess the potential for pivoting, sliding and rolling logs, and anticipate what will happen when the cut drops. On steep ground, logs can travel considerable distances disturbing other previously bucked logs. Do not buck below previously bucked logs. Good planning and proper **bucking assessment (37)** will keep you and other workers clear of these chain reactions.

### Pivot Points

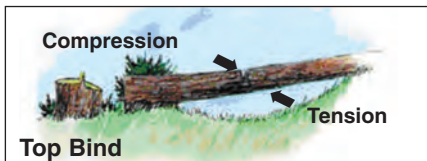
Ground objects such as stumps, rocks, root wads or other logs may cause a felled tree or log to react in an unexpected manner, i.e., one end of the log could slide or roll downhill and the other end of the log could swing uphill. Serious injury can result if the faller does not notice the pivot point and fails to plan accordingly.

**Limb (35)** the tree, then determine pivot points and where safe bucking cuts are possible.-Try to buck logs at or near the pivot

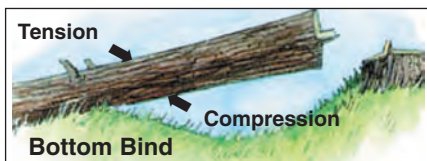
points as this provides a safe bucking zone. Learn to use the saw both left- and right-handed.

**Bind:** bind creates different pressure points, compression and tension, resulting in the wood on one side of the tree being pulled (tension), while the other side is being squeezed (compression).

**Top Bind:** a section of the tree between two areas supported by logs, stumps or the ground, has tension at bottom and compression on the top.



**Bottom Bind:** a section of the tree suspended or hanging out over the ground has tension on the top and compression on the bottom (gravity).



**Side Bind:** a section of a tree wedged between two or more standing trees, logs, stumps or other ground debris causing it to bend to one side compressing the opposite side.

### Combination Binds

Trees end up positioned over and around stumps, roots and rocks causing combinations of top/side bind, or bottom/side bind.

### Heavy Bind

If there is extreme tension or compression the final holding wood of the cut will break with sudden force. Slow this process by cutting a 'V' notch on top in top bind, and into the underside in bottom bind.

## 37 Safe Bucking Procedures

**SWP**

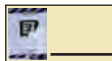
Complete a **Bucking Assessment** before bucking.

- ① Determine stability of the surrounding area; check for overhead hazards, potential chain reaction or sliding/rolling logs.
  - ② Reassess tree stability after **limbing (35)**. Check for obstacles that could cause the tree to pivot, move or roll. Check for limbs that are broken off, driven into the ground and support the tree.
  - ③ Determine high side and anticipated direction of gravity pull.
  - ④ Check for hidden limbs or saplings that may swing out or fly up as the cut drops and rolls.
  - ⑤ Assess the **pivot points (36)**.
  - ⑥ Identify the **binds (36)**.
  - ⑦ Plan the sequence of cuts.
- 🔪 Anticipate what the tree will do when the cut is completed, i.e., drop, roll, pivot, or dislodge material beside or behind it.
- 🔪 Base the sequence of cuts on the bind and how the tree is supported on the terrain.
- 🔪 If the log may pivot, plan to buck at or near the pivot point.
- ⑧ Determine a safe place to stand on the high side of the stem.

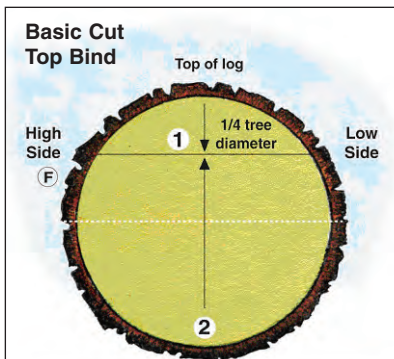
**SWP**

### Safe Bucking Procedures

- ① Brush out work area to allow freedom of movement and remove any debris that could fall or fly at you from front or behind.
- ② Brush out **escape route (16)**; do not buck without escape route.
- ③ Ensure your footing is stable.
- ④ Follow safe bucking procedures for **top & bottom binds (below)** and **(38)**.
- ⑤ After each cut reassess to ensure it is safe to make the next cut as planned.
- ⑥ If the faller's safety is compromised and the cut can not be completed, stop and mark the log.
- ⑦ Notify the supervisor/bullbucker.
- ⑧ Notify other workers who may enter the area.



#### Basic Cut Top Bind



**SWP**

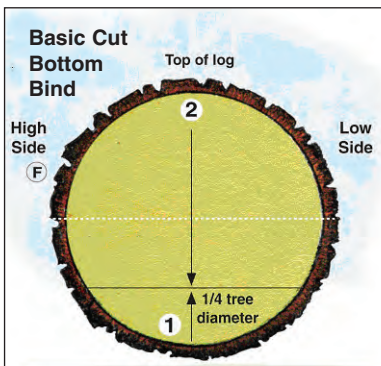
#### Basic Cut Top Bind

- ① Standing on high side, cut from top down to 1/4 tree diameter.
- ② Line up the bar with the top cut and make the second cut from the bottom up. Finish the cut sawing up to meet the first cut.
- ③ Move to **escape route (16)** as the cut drops.

**SWP**

#### Basic Cut Bottom Bind

- ① Standing on high side, cut from bottom up to 1/4 tree diameter.
- ② Line up the bar with the bottom cut and make the second cut from the top. Finish the cut, sawing down to meet the first cut.
- ③ Move to **escape route (16)** as the cut drops.



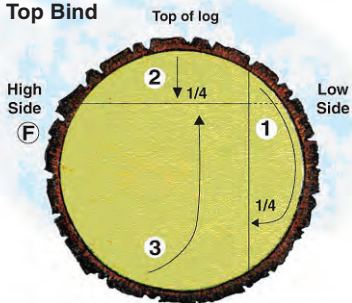
## 38 Safe Bucking Procedures Continued

**SWP**

### Small Diameter Tree, Top Bind

- ① Standing on the high side, reach over and cut the low side to  $\frac{1}{4}$  tree diameter.
- ② Line up the bar with the first cut and cut down from the top to  $\frac{1}{4}$  tree diameter.
- ③ Underbuck to finish the cut.
- ④ Move to **escape route (16)** as the cut drops.

### Small Diameter Tree Top Bind

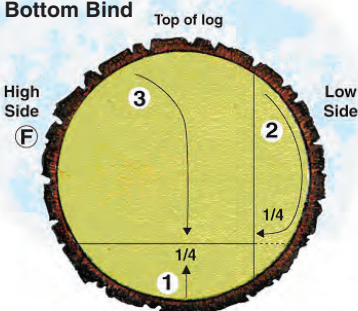


**SWP**

### Small Diameter Tree, Bottom Bind

- ① Underbuck from bottom, up to  $\frac{1}{4}$  tree diameter
- ② Reach over tree to low side and line up chainsaw with bottom cut. Make second cut from top to meet bottom cut.
- ③ Finish cut from the top and saw down to meet bottom cut.
- ④ Move to **escape route (16)** as the cut drops.

### Small Diameter Tree Bottom Bind

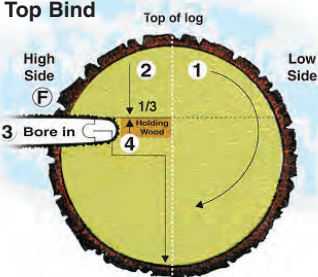


**SWP**

### Large Diameter Tree, Top Bind

- ① Standing on the high side, reach over and cut the low side to centre of tree.
- ② At the top, line up the bar with the first cut and cut from the top down to  $\frac{1}{3}$  tree diameter.
- ③ **Bore in (7)** a short way and down to create the holding wood; continue to bore into the centre of the tree and cut all the way down.
- ④ If the holding wood does not break, cut it from the bottom up.
- ⑤ Move to **escape route (16)** as the cut drops.

### Large Diameter Tree Top Bind

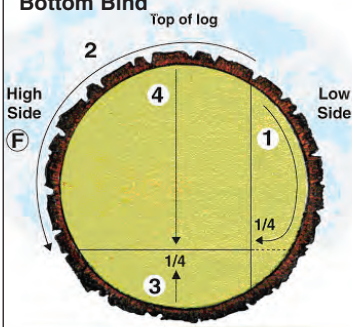


**SWP**

### Large Diameter Tree, Bottom Bind

- ① Stand on high side and reach over to low side, make a cut to  $\frac{1}{4}$  tree diameter
- ② At the top, line up the bar with the first cut and **scribe (18)** over the top and down  $\frac{3}{4}$  tree diameter. Wood can be under extreme tension, therefore, do not cut too deep when scribing.
- ③ From the bottom, line up the bar with the first cut, and underbuck from the bottom, up to  $\frac{1}{4}$  tree diameter
- ④ From the top, line up the bar with the first cut and saw down to meet the bottom cut.
- ⑤ Move to **escape route (16)** as the cut drops.

### Large Diameter Tree Bottom Bind



## 38 Safe Bucking Procedures Continued





## 40 Windthrow

Windthrow is the result of a major wind blowing down an exposed stand of timber. This results in several layers of blown down trees, often criss-crossed at various angles, interspersed with full or partial standing trees and damaged stems. A blown down tree may also be the first thing a faller has to deal with when opening or starting a new cutblock or right-of-way.

Planning, including detailed assessments of site and individual tree hazards, and a proper sequence of cuts, is critical for the safety of fallers. Alter **man-check procedures (9)** to reflect all local hazards.



### Hazards

- Cutting

close to the roots may cause rootwad to tumble forward, swing uphill or sideways, or stand up into its original position.

- Log could pivot and roll down hill, or swing uphill.
- Loose rocks on the rootwad could dislodge.

**Note:** Cutting near the rootwad on windthrown trees can result in rocking the chain due to excess dirt and rocks. This can increase the risk of injury of the faller as a dull chain decreases the cutting speed which can contribute to the logs splitting. Also, cuts can

wander resulting in the cuts not matching. Cutting with a dull chain causes fatigue which could result in the faller losing focus and loss of control of the chainsaw. Prior to cutting near the rootwad, use the axe to remove the bark, dirt and rocks. It is recommended to leave a short log length attached to the rootwad. Many companies accept this practice in their written procedures.



**SWP**

### Windthrow Bucking Procedures

- ① Have a spare chainsaw, axe, **wedges (8)** and other equipment readily available to overcome difficulties that may be encountered. Consider **blasting (33)** or other alternate means.
- ② Determine and establish **escape route(s) (16)**, i.e., cutting steps in surrounding logs or windfalls, brush out saplings.
- ③ Fall unstable standing trees, dangerous trees, partially blown down and wind-snapped trees.
- ④ Determine **safe bucking positions**.
  - When bucking in windthrow situations, it is recommended to use a longer bar. This allows the faller to stand further back for better visibility while cutting which reduces the risk of being struck by springing or dropping cuts.
  - Random log lengths must be considered whenever there is no safe position for a preferred length.
  - Fallers must never attempt a cut that would put them at risk or that can not be safely completed.
- ⑤ Plan a safe sequence of cuts.
- ⑥ After each cut, reassess to ensure it is safe to make the next cut as planned.
- ⑦ Complete bucking cuts.
- ⑧ Move to the **escape route (16)** as the cut drops.

**Reference Guide for  
Preferred Height of Backcuts Above  
Undercuts in Relation to Diameter Size**

The following measurements are based on the relationship of falling cuts detailed within the B.C. Faller Training Standard and varying over-sized diameter trees.

The visual appearance of falling cut construction for small, large and over-sized diameter trees must remain consistent. The varying heights of the anti-kickback step in this guide reflect this.

The weight loads and mechanical leverage that occur as the tree closes on the undercut multiplies as the tree diameter increases.

The anti-kickback step must follow the guide to ensure the safe falling of the tree.

The preferred dimensions for the construction of undercuts and backcuts are detailed within the B.C. Faller Training Standard and remain consistent regardless of tree diameter, with exceptions as noted in the B.C. Faller Training Standard for specific situations and species.

75% of the anti-kickback step across the face of the backcut must be within the preferred height tolerances to demonstrate acceptable workmanship.

**Note:**

The restriction of a 2" anti-kickback step on the Pie undercut in the B.C. Faller Training Standard is designed for frozen trees and deciduous trees that can break the holding wood prior to the tree closing on the undercut.

The use of a Pie undercut in trees 72" and larger, notably western red cedar can be employed using the same anti-kickback height measurements as found in the Humbolt and Swanson column from that diameter onwards, as long as the wood is not frozen.

When making use of a Pie undercut in frozen wood, reference the Conventional Undercut anti-kickback height column.

The action of the falling tree using a Swanson and Pie is similar in context, as the butt of the tree will slide off the face striking the ground before the top lands.

**Preferred Height of Backcuts Above  
Undercuts in Relation to Diameter Size**

Diameter of Tree	Height Difference
<b><i>Humbolt and Swanson Undercuts:</i></b>	
Up to 36 inches (3 ft)	¾ - 1 inches
48 - 60 inches (4 - 5 ft)	1 ½ inches
<b><i>Humbolt, Swanson and Pie Undercuts:</i></b>	
72 - 84 inches (6 - 7 ft)	2 inches
96 - 108 inches (8 - 9 ft)	3 inches
120 - 144 inches (10 - 12 ft)	4 inches
156 inches (13 ft ) and above	6 inches
<b><i>Conventional and Pie (frozen) Undercuts:</i></b>	
Up to 14 inches (1 ft 2 in)	¾ - 1 inches
16 - 36 inches (1 ft 4 in - 3 ft)	2 inches
48 - 60 inches (4 - 5 ft)	3 inches
72 - 84 inches (6 -7 ft)	4 inches
96 - 108 inches (8 - 9 ft)	6 inches
120 to 144 inches (10 - 12 ft)	8 inches
156 inches (13 ft) and above	12 inches

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